

CentOS Dojo
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Cloud environment with CentOS, OpenNebula and KVM

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C12G
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OpenNebula.org

- What is OpenNebula?
- Why CentOS and OpenNebula?
- Building a Cloud from scratch in 15 minutes
- Optimizing KVM

What is OpenNebula?

IaaS Cloud Computing Tool for Managing a Data Center's Virtual Infrastructure

Data Center Virtualization Manager

- Open-source Apache license
- Interoperable, based on standards
- Adaptable

Private Clouds

- Virtualize your on-premise infrastructure

Public Clouds

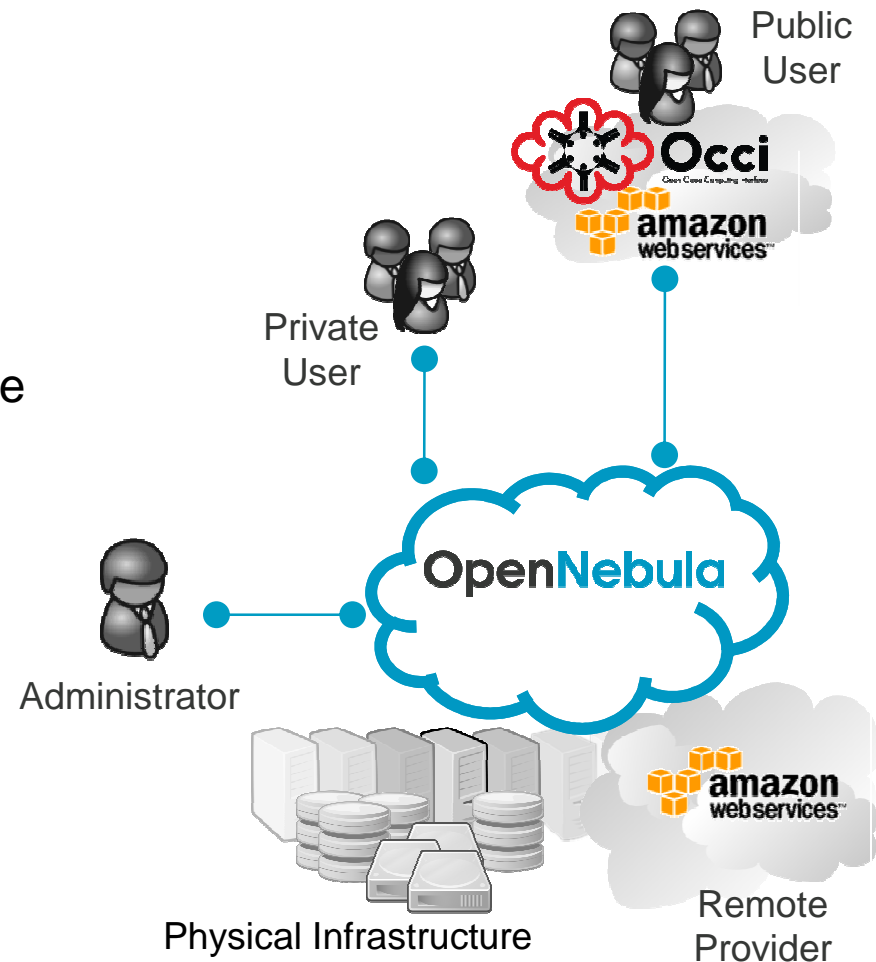
- Expose standard cloud interfaces

Hybrid Clouds

- Extend your private cloud with resources from a remote cloud provider

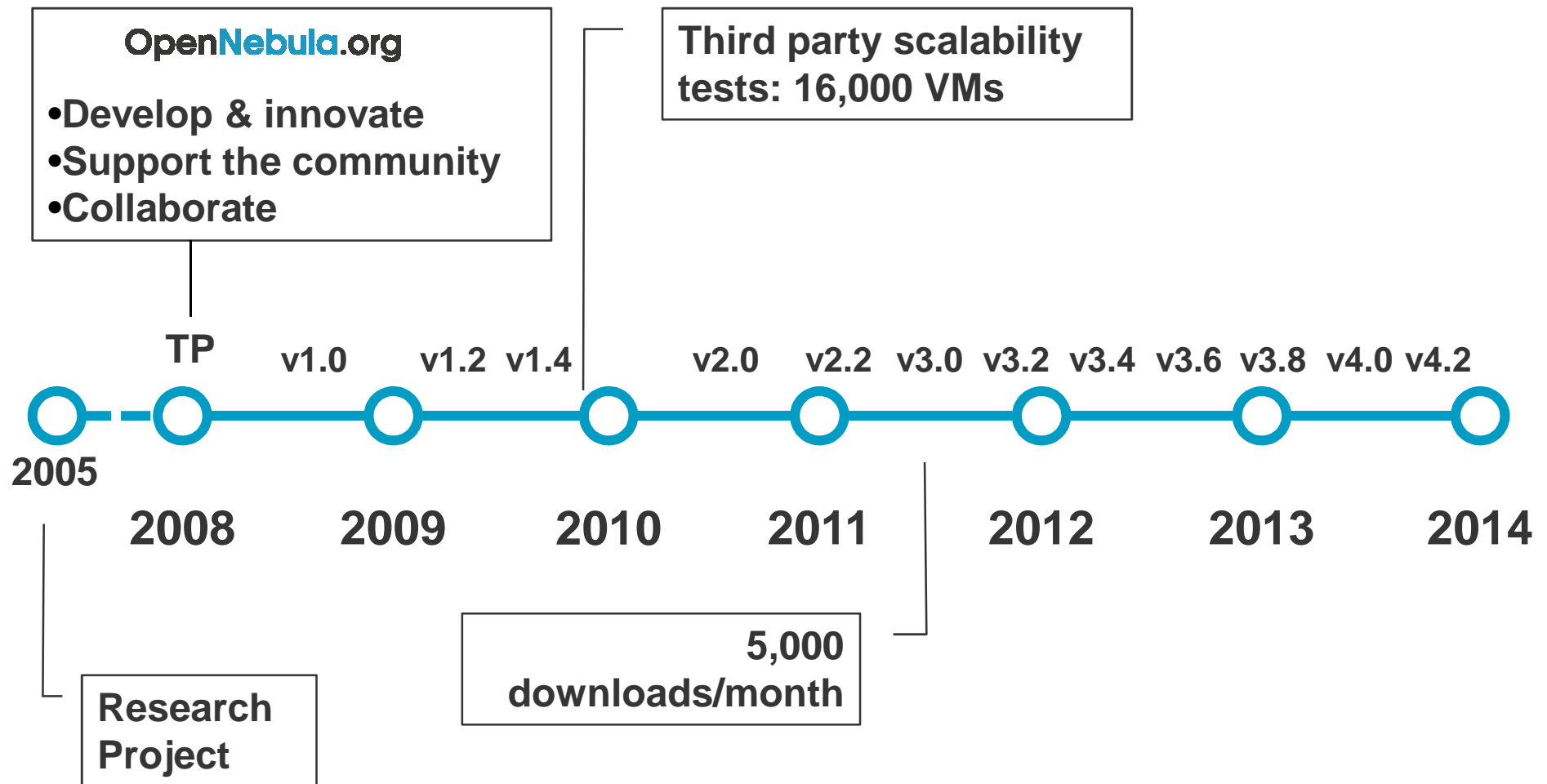
Ready for end-users

- Advanced user management
- CLI and Web Interface



What is OpenNebula?

Rigorously Tested, Matured Through Vibrant Community and Many Release Cycles



What is OpenNebula?

