

**FOSDEM 2012**

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# The OpenNebula Project

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## Acknowledgments



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*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

## Hybrid Clouds

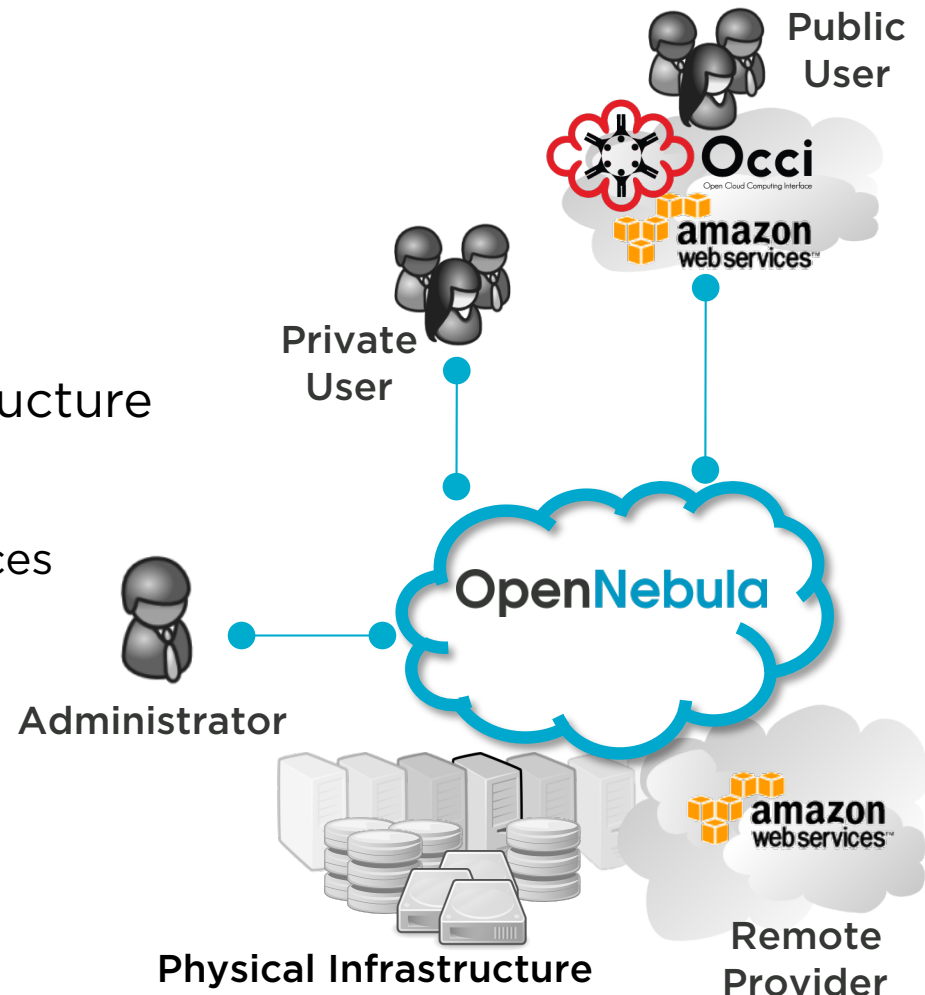
- Extend your private cloud with resources from a remote cloud provider

