

**13<sup>th</sup> LSM 2012**  
7<sup>th</sup>-12<sup>th</sup> July, Geneva

# OpenNebula Open Souce Solution for DC Virtualization

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OpenNebula.org



# What is OpenNebula?

Multi-tenancy, Elasticity and Automatic Provision on Virtualized Environments

I'm using virtualization/cloud, and plan a private Cloud (BUT's)

Where do/did I put my web server VM?  
**Monitoring & Scheduling**

How do I provision a new VM?  
**Image Management & Context**

Who has access to to which features?  
**User & Role Management**

How do I create a new disk?  
**Storage**

How do I set up networking for a multitier service?  
**Network & VLANs**

Can I use hypervisor X?  
**Virtualization**

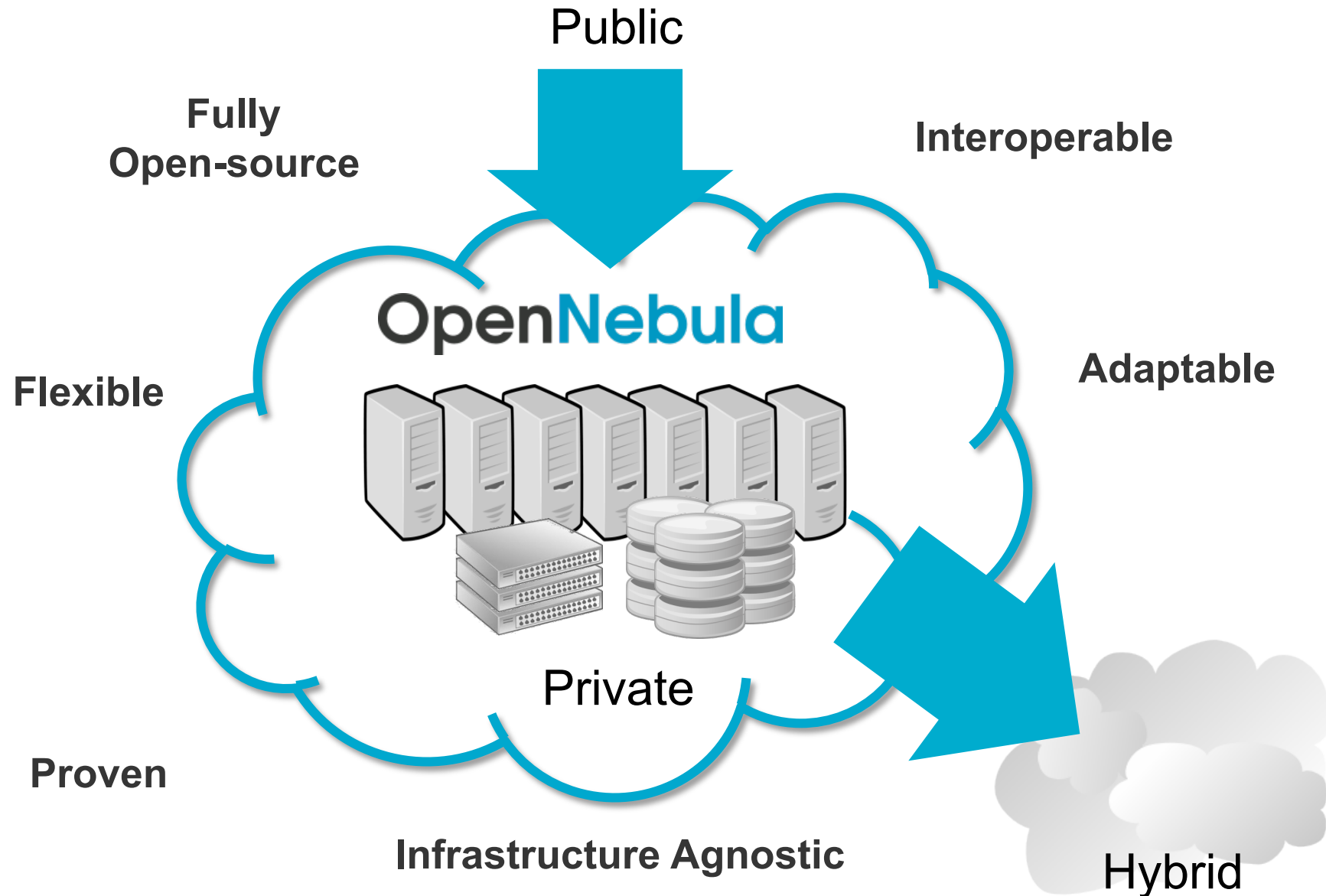
How can I manage the distributed infrastructure?  
**Interfaces & APIs**