Widely Used to Build Enterprise Private Clouds in Medium and Large Data Centers

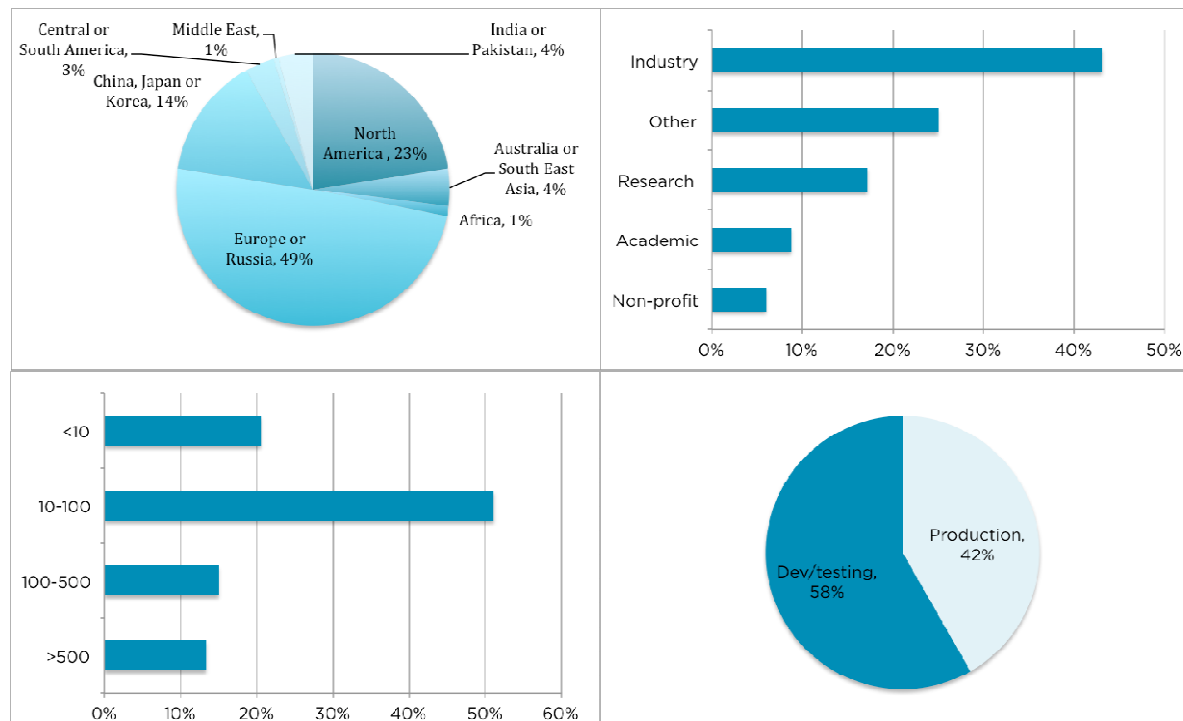
Reference Users



中国移动通信
CHINA MOBILE



Survey Q2/Q3 2012 (2,500 users <http://c12g.com/resources/survey/>)



The OpenNebula Model

- **Adaptable**: Integration capabilities to fit into any data center
- **Enterprise-ready**: Upgrade process and **commercial support**
- **No Lock-in**: Infrastructure and platform independent
- **Light**: Efficient & simple
- **Proven**: Rigorously tested, mature and widely used
- **Scalable**: single instance & multi-tier architectures
- **Interoperable**: rich set of API's & Interfaces
- **Open Source**: Apache License v2

CentOS



- Long production cycles
- Mature, tested code base
- Widespread user base (Hosting, Cloud, voip, HPC...)
- Xen, xen, xen...
- Hypervisor support, ARM, automation, etc...