## Public Clouds

- Expose standard cloud interfaces

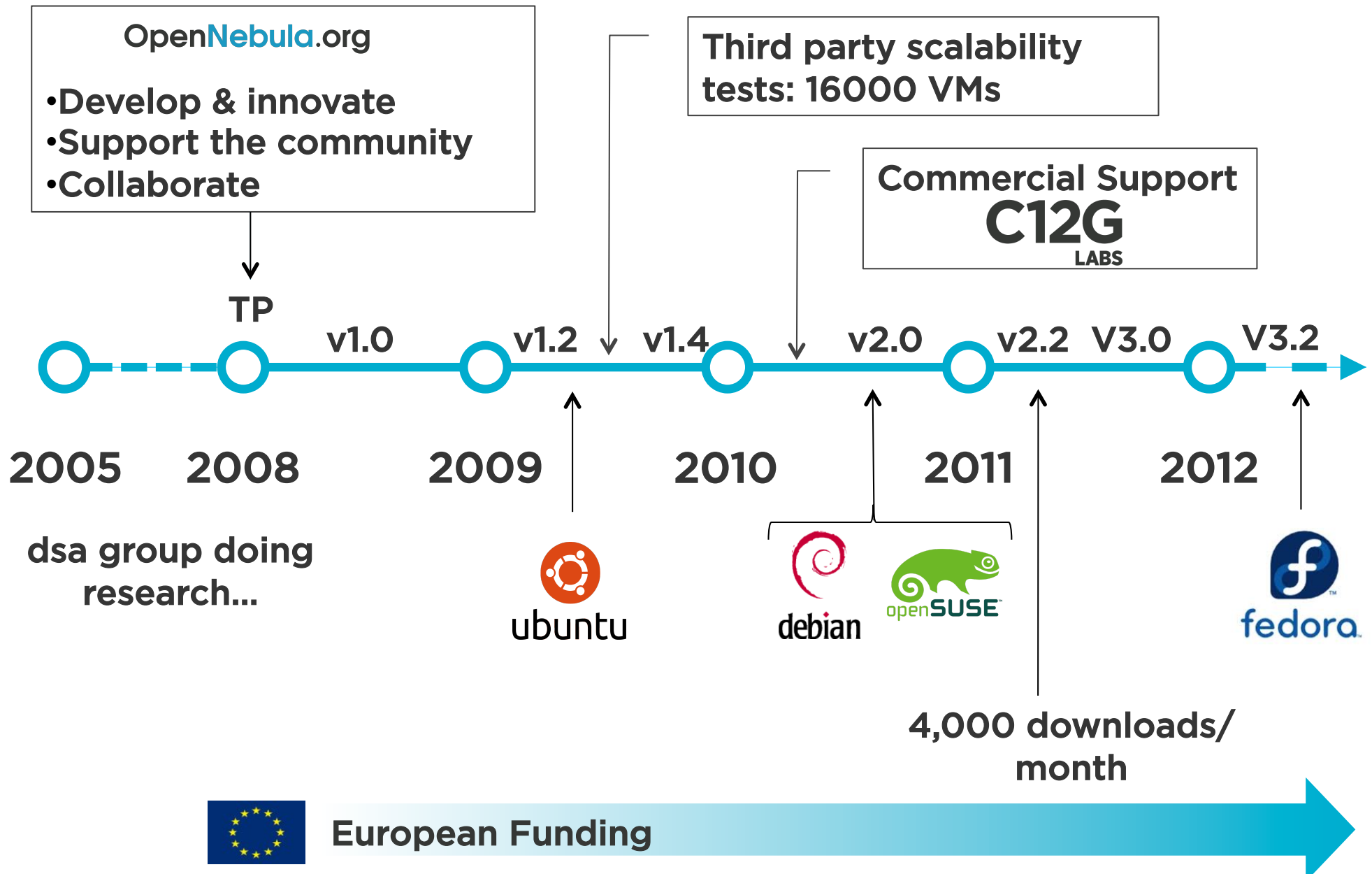
## Ready for end-users

- Advanced user management
- CLI and Web Interface