**Uniform management layer that orchestrates multiple technologies**



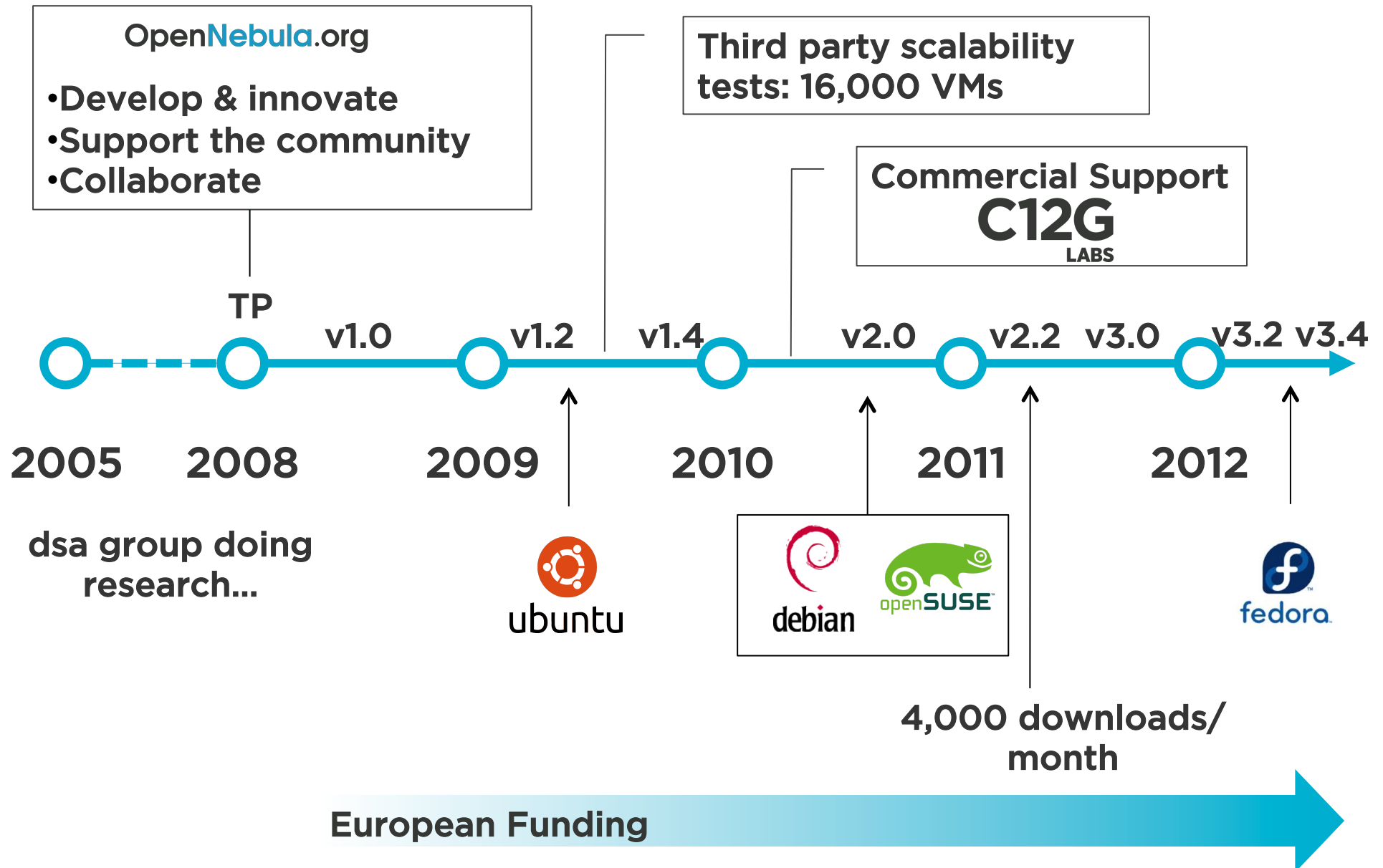
# OpenNebula

Open Cloud Solution for Building and Managing Virtualized Data Centers



# What is OpenNebula?

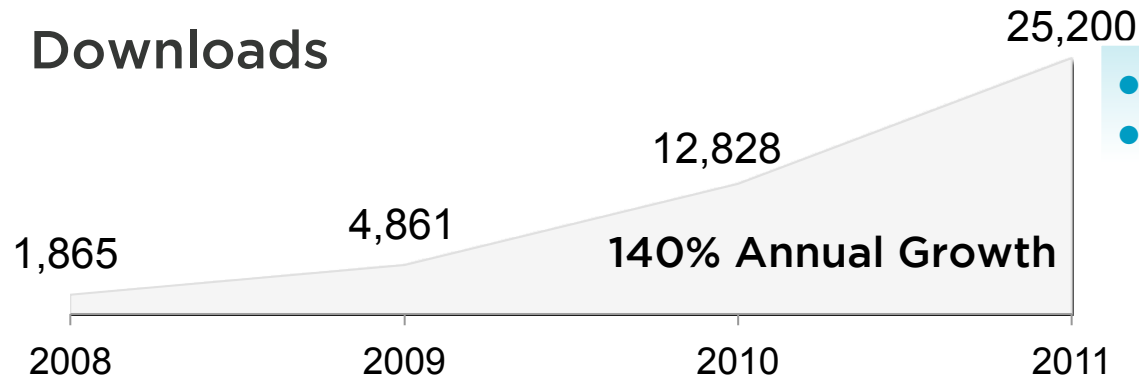
## A Project Aimed at Building the Industry Standard Open Cloud Management Tool



# What is OpenNebula?

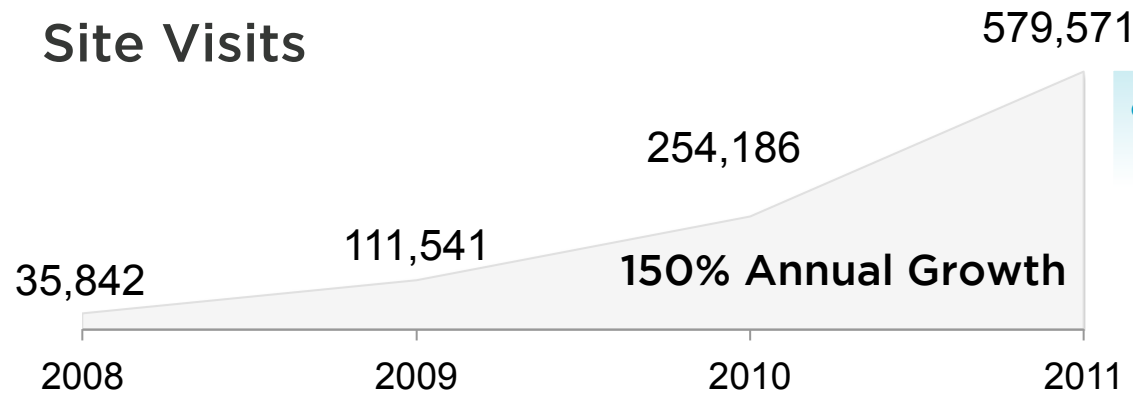
## A Quickly Growing Community More than Doubling Each Year

### Downloads



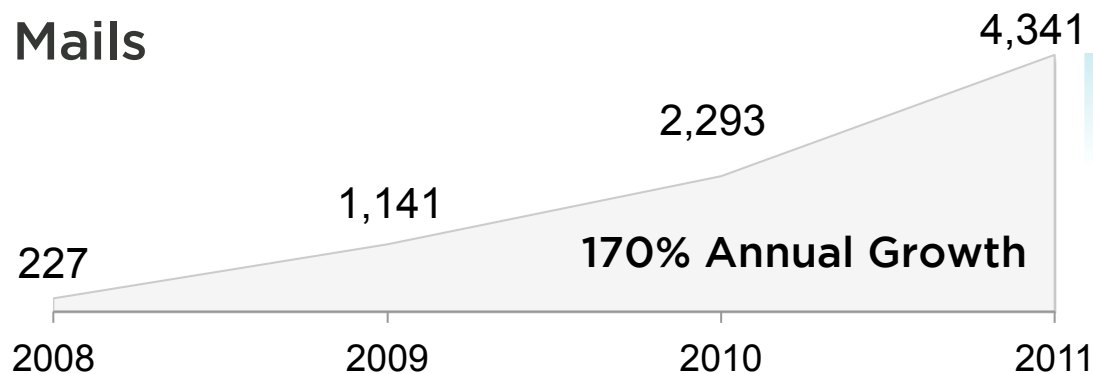
- 900 downloads in the last week
- Linux distro and code repo

