

High Performance Cloud Computing Day

BiG Grid - SARA

Amsterdam, The Netherland, October 4th, 2011

HPC Cloud Computing with OpenNebula

Ignacio M. Llorente

Project Director

OpenNebula.org

Acknowledgments



The research leading to these results has received funding from the *Ministerio de Ciencia e Innovación* of Spain through research grant TIN2009-07146.

HPC Cloud Computing with OpenNebula

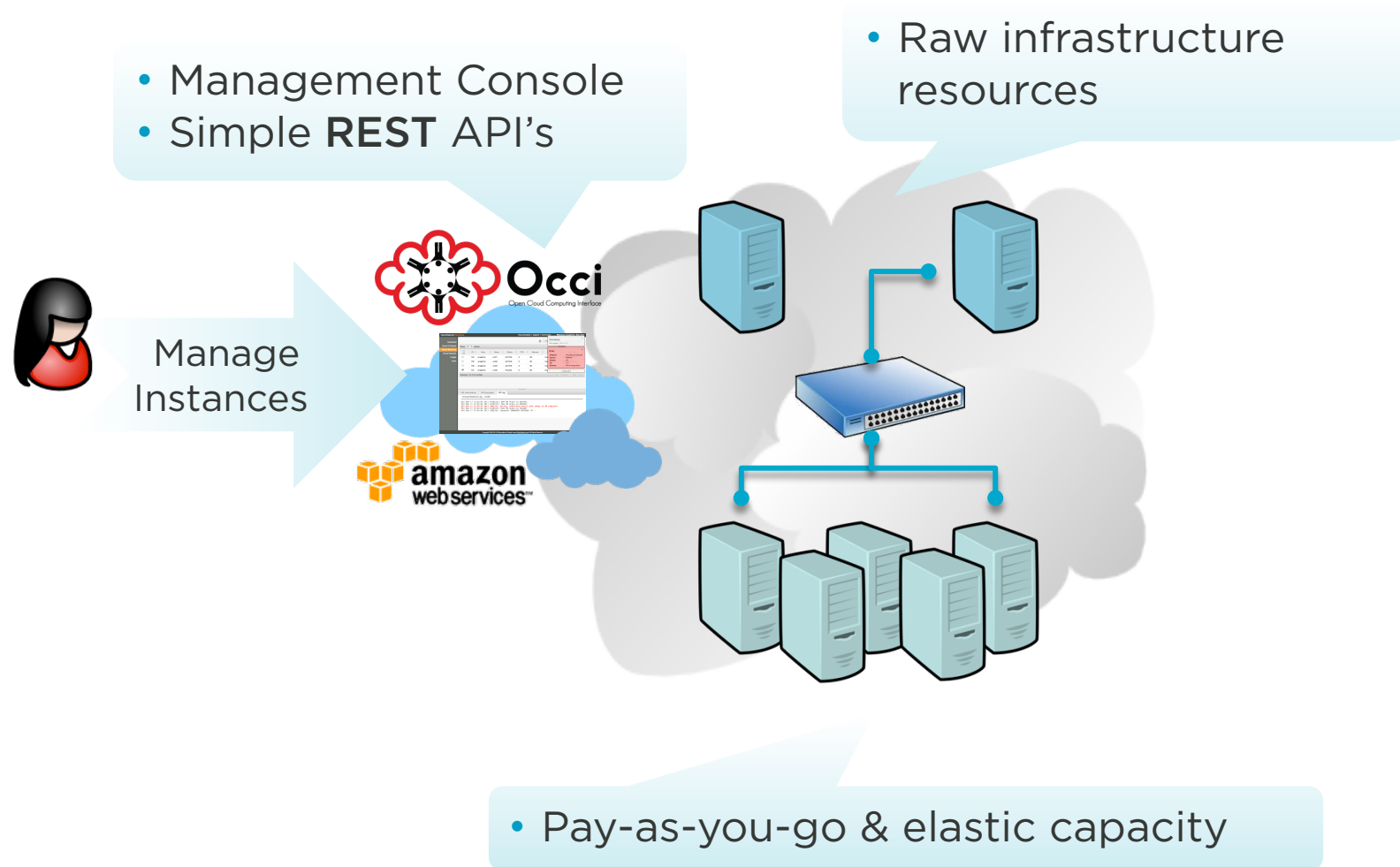
- What is Cloud Computing?
- What is OpenNebula?
- HPC and Science Cloud Computing
- HPC Cloud Computing at SARA and BiG Grid