Disclaimer: this list has been shamelessly ripped off from Karanbir Singh's Presentation @ OpenNebulaConf:

<http://www.slideshare.net/NETWAYS/cent-os-and-opennebula-karanbir-singh>

OpenNebula in CentOS

- Very mature OpenNebula package
- I love opennebula-node-kvm
- I will love opennebula-node-xen
- Included in the default repos
- yum install centos-release-opennebula
- yum install opennebula-server opennebula-sunstone

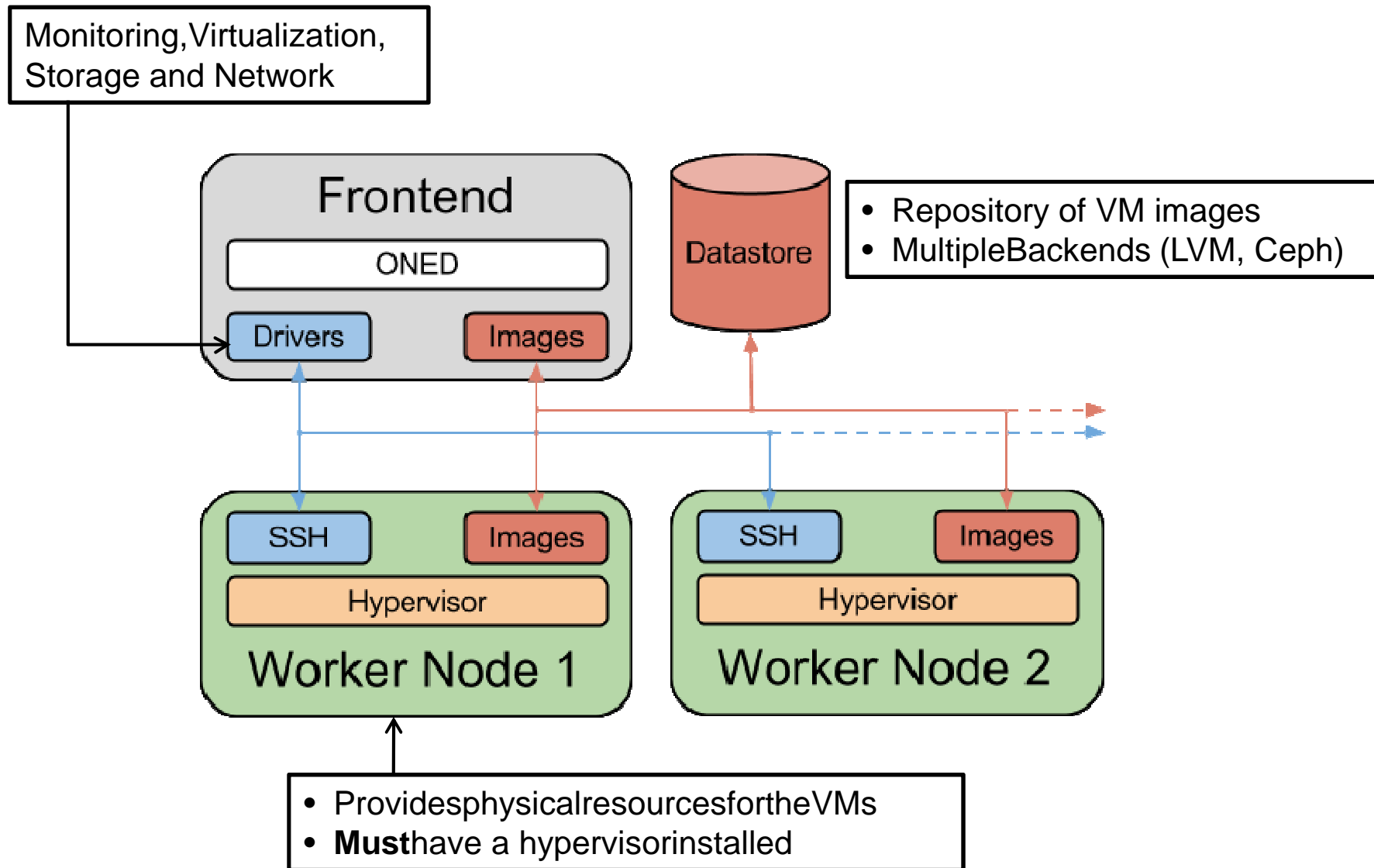
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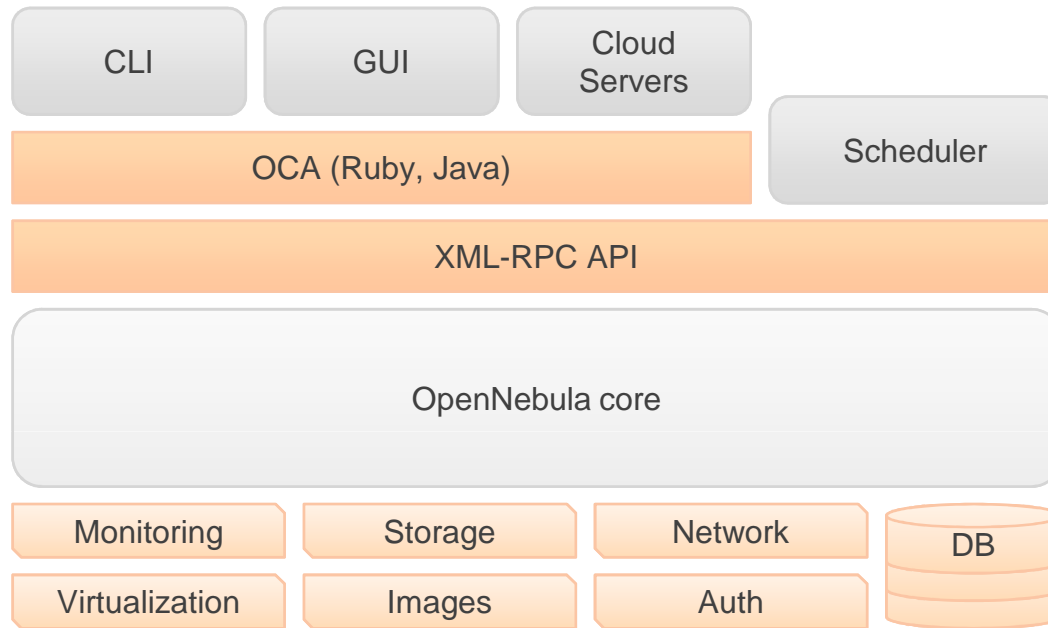
Our Plan

