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# Building Clouds with OpenNebula 3.4

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# Building Clouds with OpenNebula 3.4

## *“An Introduction to Cloud Computing”*

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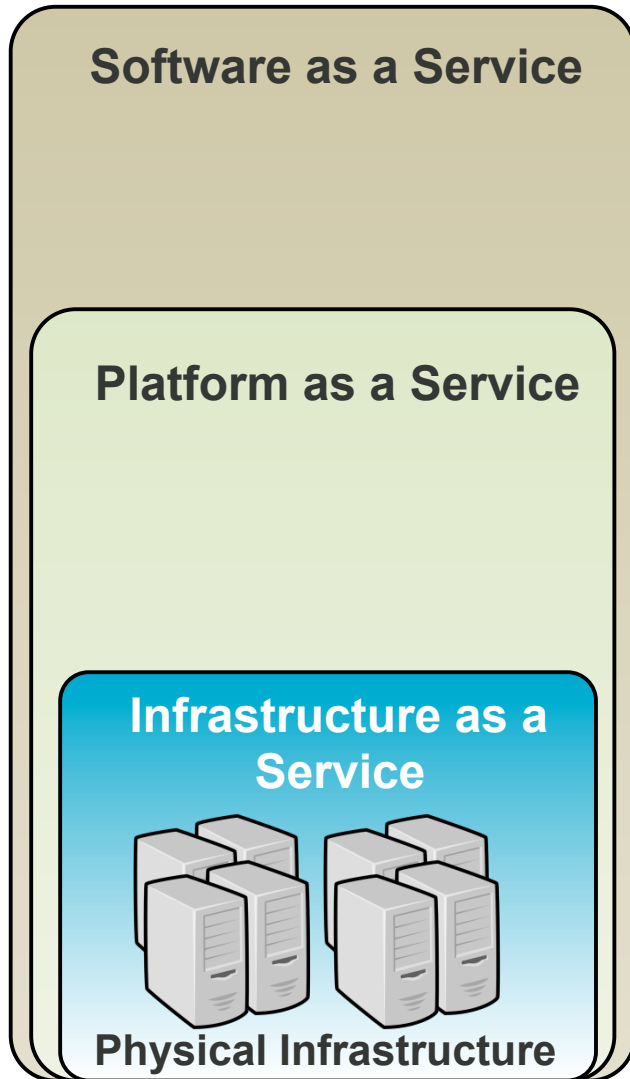
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- Cloud Computing Disciplines
- Infrastructure as a Service
- Challenges of IaaS Clouds
- History of OpenNebula.org
- Technical Overview of OpenNebula

# Cloud Computing Disciplines

## An Introduction to Cloud Computing



### What

### Who

On-demand access to any application

**End-user**  
(does not care about hw or sw)



Platform for building and delivering web applications

**Developer**  
(no managing of the underlying hw & sw layers)



Delivery of a *raw* computer infrastructure

**System Administrator**  
(complete management of the computer infrastructure)



# Infrastructure as a Service (IaaS)

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## An Introduction to Cloud Computing

### Public Cloud

- Simple Web Interface
- Raw *Infrastructure* Resources
- Pay-as-you-go (On-demand access)
- Elastic & “infinite” Capacity



# Infrastructure as a Service (IaaS)

## An Introduction to Cloud Computing

### Public Cloud

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### Private Cloud

A “*Public Cloud behind the firewall*”

- Simplify internal operations
- Dynamic allocation of resources
- Higher utilization & operational savings
- Security concerns

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### Hybrid Cloud

- Supplement the capacity of the Private Cloud
- Utility Computing dream made a reality!

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# OpenNebula

### Hybrid Cloud

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- Utility Computing dream made a reality!

# Challenges of an IaaS Cloud

## An Introduction to Cloud Computing

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 cloud (and What)?

**User & Role Management**

How do I create a new disk?

**Storage**

How do I set up networking for a multitier service?

**Network & VLANs**

How can I manage the distributed infrastructure?

**Interfaces & APIs**

Can I use hypervisor X?