Types of Cloud Services for Provision of IT Capabilities as a Service

	What	Who
<div data-bbox="255 341 779 386" data-label="Section-Header"> <h3>Software as a Service</h3> </div>	<p>On-demand access to any application</p>	<p>End-user (does not care about hw or sw)</p> <div data-bbox="1265 438 1908 582" data-label="Image"> </div>
<div data-bbox="262 647 772 692" data-label="Section-Header"> <h3>Platform as a Service</h3> </div>	<p>Platform for building and delivering web applications</p>	<p>Developer (no managing of the underlying hw & sw layers)</p> <div data-bbox="1294 774 1886 922" data-label="Image"> </div>
<div data-bbox="300 979 739 1082" data-label="Section-Header"> <h3>Infrastructure as a Service</h3> </div> <div data-bbox="331 1145 698 1356" data-label="Image"> </div> <div data-bbox="280 1366 761 1410" data-label="Caption"> <p>Physical Infrastructure</p> </div>	<p>Raw computer infrastructure</p>	<p>System Administrator (complete management of the computer infrastructure)</p> <div data-bbox="1272 1117 1877 1417" data-label="Image"> </div>

What is Cloud Computing?

Provision of Virtualized Resources as a Service



What is OpenNebula?

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

Adaptable

- Customizable and Extensible

Proven

- Many Massive Scale Production Deployments

Powerful and Innovative

- Advanced Enterprise-class Functionality

No Lock-in

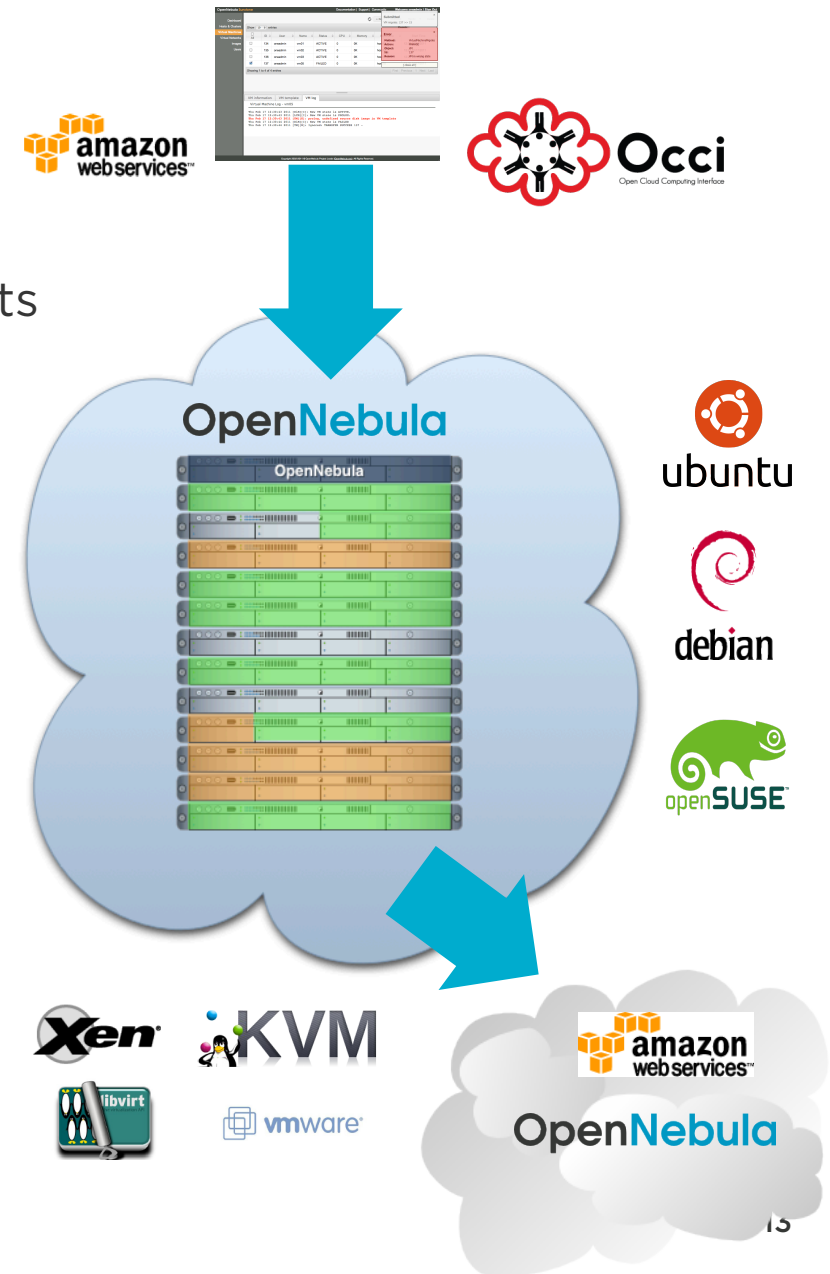
- Platform Independent and Interoperable