### Site Visits



- 15,300 visits and 194,000 page views in the last week

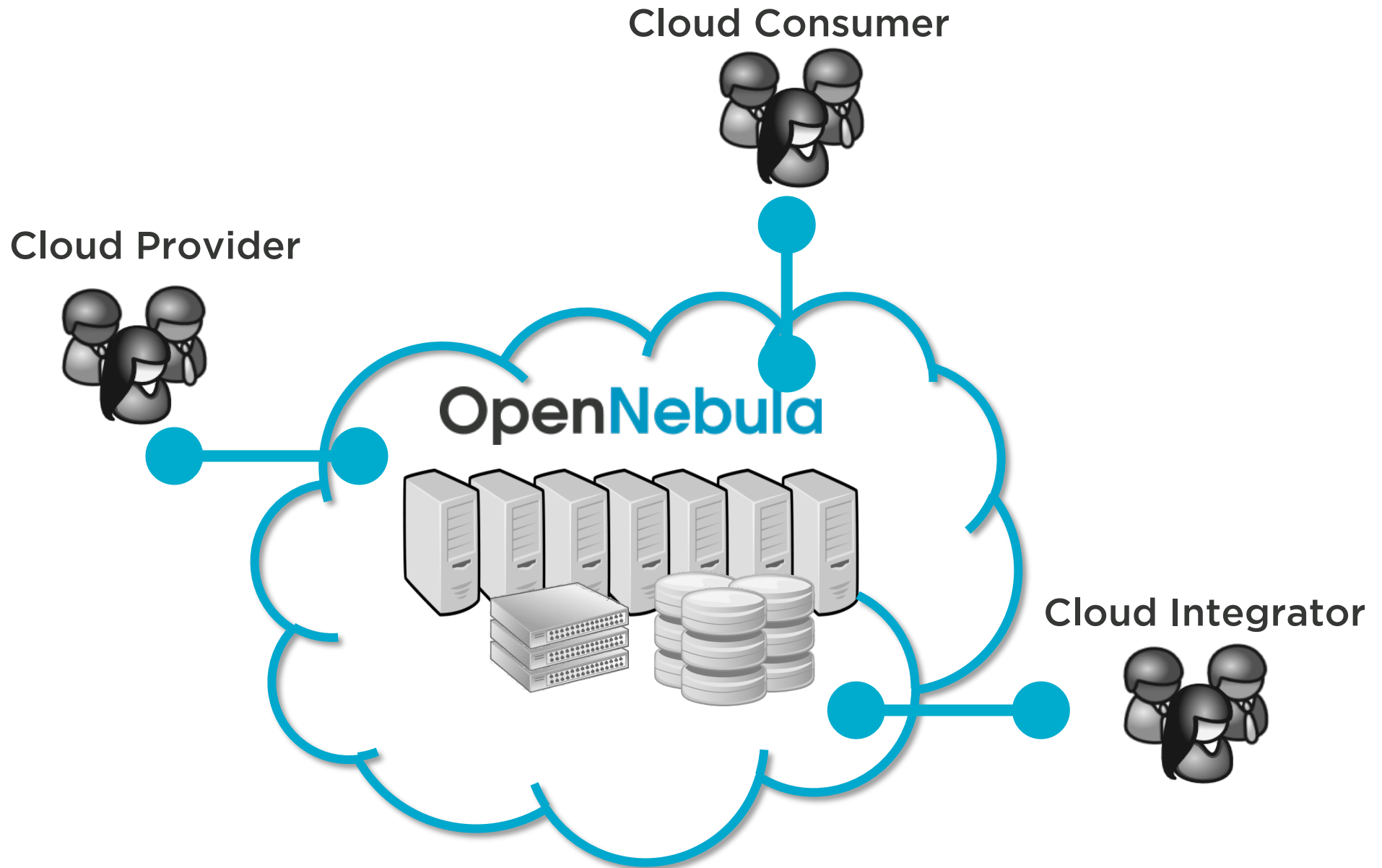
### Mails



- 800 registered users at present

Date: November 7<sup>th</sup>, 2011

## Different Aims and Needs

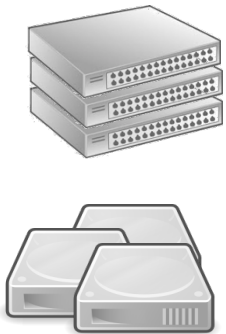


# The Cloud Consumer Perspective

## Setting up and Managing Virtual Infrastructure

### Network Management

- Network catalog management
- Public & elastic IPs
- Private isolated networks
- Simple firewall rules



### Remote Connection

- SSH
- VNC
- Remote desktop

### Usage Data

- Accounting info

### Storage Management

- Image catalog management
- Prepared on-site & uploaded
- Pre-defined appliances
- OS and Data types (persistent)

### VM Management

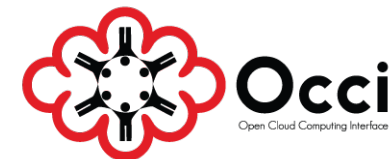
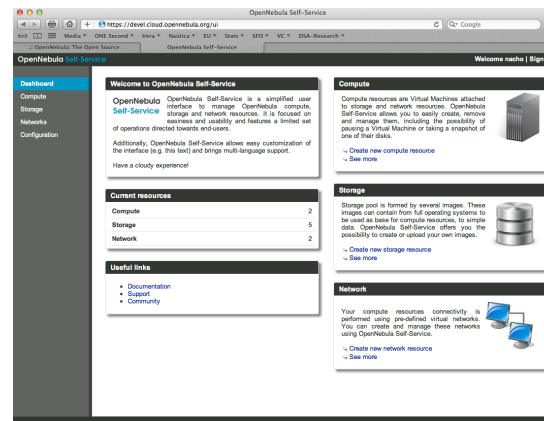
- VM template catalog
- Life-cycle management
- Contextualization



## How Can I Manage my Virtual Infrastructure?

... standards (*de facto* and *de jure*) Cloud APIs to leverage existing ecosystems and ensure portability across providers and **self-service portal** ....