# What is OpenNebula?

*Building the Industry Standard Open Source Cloud Computing Tool*

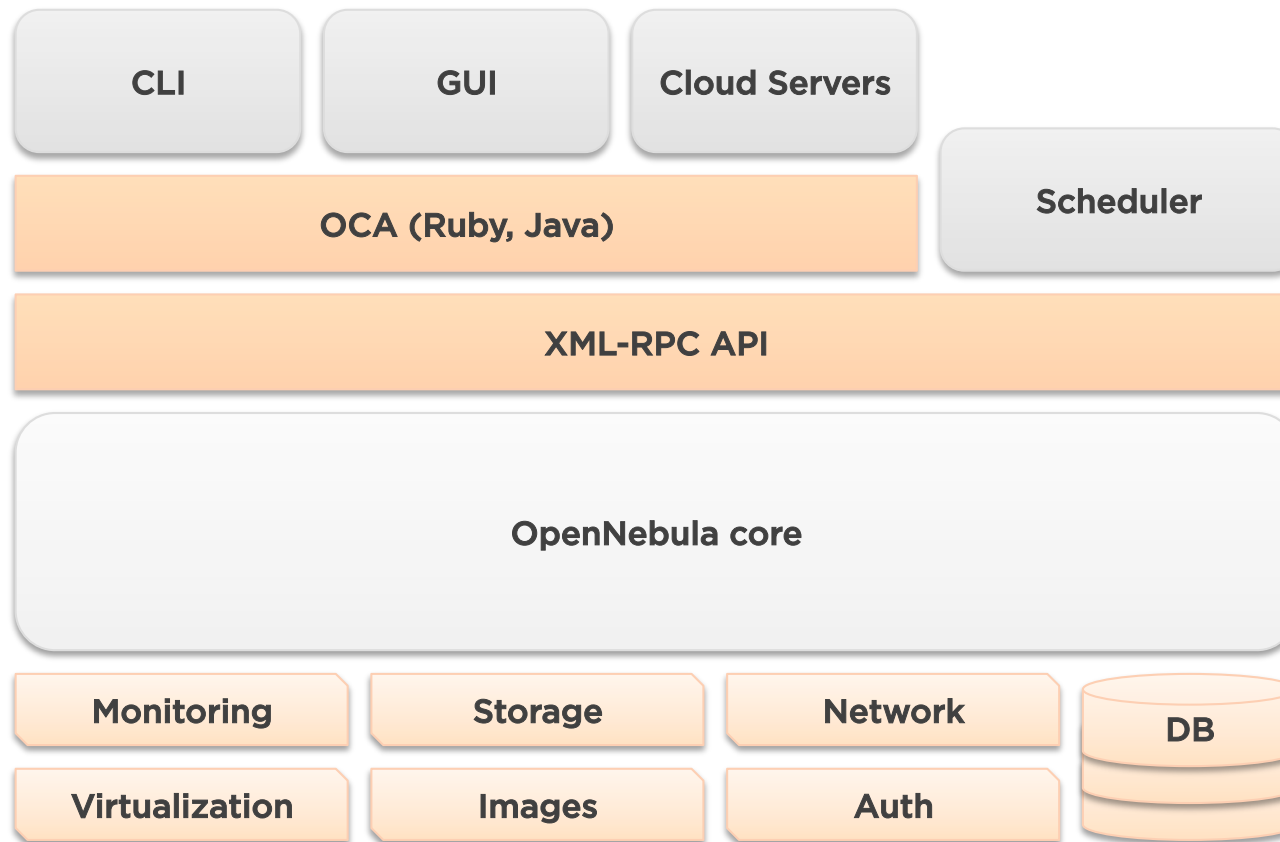


## *A Really Quick Demo*

- Let's take a look at Sunstone!