Interoperable

- Popular cloud APIs and standard based

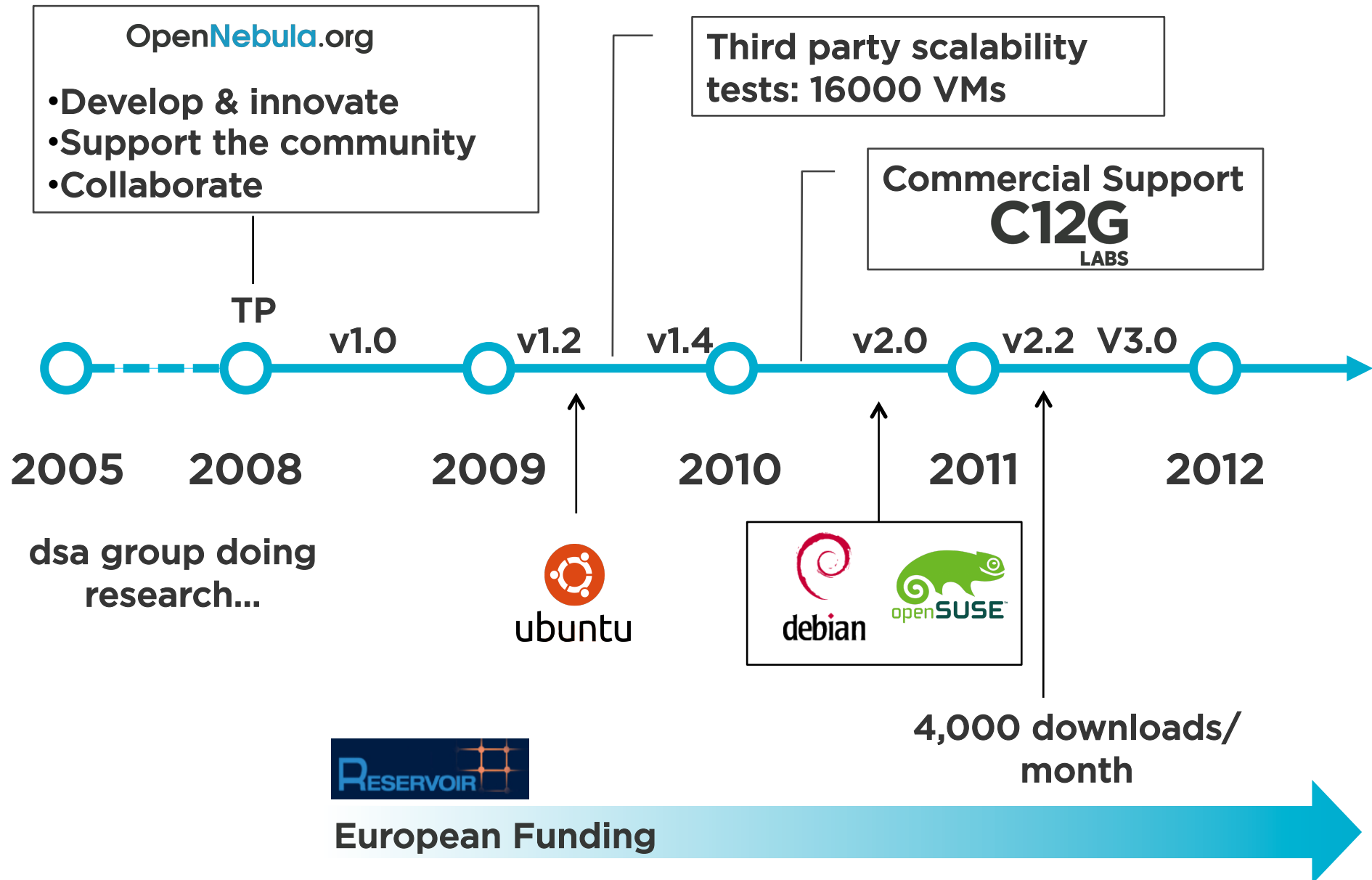
Openness

- Fully open-source
- Apache license



What is OpenNebula?

Building the Industry Standard Open Source Cloud Computing Tool



Organizations Building Clouds and Innovative Projects

Organizations Building Clouds for Development, Testing and Production



Projects Building an Open Cloud Ecosystem Around OpenNebula



Different Models of Deployment

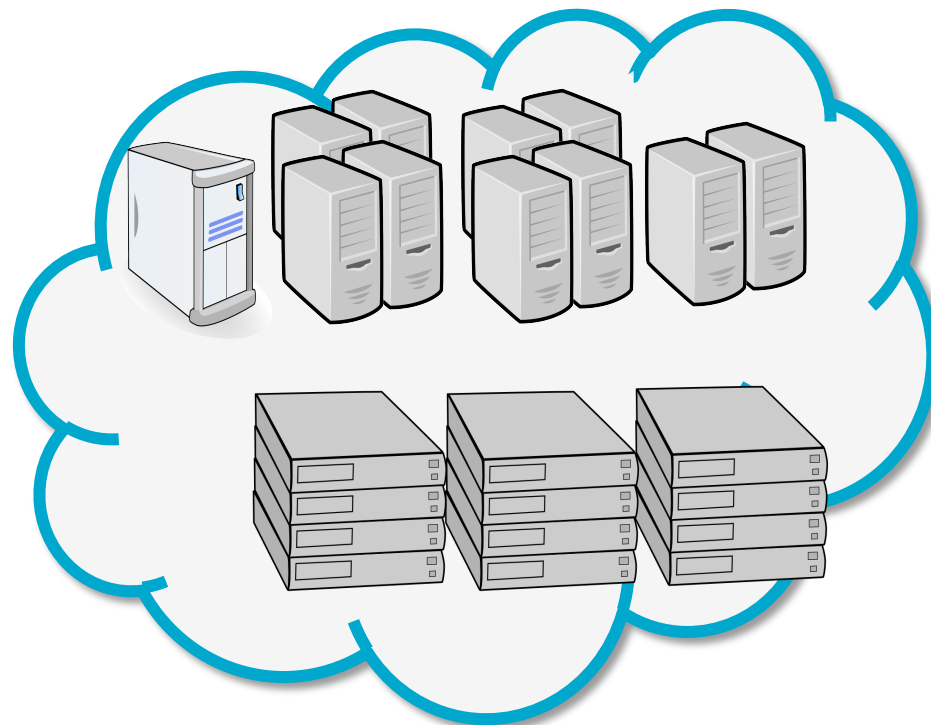
Model	Definition	Cloud Cases
Private	Infrastructure is owned by a single organization and made available only to the organization	<ul style="list-style-type: none">• Optimize and simplify internal operation• SaaS/PaaS support• IT consolidation within large organizations (Government Clouds, University Clouds...)
Public	Infrastructure is owned by a single organization and made available to other organizations over the Internet	<ul style="list-style-type: none">• Commercial cloud providers, mostly hosting providers to offer low cost solutions with limited control/configuration and security/reliability good enough• Science public clouds to enable scientific and educational projects or to experiment with cloud computing
Virtual Private	Infrastructure is owned by a single organization and made available to other organization over a dedicated private network	<ul style="list-style-type: none">• Telecom cloud providers to offer premium solutions with additional control/configuration and security/reliability