## OpenNebula Self-Service



OpenNebula

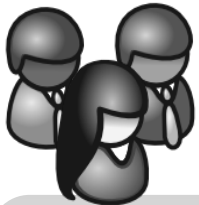


# The Cloud Provider Perspective

## What are the Main Components to Build a Cloud Infrastructure?

### Instance Networks

- Guests
- Public and private networks

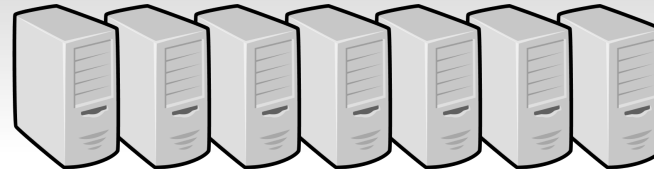


### Front-end

- Authentication
- Authorization
- ACLs, roles, groups...
- Accounting
- Logging
- Resource quotas

### Service Networks

- Monitoring, control...
- Live migration...
- Storage access...



### Hosts

- Multiple hypervisors
- Up to 500 hosts
- Automatic failover and HA
- Resource pools
- Automatic resource allocation



### Datastores

- VM image storage
- Multiple datastores
- Heterogeneous configurations
- Shared or non-shared

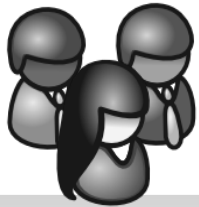


# The Cloud Provider Perspective

## Broad Commodity and Enterprise Platform Support

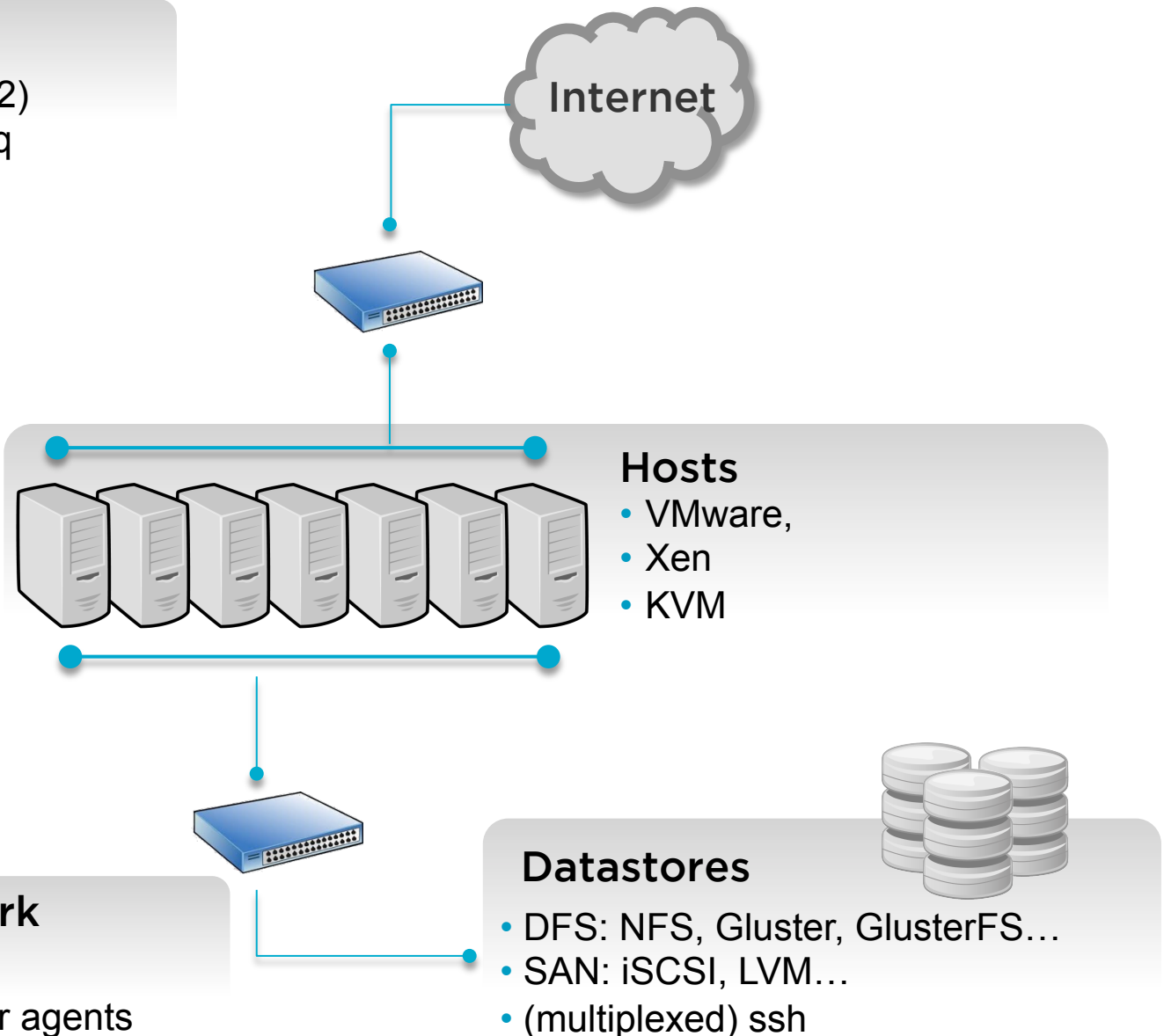
### Instance Network

- VLAN per user (layer2)
- Open vSwitch, 802.1q
- Ebttables



### Front-end

- X509, LDAP, ssh keys
- ACLs, roles, groups...



### Hosts

- VMware,
- Xen
- KVM

### Service Network

- Ganglia/Nagios
- Additional monitor agents

### Datastores

- DFS: NFS, Gluster, GlusterFS...
- SAN: iSCSI, LVM...
- (multiplexed) ssh

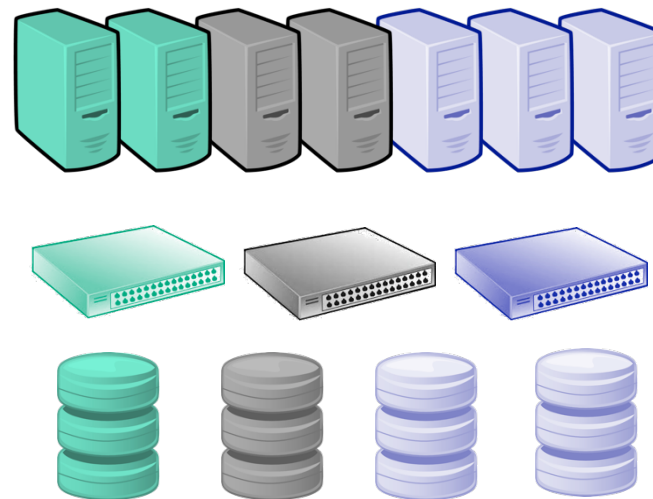


# The Cloud Provider Perspective

## Clustering the Physical Resources

### Clusters

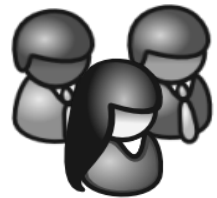
- Pools of hosts that share datastores and networks
- Used for load balancing, high availability, and high performance computing