## *A Peek under the Hood*



### Design Principles

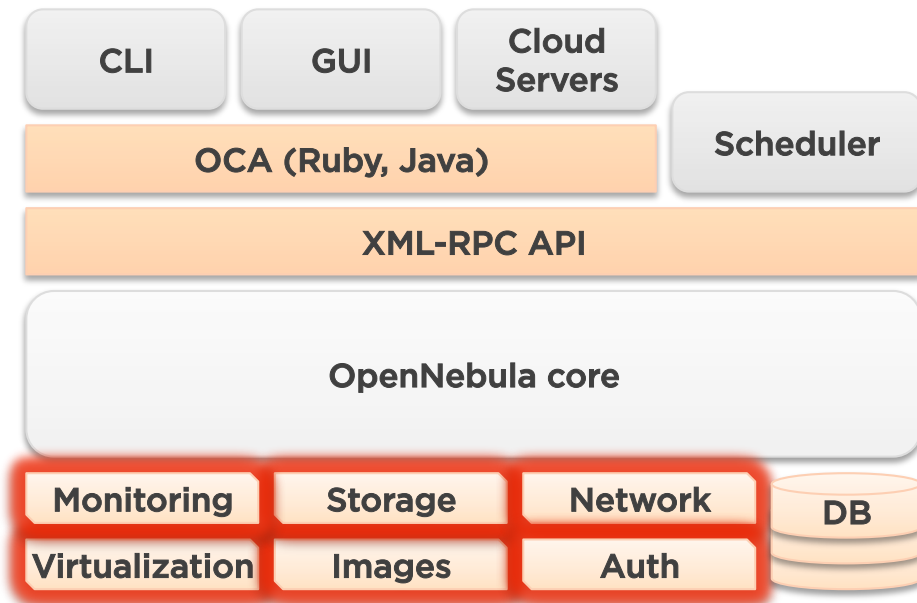
- Modularity
- Lightness
- Openness

### Languages

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



## *How to Develop Drivers*



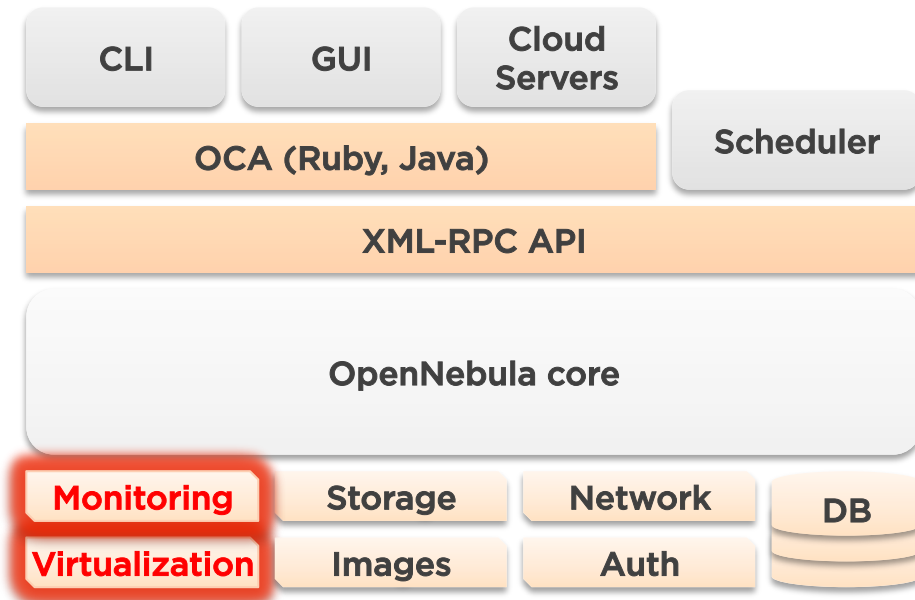
## Drivers

- Small scripts for each action
- Any language (Shell, Ruby...)
- Different drivers can co-exist in heterogeneous environments

Easy to adapt

Easy to create new ones

## How to Develop Drivers



## Virtualization Drivers

- Translate the OpenNebula VM life-cycle management into specific hypervisor operations