HPC and Science Cloud Computing

One of Our Main User Communities

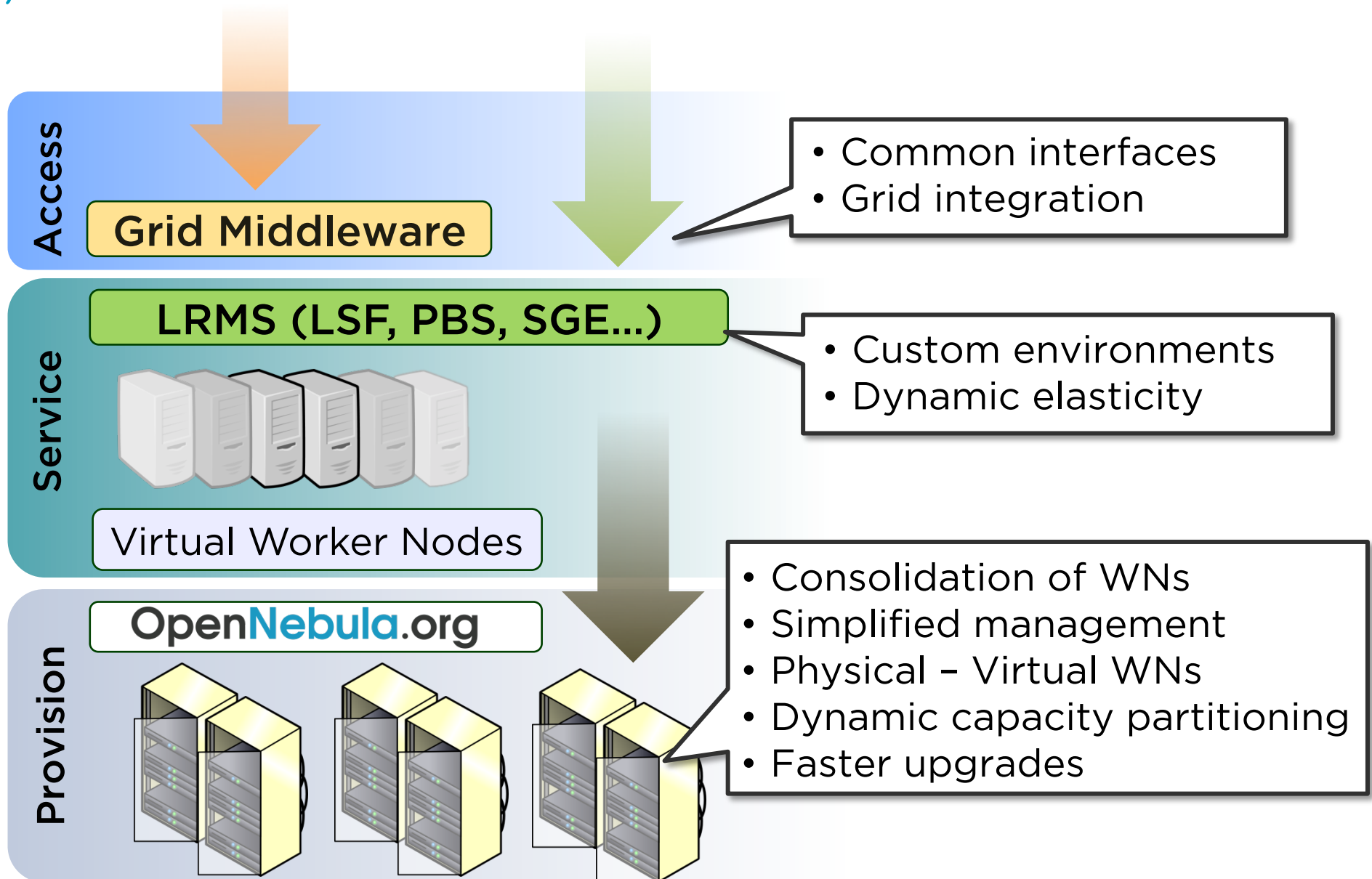
Deployment Scenarios

- **Private clouds as infrastructure tool** for hosting virtualized computing environments (job managers or pre-defined scientific platforms)
- **Public clouds as provisioning tool** for providing users with “HPC cluster as a service” resource provisioning using cloud interfaces