### Multiple Datastores per Cluster

- Balance I/O operations between storage servers
- Define different SLA policies (e.g. backup) and performance features for different VM types or users

## Centralized Management of Multiple OpenNebula Instances (Zones)



Cloud Consumer

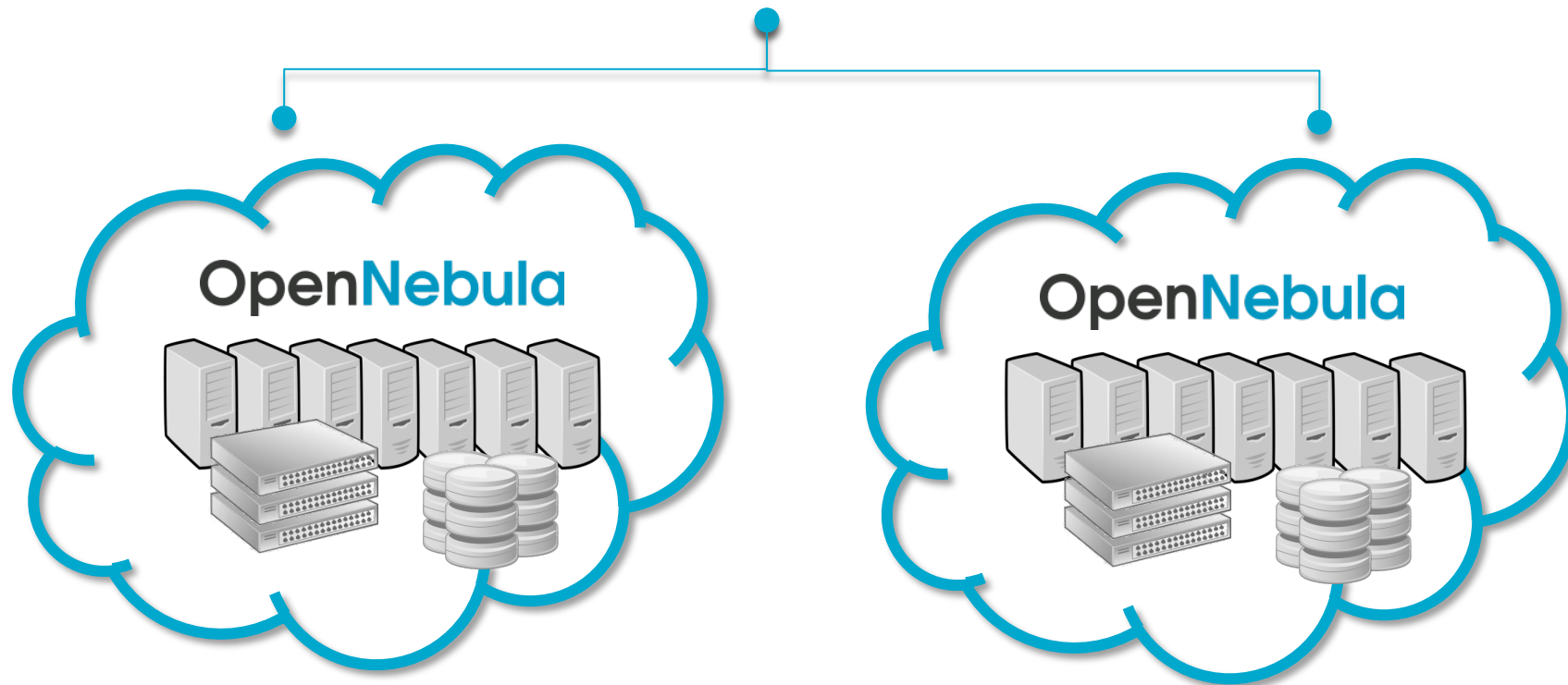


### oZones Server

- Portal
- Cloud API (EC2, OCCl)
- Global AuthN

### Federation of Clouds

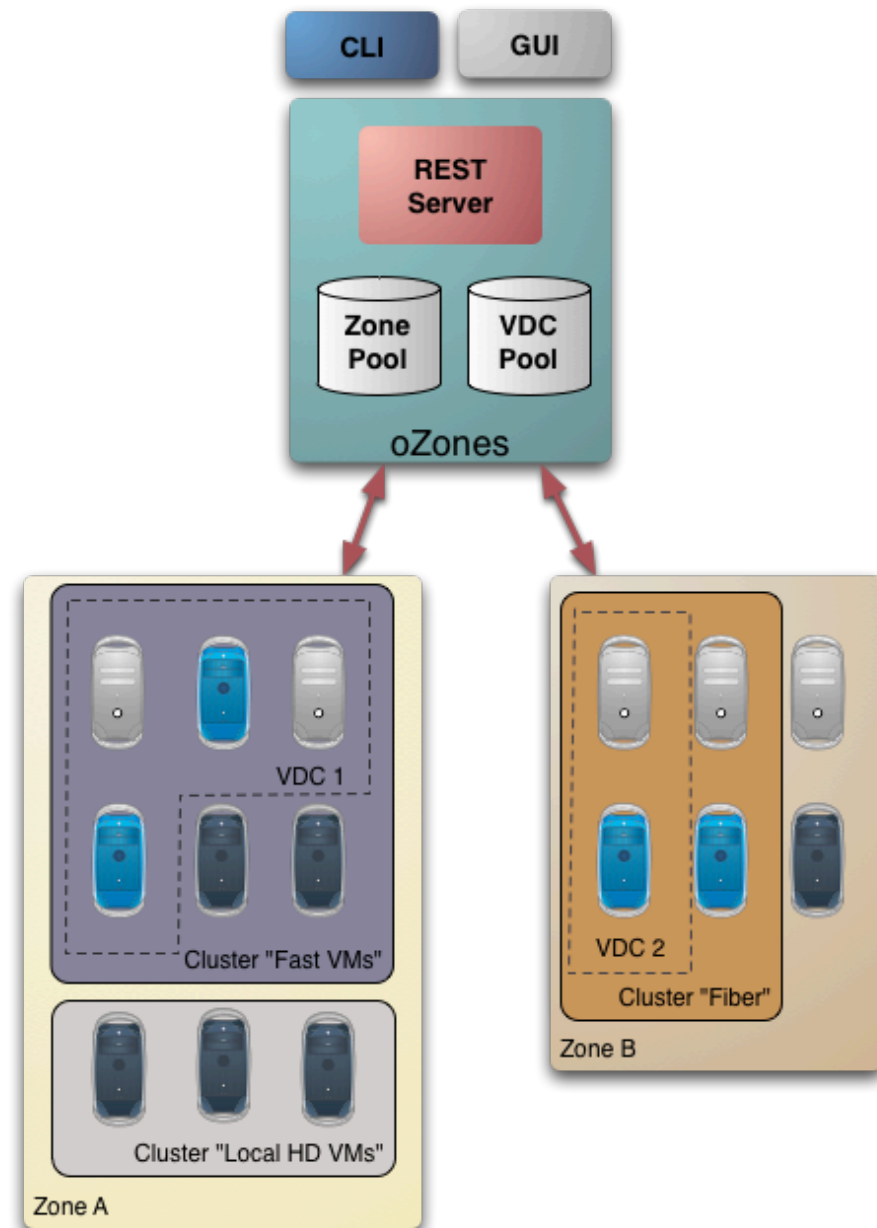