## Monitoring Drivers

- Gather information about the physical host and hypervisor status

## Hybrid Cloud Drivers

- Interact with an external provider instead of a hypervisor



## How to Develop Drivers

### Virtualization Driver Example:

Hypervisor: Xen

Action: migrate

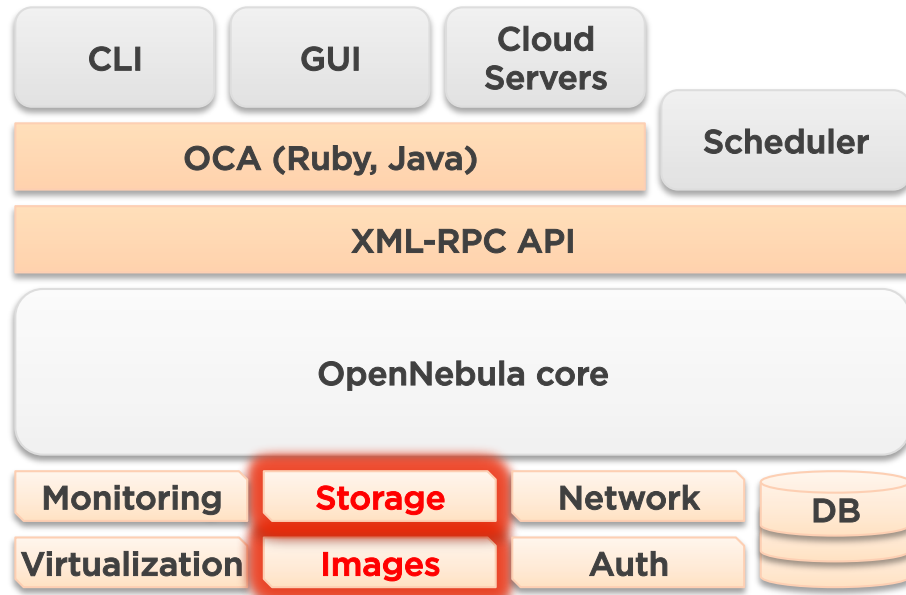
Description: live-migrates a running VM to the specified Host

```
├── xen
│   ├── save
│   ├── shutdown
│   ├── restore
│   ├── reboot
│   ├── xenrc
│   ├── deploy
│   ├── poll
│   ├── cancel
│   ├── migrate
│   └── poll_ganglia
```

```
1 |#!/bin/bash
2
3 source $(dirname $0)/xenrc
4 source $(dirname $0)/../../scripts_common.sh
5
6 deploy_id=$1
7 dest_host=$2
8
9 ▼ exec_and_log "$XM_MIGRATE $deploy_id $dest_host" \
10     "Could not migrate $deploy_id to $dest_host"
11
```



## How to Develop Drivers



## Image & Storage Drivers

- Create or Import new Images into the Image Repository
- File management between the Image Repository and the physical hosts

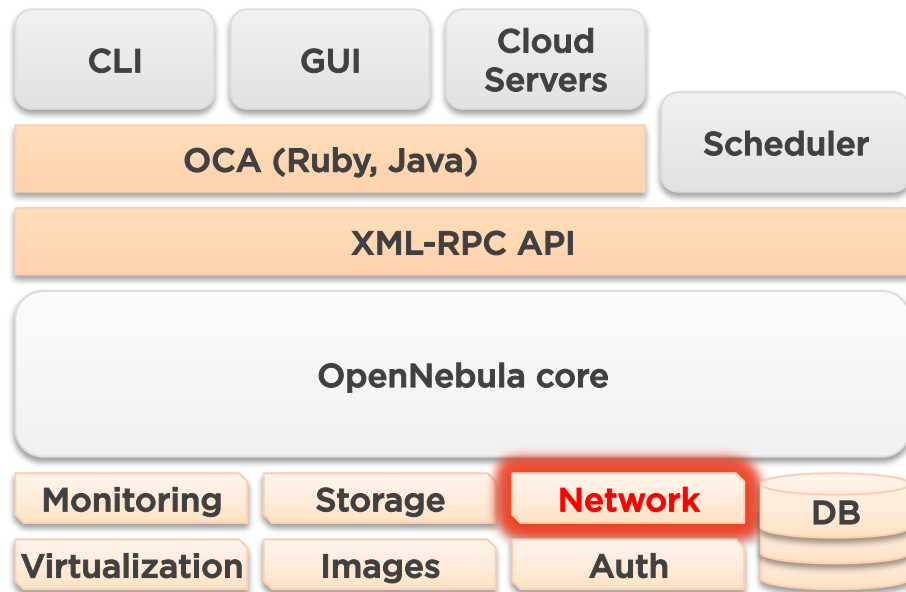
### OpenNebula distribution

- Shared FS
- LVM
- iSCSI
- SSH
- HTTP

### Community contributions

This section displays logos for various community contributions. On the left, there is the 'MooseFS' logo (a black square with a red tree-like structure) and the 'StratusLab Market Place' logo (a blue cloud shape). In the center, there is the 'SNIA CDMI API' logo (purple text with a small square icon). On the right, there is the 'BitTorrent scp-tsunami' logo (green and white) and the 'openstack Swift/Glance' logo (red and white).