- Set-up a DHCP and TFTP server (dnsmasq)
- Get pxelinux images (syslinux)
- Write a PXE cfg file
- Mirror the **CentOS base** and **opennebula** repos
- Write a Kickstart file
- Install CentOS in a laptop in < 10 minutes

Basic OpenNebula Deployment

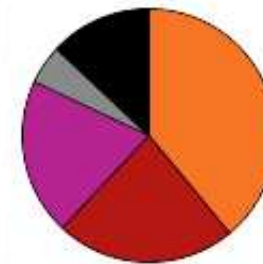


OpenNebula Architecture - Infrastructure Agnostic and Highly Customizable



Languages

C++	39%
Ruby	23%
JavaScript	20%
shell script	5%
Other	13%



Sunstone

The screenshot displays the OpenNebula Sunstone dashboard. On the left is a navigation sidebar with categories: Dashboard, System (Users, Groups, ACLs), Virtual Resources (Virtual Machines, Templates, Images, Files & Kernels), Infrastructure (Clusters, Hosts, Datastores, Virtual Networks), and Marketplace. The main dashboard area is titled 'Dashboard' and shows the user 'oneadmin'. It features several summary cards: Storage (2 IMAGES, 2GB USED), Users (4 USERS, 2 GROUPS), Network (3 VNETS, 7 USED IPs), Hosts (1 TOTAL, 1 ON, 0 OFF, 0 ERROR), and Virtual Machines (99 TOTAL, 17 ACTIVE, 82 PENDING, 0 FAILED). Below these are four line graphs: CPU usage (0-1000), MEMORY usage (0KB-19.1GB), NET DOWNLOAD SPEED (0B/s-4B/s), and NET UPLOAD SPEED (0B/s-1.5B/s). A legend at the bottom indicates 'Allocated' (blue), 'Real' (grey), and 'Total' (red) resource usage.