**Virtualization**

**Uniform management layer that orchestrates multiple technologies**

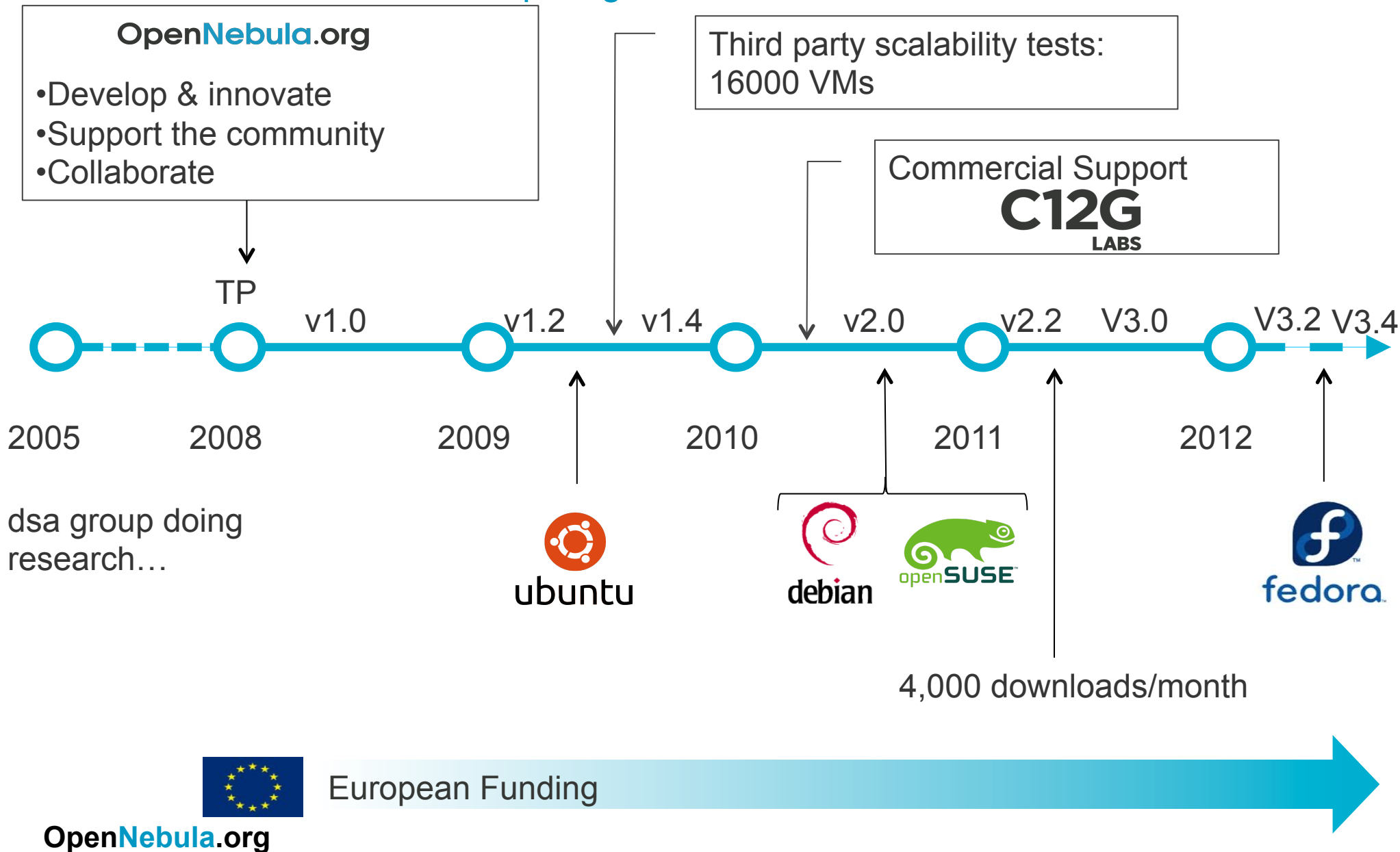


**OpenNebula**



# History of OpenNebula.org

## An Introduction to Cloud Computing



# History of OpenNebula.org: Sample Users

## An Introduction to Cloud Computing

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



### Projects Building an Open Cloud Ecosystem Around OpenNebula



# Technical Overview of OpenNebula: Vision & Design Philosophy

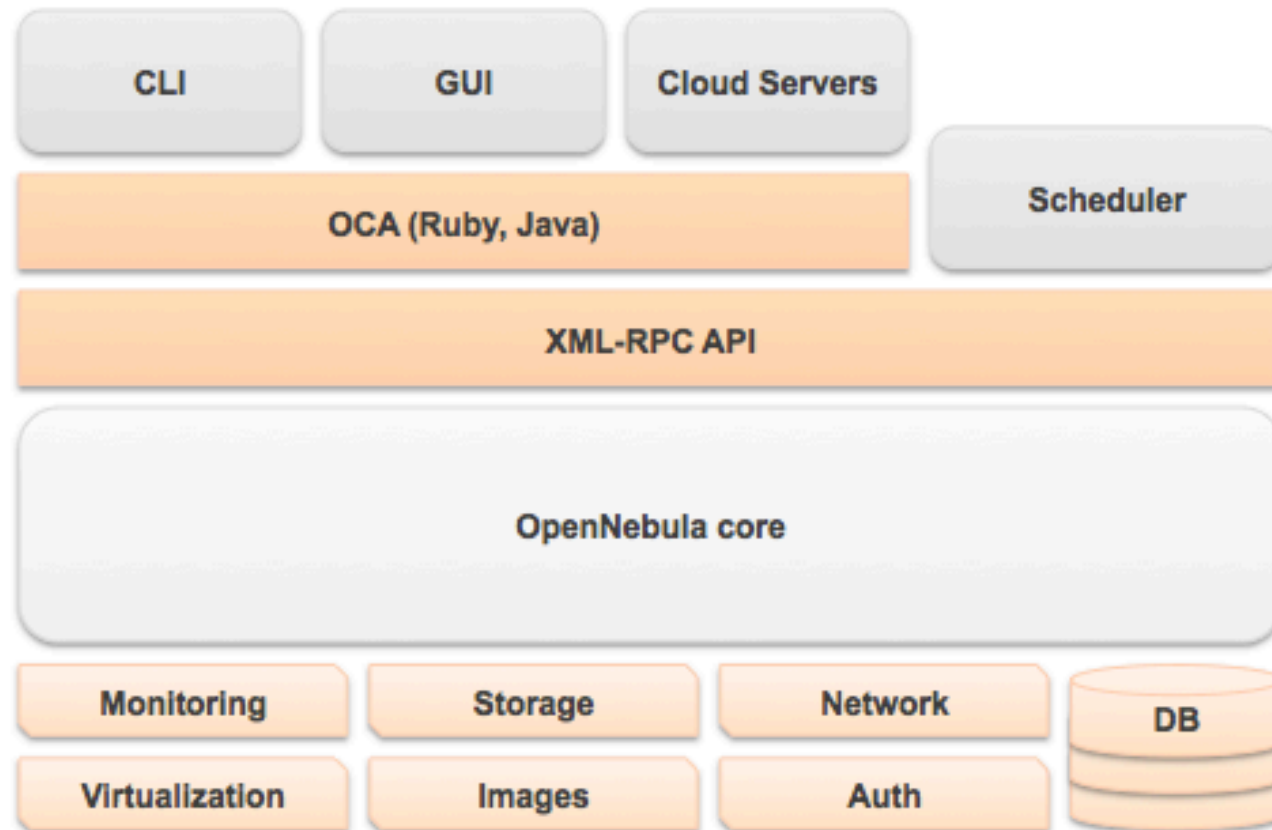
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## An Introduction to Cloud Computing

- One solution can not fit all data-center, requirements and constraints
- Open, flexible and extensible architecture that allows multiple components to be orchestrated
- Ready for production
- Massively scalable deployments
- Open Source – Apache License v2.0
- Provide basic components, but allow them to be easily replaceable