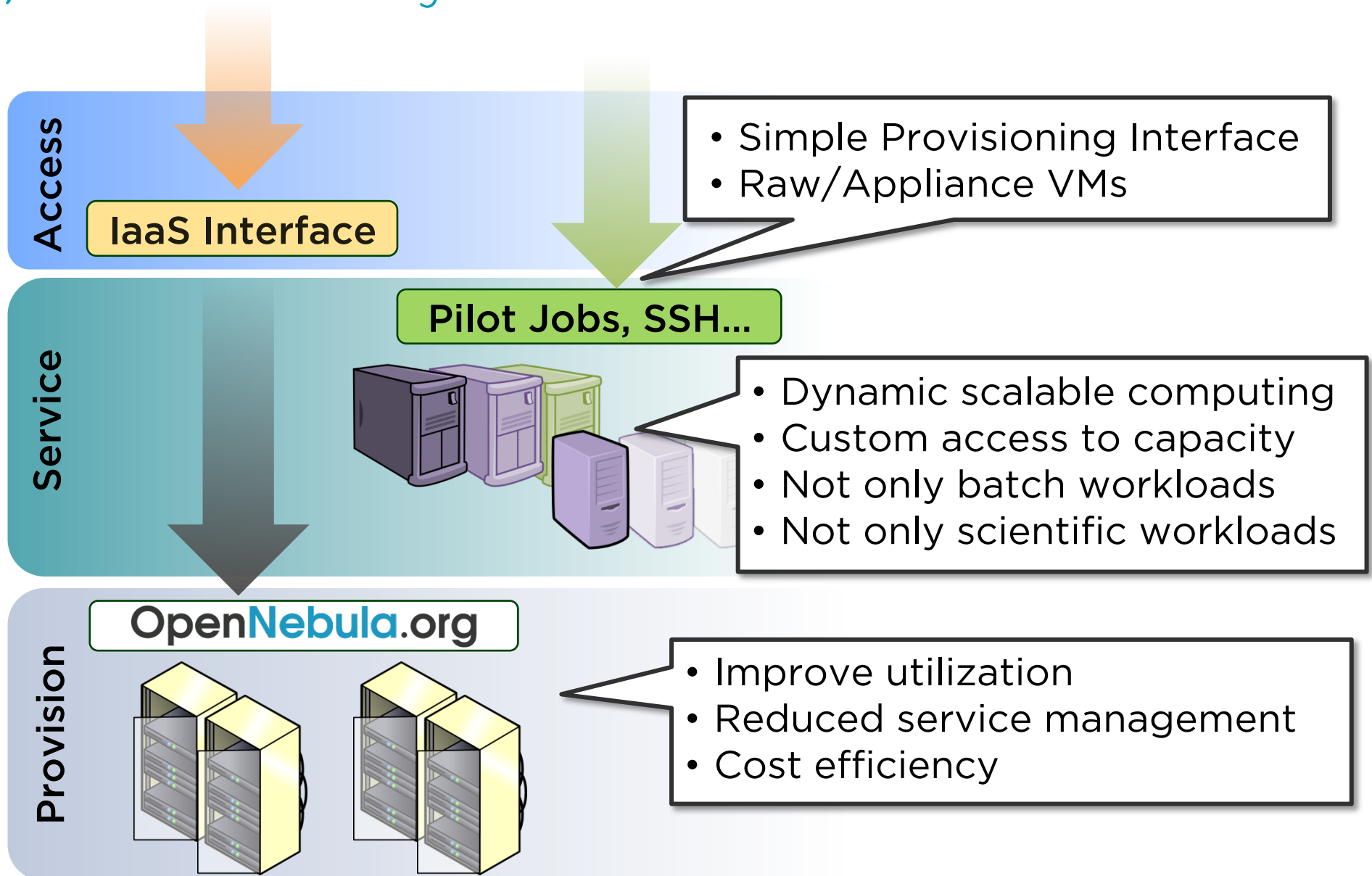
HPC and Science Cloud Computing

OpenNebula as an Infrastructure Tool



HPC and Science Cloud Computing

OpenNebula as an Provisioning Tool

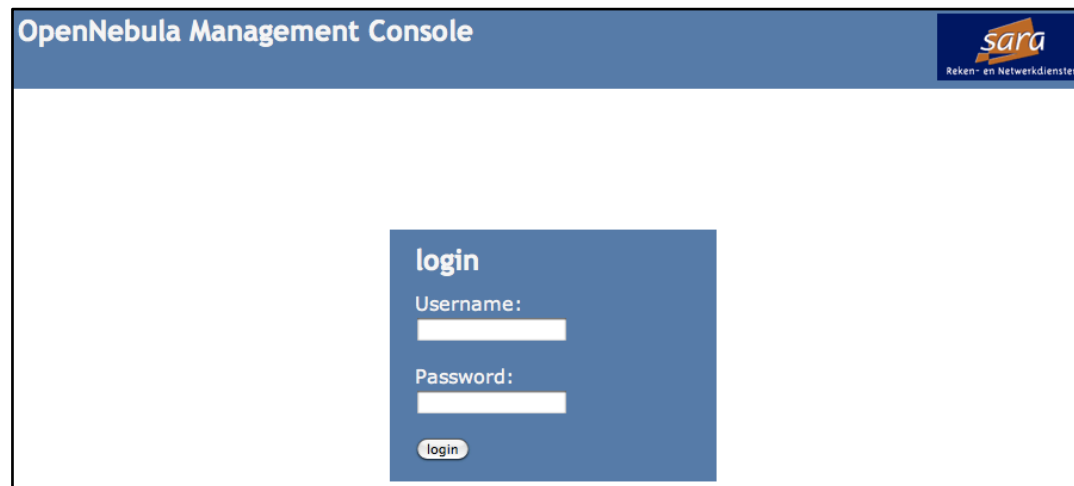


HPC Cloud Computing at SARA and BiG Grid

BiG Grid and SARA as Leaders in HPC Cloud Computing Services

Pioneers in Design and Deployment of HPC Clouds

- OpenNebula is only one of the components
- Deployment and integration are very complex tasks
- There is a lot of complexity behind this portal to make your life easier



The image shows a screenshot of the OpenNebula Management Console. The header is a dark blue bar with the text "OpenNebula Management Console" on the left and the "sara" logo (with the tagline "Reken- en Netwerkdiensten") on the right. The main content area is white and contains a blue login box. The login box has the title "login" and two input fields: "Username:" and "Password:". Below the password field is a "login" button.

A Mutually Beneficial Collaboration

- Early adopters of the software contributed to beta testing of the code
- Authors of the well-known OpenNebula Management Console

Questions?

We Will Be Happy to Answer Any Question

 CloudPlan.org

 [@imllorente](https://twitter.com/imllorente)



The research leading to these results has received funding from the *Ministerio de Ciencia e Innovación* of Spain through research grant TIN2009-07146.