## How to Develop Drivers



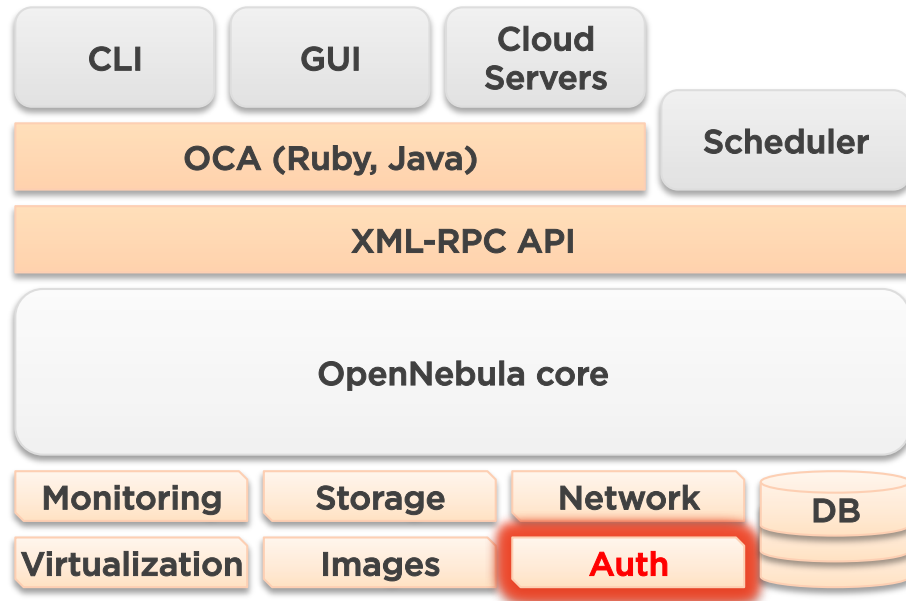
## Networking drivers

- Manage network configuration in the hosts
- Firewalling rules
- Network Isolation
- Bridge creation