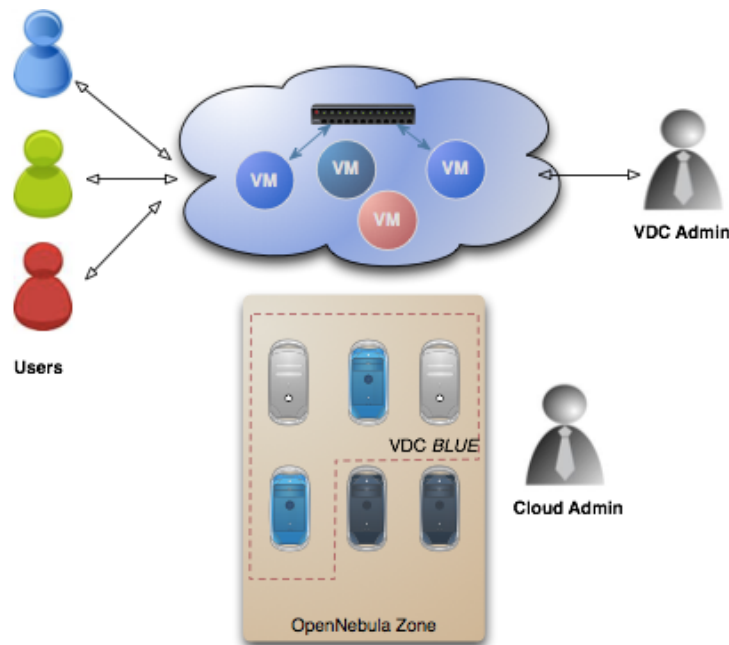
- Multi-tier architecture
- Scalability
- Isolation
- Multiple-site support



## On-demand Provision of Virtual Data Centers

### Virtual Private Cloud Computing

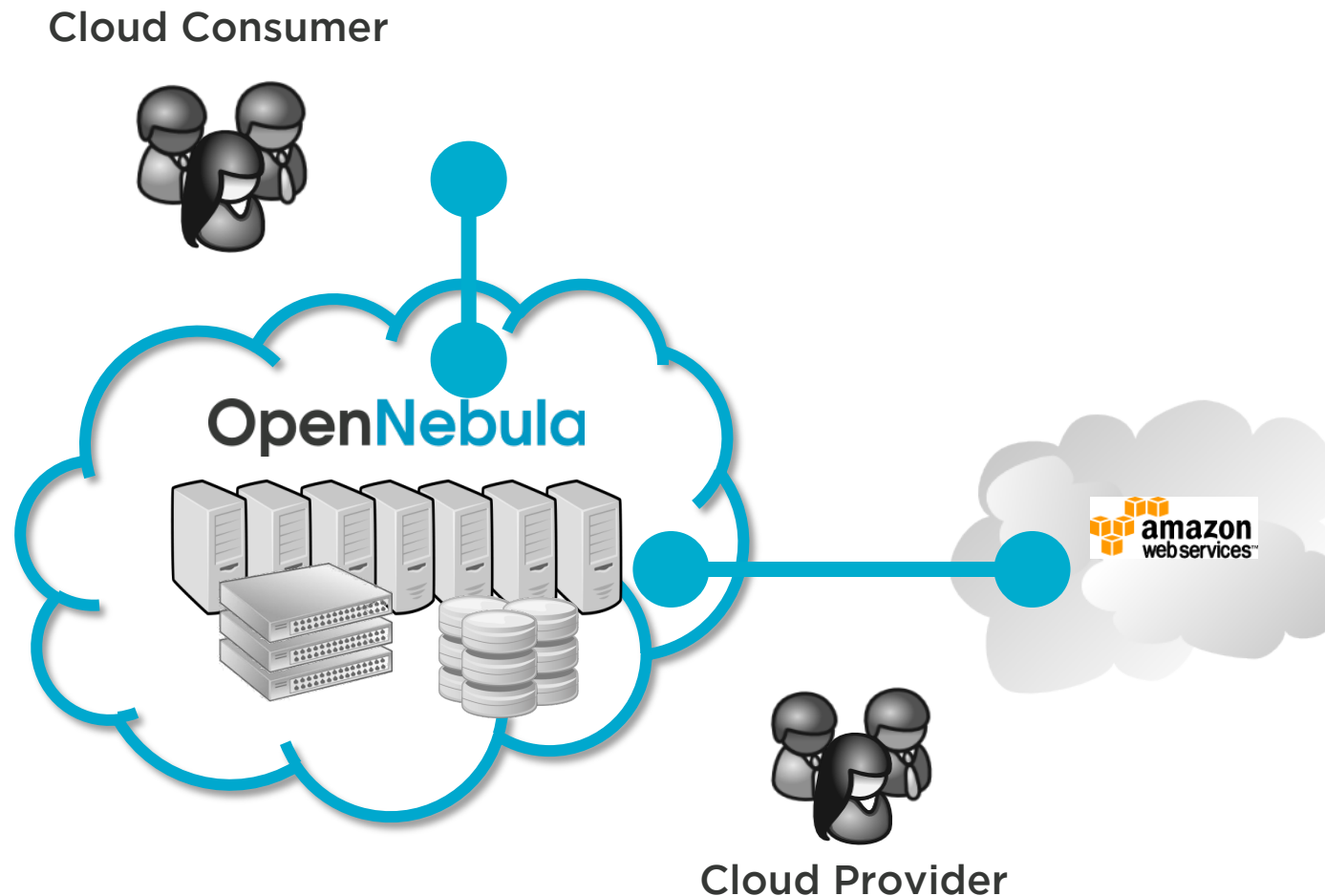
- Typical scenario in large organizations and cloud providers
- On-demand provision of fully-configurable and isolated VDC with full control and capacity to administer its users and resources