# The OpenNebula Architecture

## A Peek under the Hood



### Design Principles

- Modularity
- Lightness
- Openness

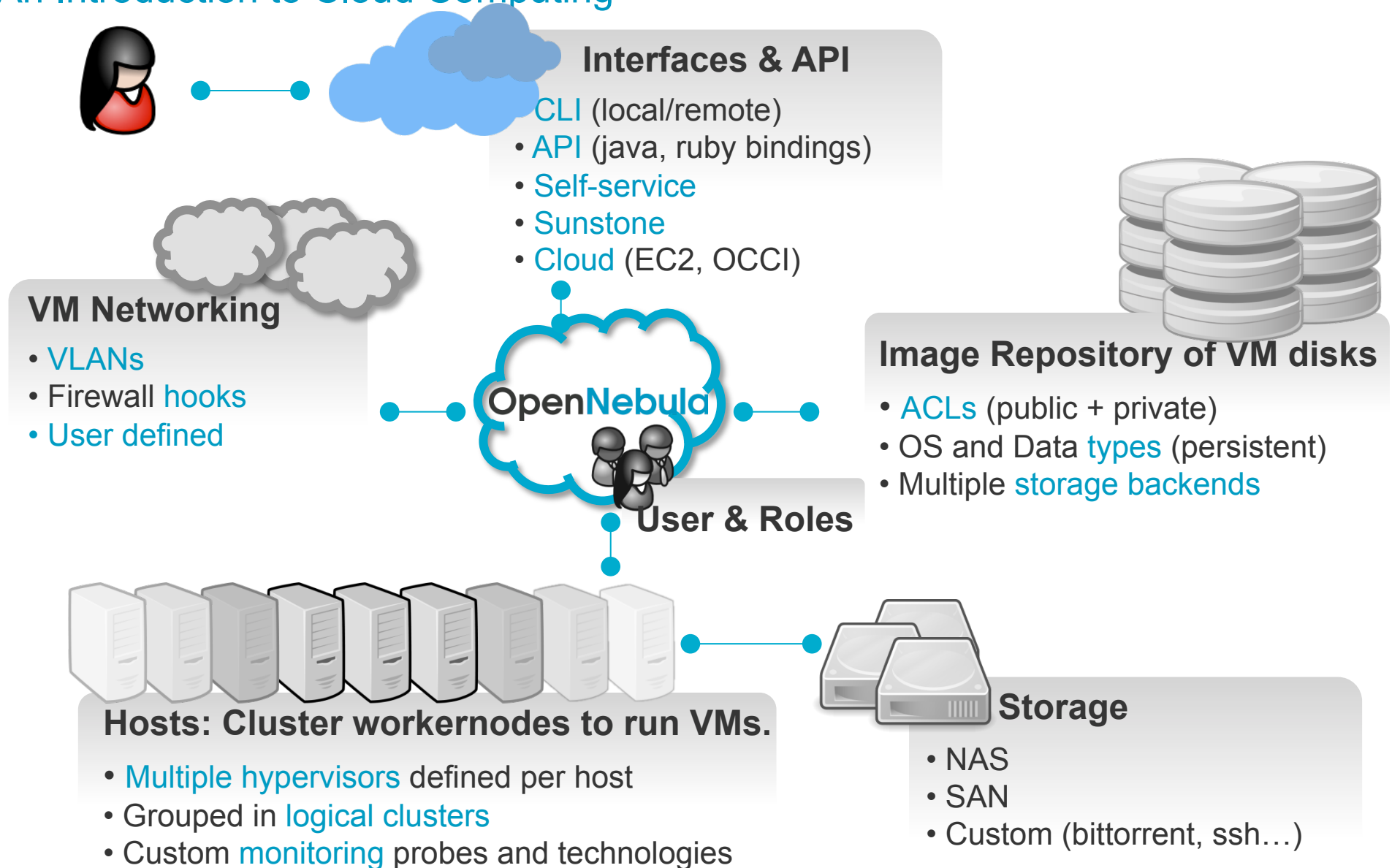
### Languages

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



# Technical Overview of OpenNebula: Key Components

## An Introduction to Cloud Computing



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