OpenNebula distribution

- VLAN, 802.1Q
- OpenvSwitch
- ebtables
- FLAT

## How to Develop Drivers



### Authentication drivers

- Strong security
- Flexibility

### Authorization drivers

- Add any limitations to the user actions

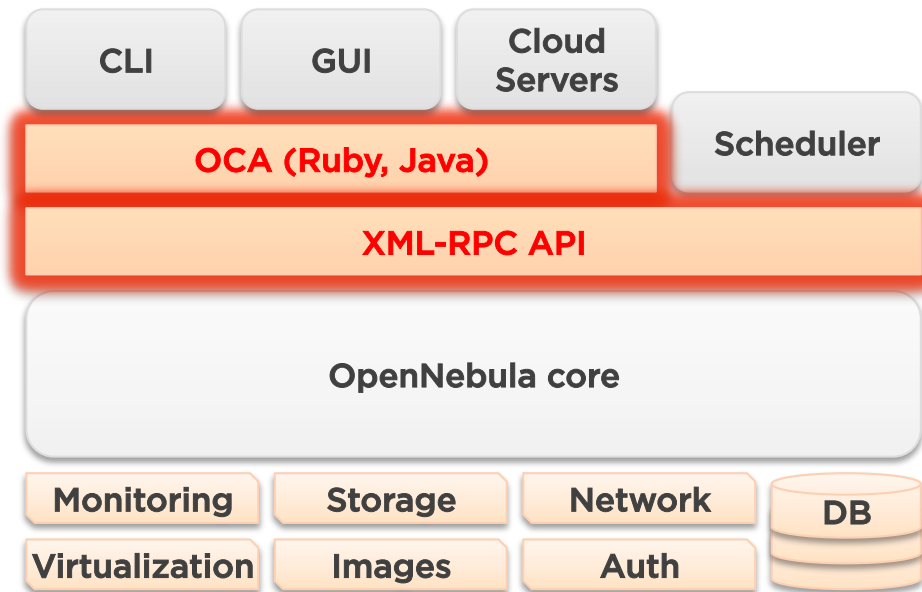
#### OpenNebula distribution

- SSH Keypairs
- x509 Certificates
- LDAP
- ACLs
- Quotas

#### Community contributions



## How to Interact with OpenNebula



## XML-RPC

- Simple, fast
- Works in any language

## OCA (OpenNebula Cloud API)

- High level bindings
- Complete functionality
- Ruby, Java, Python



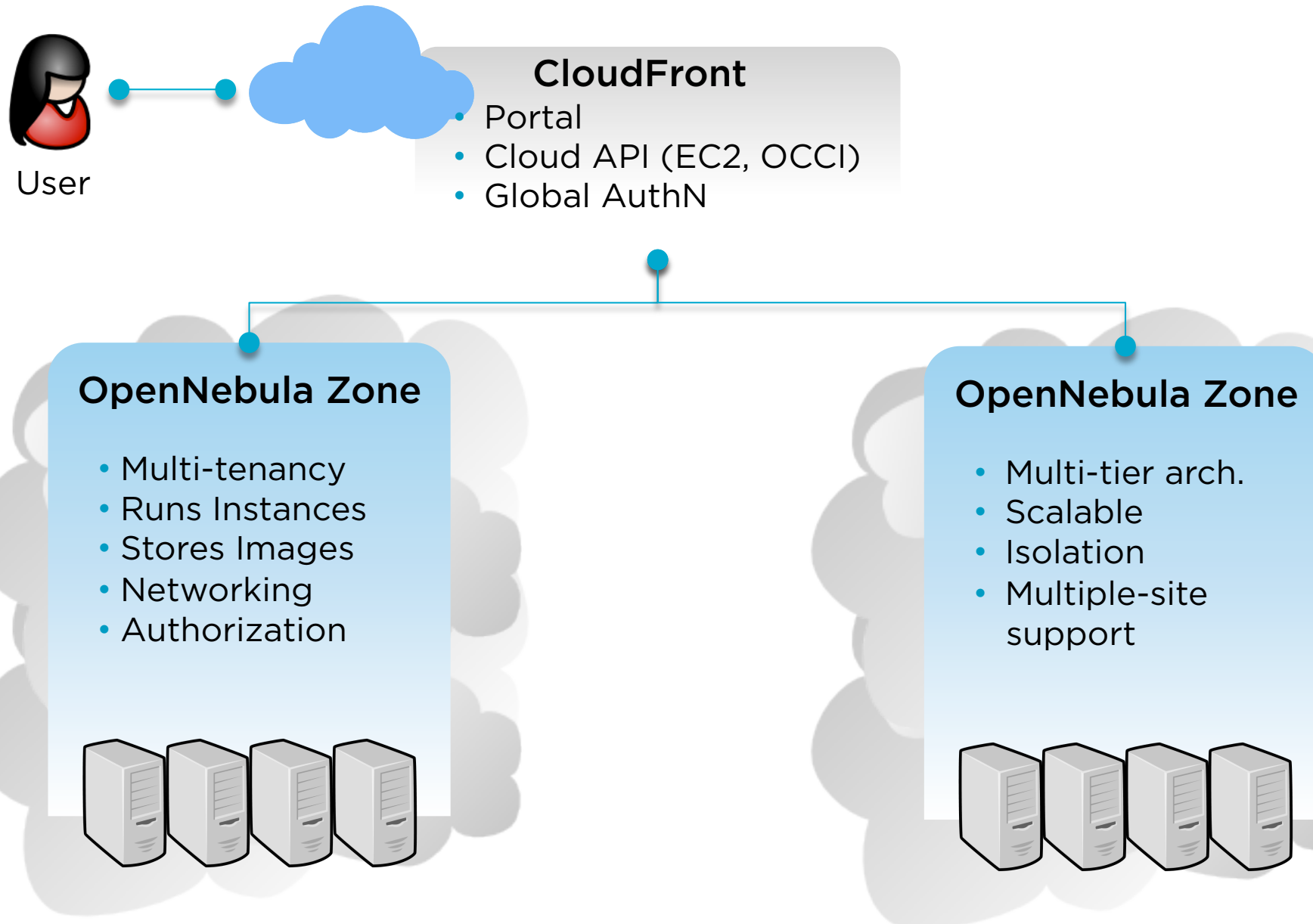
## *How to Interact with OpenNebula*

### OCA Ruby Example:

Shutdown all my Virtual Machines

```
1  #!/usr/bin/env ruby
2
3  require 'OpenNebula'
4
5  CREDENTIALS = "oneuser:onepass"
6  ENDPOINT    = "http://localhost:2633/RPC2"
7
8  client = OpenNebula::Client.new(CREDENTIALS, ENDPOINT)
9
10 vm_pool = VirtualMachinePool.new(client, OpenNebula::Pool::INFO_MINE)
11
12 rc = vm_pool.info
13 if OpenNebula.is_error?(rc)