Our Plan

- Install OpenNebula and create:
 - a Compute host (localhost)
 - a Network
 - an Image
- Create a Virtual Machine which dynamically installs apache
- Logs
- Contextualization
- Virtual Machine actions

From the ground up

- Human beings do not understand qemu-kvm syntax (maybe Fabrice Bellard...)
- We need Libvirt
- Other tools: virt-manager, virt-install, qemu-img, virt-alignment-scan
- Drivers: **virtio**
 - Huge performance gain
 - No emulation
 - Cooperation with the hypervisor
 - Integrated into the Linux kernel

Image Backends

- Regular file (Raw)
 - Large
- Qcow2
 - Snapshots
 - Additional layer → less performance
- LVM
 - Block Device
- Cache

Writethrough

- host page on, guest disk write cache off

Writeback

- host page on, guest disk write cache on
- Good overall I/O Performance

None

- host page off, guest disk write cache on
- Good write performance

CPU and Memory

- CGROUPS
 - Limit, account and isolate resource usage
- CPU model
 - Subset of features
 - Nested Virtualization
 - `/usr/share/libvirt/cpu_map.xml`
- Kernel Samepage Merging (KSM)
 - Combines memory private pages
 - Useful for similar VMs
 - Increases VM density
 - Enabled by default

Networking

- MacVTap (direct)
 - Connect directly to physical interface
 - Doesn't allow connection host ⇔ vm
 - Not recommended
- Bridged Networking
 - Plugs a VM interface to a Linux bridge
 - Disable STP
 - Kernel's networking stack: NAT, iptables...
 - **Recommended**
- Open vSwitch

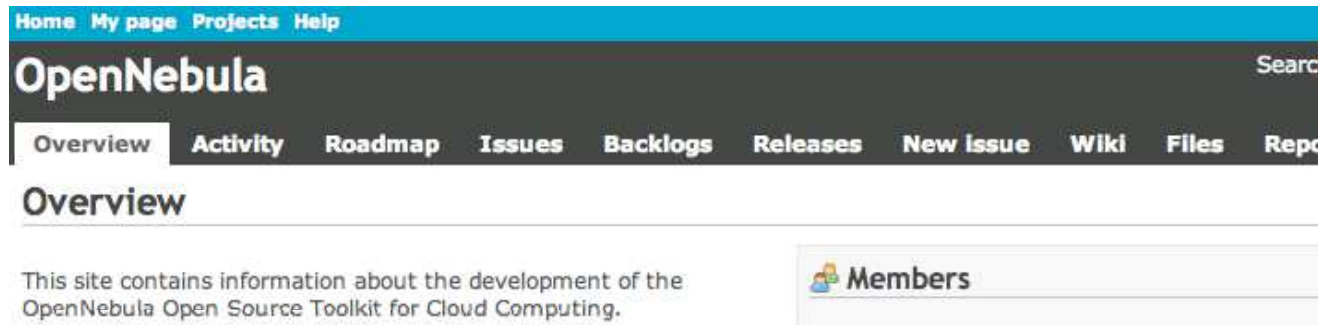
Desktop Sharing

- VLC
 - Keymap (or you will go crazy)
- SPICE
 - QXL driver (guest OS)
 - Printers
 - USB mass-storage
 - Audio

How to contribute

🔗 Join our mailing list (users and dev)

🔗 Follow the development at **dev.opennebula.org**



Add-ons

Extensions (tools, interfaces or drivers) that enlarge the capabilities of OpenNebula.

You can contribute code to any of these add-ons, make a new add-on, or join the discussions in the development mailing list.

IRC Channel

🔗 **#opennebula** on **irc.freenode.net**

Questions?

We Will Be Happy to Answer any Question

TL; DR: OpenNebula is awesome, go check it out!



@opennebula