# The Cloud Provider Perspective

## Hybrid Cloud Computing

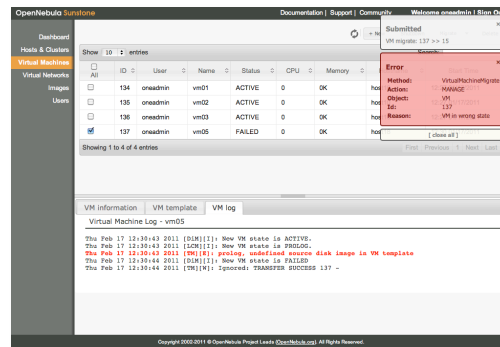
- Extension of the local private infrastructure with resources from remote clouds
- Cloudbursting to meet peak or fluctuating demands



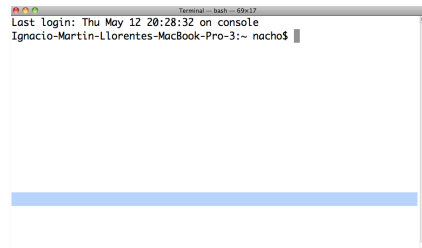
## How Can I Operate my Cloud Infrastructure?

... programming APIs (create new tools and integrate), web interfaces (simplify operation), and command lined interface (create scripts)...

### OpenNebula Sunstone



### CLI



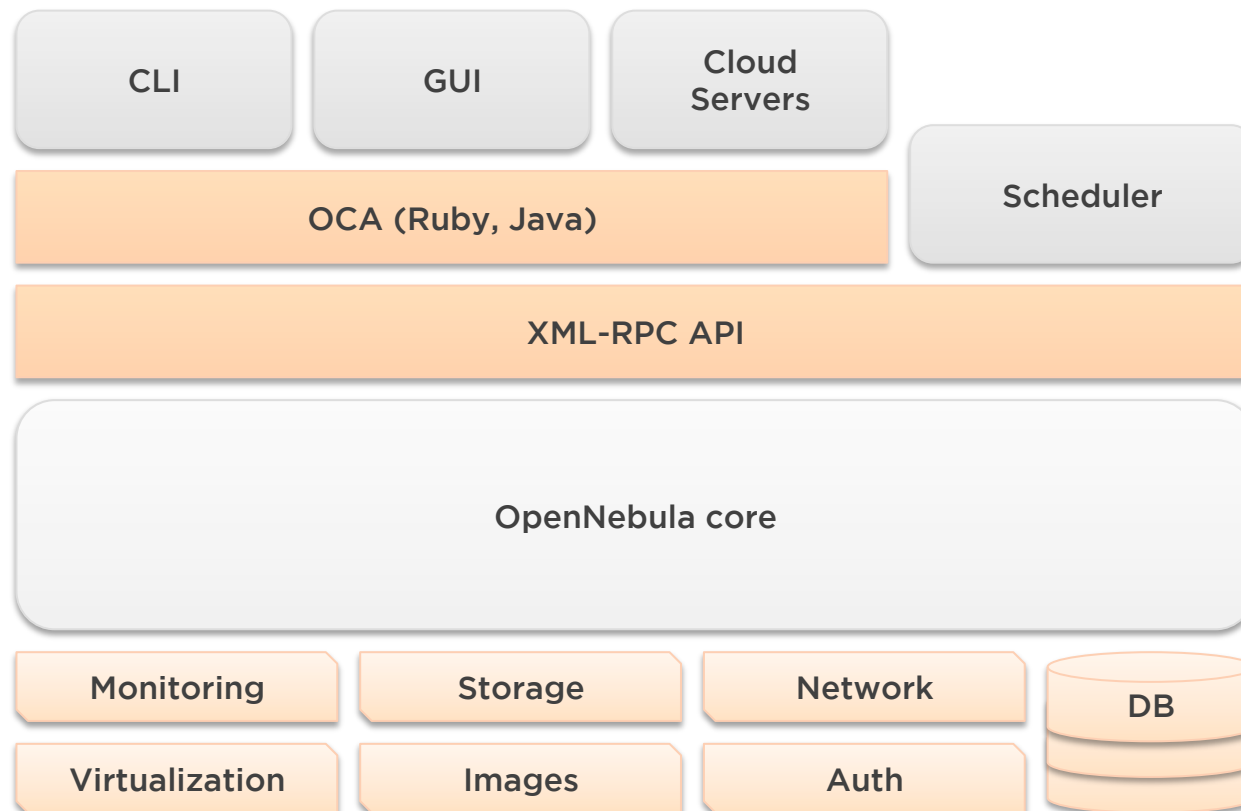
**API**

- XML-RPC
- OCA (Ruby, Java, Python)