14     puts rc.message
15     exit -1
16 end
17
18 vm_pool.each do |vm|
19     rc = vm.shutdown
20     if OpenNebula.is_error?(rc)
21         puts "Virtual Machine #{vm.id}: #{rc.message}"
22     else
23         puts "Virtual Machine #{vm.id}: Shutting down"
24     end
25 end
26
27 exit 0
```

## Multi-tier Cloud Architecture



## Organizations Building Clouds and Innovative Projects

### Organizations Building Clouds for Development, Testing and Production

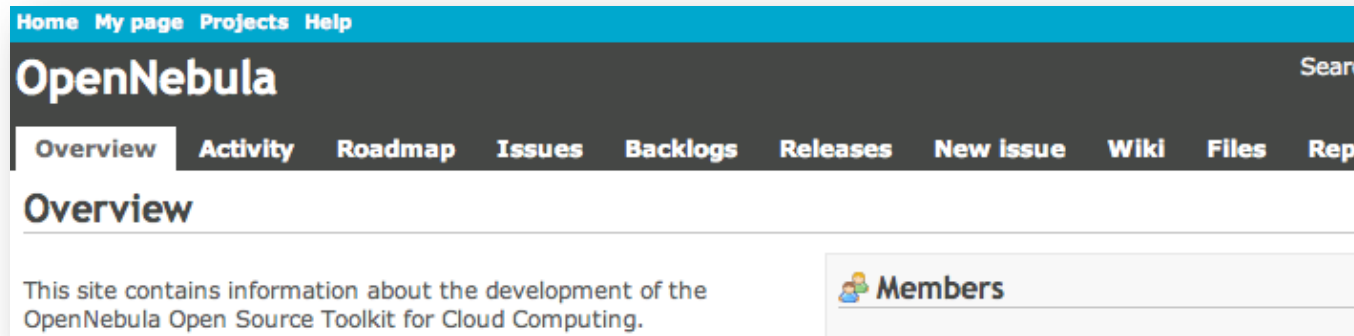


### Projects Building an Open Cloud Ecosystem Around OpenNebula



## How to contribute

- Join our mailing list
- Follow the development at [dev.opennebula.org](http://dev.opennebula.org)



## Ecosystem projects

- OpenNebula hosts an ecosystem catalog
- Promote and discuss ecosystem projects in our ecosystem mailing list

## IRC Channel

- [#opennebula](https://irc.freenode.net/#opennebula) on [irc.freenode.net](https://irc.freenode.net)



*We Will Be Happy to Answer any Question*

 @opennebula



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