## OpenNebula

## The Cloud Integrator Perspective

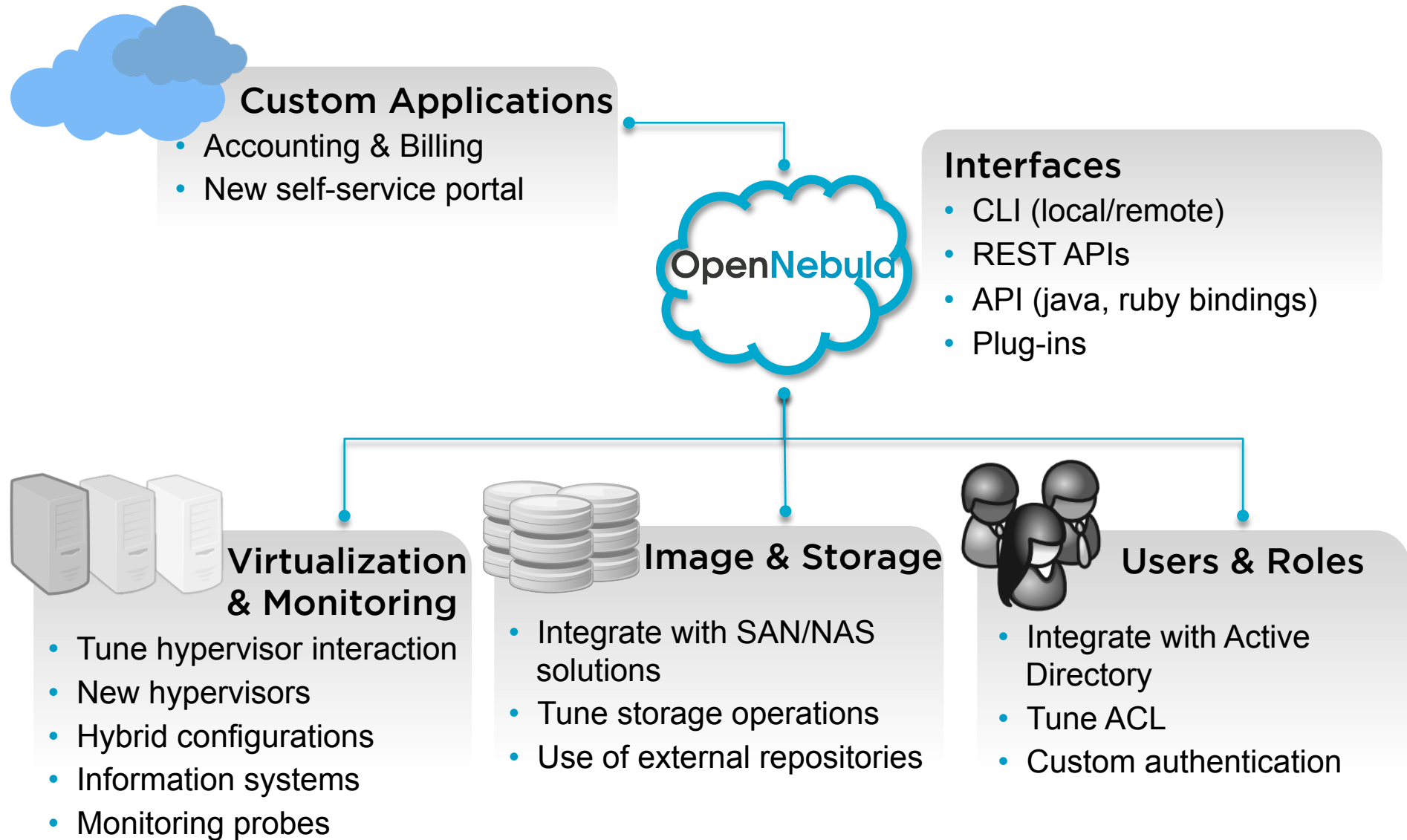
... **truly open** (fully open-source, Apache license) and **adaptable** (modular and extensible)... because no two data centers are the same





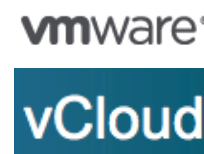
# The Cloud Integrator Perspective

## Seamless Integration with Existing Applications and Services

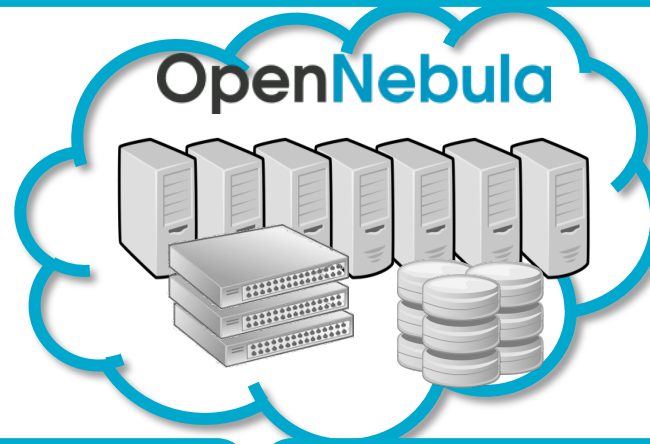


## The Ecosystem

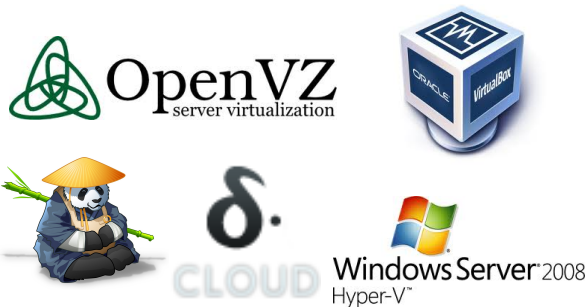
### Standards



### Adapters



### Virtualization Drivers



### Configuration



### Storage



# Who Uses OpenNebula?

## Open Cloud Enabler in the ICT Industry

### Enabling Hosting Companies and Telcos to Offer Cloud Services



### Enabling Technology Companies to Offer Cloud Products



### Enabling Service Companies to Offer Cloud Consulting and Integration



# Who Uses OpenNebula?

## Open Cloud Enabler for Building and Operating Virtualized Data Centers

### Industry



### Supercomputing Centers



### Research Centers



# Who Uses OpenNebula?

## Open Cloud Enabler for Building and Research and Innovation

### Distributed Computing Infrastructures



### Research Projects



We Will Be Happy to Answer Any Question

The screenshot shows the OpenNebula.org website homepage. At the top right is the logo "OpenNebula.org" with the tagline "The Open Source Solution for Data Center Virtualization". Below the logo is a navigation bar with links: Home, About, Documentation, Software, Support, Community, Cloud, Dev, Blog, Wiki. The main content area features a large heading "Leading Cloud Management Solution" with the subtitle "and it's free, fully open-source". Below this, it states "More than 4,000 Downloads per Month", "Most Powerful Platform for Enterprise Data Center Innovation", and "Vendor-agnostic Open Alternative to Proprietary Cloud Solutions". A paragraph describes OpenNebula as the "open-source industry standard for data center virtualization". To the right, there is a sidebar with a list of links: "About OpenNebula.org", "What is OpenNebula?", "Why OpenNebula?", "Who is Behind?", "What are its Features?", "How Can I Try it?", and "How Can I Download it?". Below this is a section titled "Who is Using OpenNebula?". Further down, there are three columns of features: "Open" (Fully open-source), "Adaptable" (Customizable to fit into your own data center), and "Proven" (Many massive scale production deployments). Below these are "Powerful" (Advanced enterprise class functionality), "Interoperable" (Most popular cloud APIs and standard-based), and "No Lock-in" (Platform independent on major hypervisors). At the bottom, it says "Install OpenNebula from the Official Repo of your favourite Linux Distro." and shows logos for debian, openSUSE, ubuntu, and a logo for "coming soon". On the right side, there is a section for "OpenNebula 3" with a play button icon and a list of features: "Advanced multi-tenancy", "Virtual data centers", and "Multiple zones", followed by "... and many more things" and a "Download now" link.