*An OW2 initiative for
open and free cloud computing*

November 2010

OW2 Overview

ObjectWeb

➲ **Founded in 2000**

➲ **A joint project funded by INRIA, Bull and France Telecom**

- 100 projects
- 650 committers
- 5100 contributors
- 12,200 subscribers
- 80 countries
- 2,400,000 downloads

OrientWare

➲ **Founded in 2004**

➲ **Sponsored by the Chinese Ministry of Science and Technology (MOST)**

- Chinese National High Tech. Program (863 Program)
- US$1billion+ investment
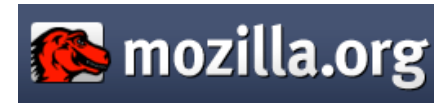
In 2007, ObjecWeb and OrientWare merge to form OW2

OW2 in top-4 global open source organizations with diversified code

Diversified-code organizations — THE LINUX FOUNDATION, eclipse, OW2 Consortium, Apache Foundation

Product line organizations — OpenOffice.org, mozilla.org

Technology-oriented communities — FreeBSD, BZFlag, RAILS, Joomla!

Legal ressources organizations — open source (Open Source Initiative), frdm Software Freedom Law Center, FREE SOFTWARE FOUNDATION, openinvention network

Standards organizations — W3C, IEEE, OPEN DOCUMENT FORMAT ODF ALLIANCE, OSGi Alliance

Advocacy and lobbying organizations — April promouvoir et défendre le logiciel libre, OPEN SOLUTIONS ALLIANCE Open Source at Work, OSFA OPEN SOURCE FOR AMERICA
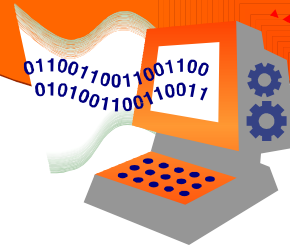
Consortium Structure Overview

Community

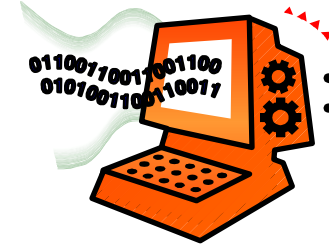Governance

Code Base

Activities
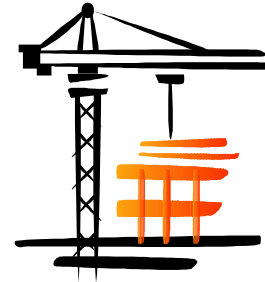
Membership Fees

OW2 Activities

➲ **Projects**
- ▪ Technology Innovation

➲ **Initiatives**
- ▪ Business Leverage

➲ **Local Chapters**
- ▪ Global Governance
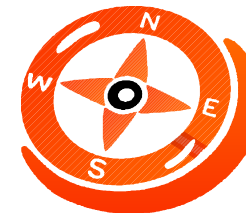
A truly global membership

Bull
France Telecom
INRIA
Thales
Alcatel Lucent
EBM
SERLI
Xwiki
Exo Platform

Scalagent
Talend
BonitaSoft
Sogeti
Edifixio
LIG
CNRS-IMAG
UJF
Telecom Inst.

Fraunhofer-FOKUS
Tarent

Charles U.

Engineering

TongTech
Intervision
O-Engine
Peking University
Beihang University
NUDT
ISCAS
CVIC-SE

Red Hat
Inres
JasperSoft
Orbeon
Funambol

SERPRO
4Linux
Neociclo
Konsultex
Uni.of Fortaleza
Uni. of São Paolo

C-DAC
Essentia

OSCi Presentation v0,1

Some 80 Open Source projects

Mature Projects
(37)

Acceleo
ASM
Bonita
CARDAMOM
CAROL
CLIF
Enhydra
Shark
EasyBeans
eXo Platform
FederID
Fractal
sync4j
GASP
InterLDAP
JavaService
JOnAS
JOPE
JORAM

JOTM
Lomboz
NovaForge
Open Mobile IS
OPS
Orchestra
PEtALS
ProActive
RmiJdbc
RUBiS
Salome-TMF
Sat4J
SOFA
Spagic
Spago
Spago4Q
SpagoBI
Telosys
XWiki

*2,5 million downloads
per year since 2007*
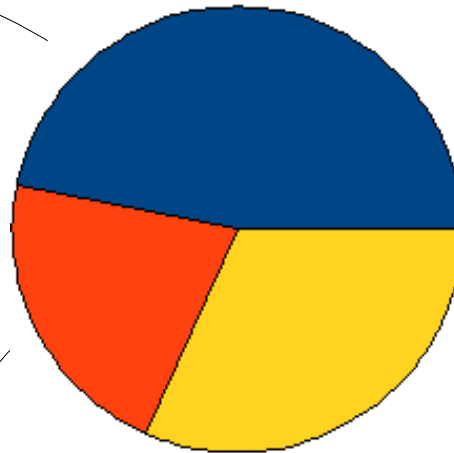
Projects in Incubation
(23)

Aspire RFID
BEEN
CMI
Demoiselle
Dragon
Dream
Dysoweb
EasyWSDL
Elastic-Grid
FraSCAti
J2WS
JASMINe

JASptE
JWTGen
LeWYS
OpenSuit
OSLC
Perseus
Q-ImPrESS
Scarbo
Ubistar
xPlus

Projects in Archive
(26)

Azuki
BarracudaMVC
C-JDBC
DotNetJ
Dryverl
EclipseJDO
Enhydra XMLC
GOTM
HOWL
Introspector
Jalisto
Jonathan
JORM

Massiv
MEDOR
MobiliTools
Monolog
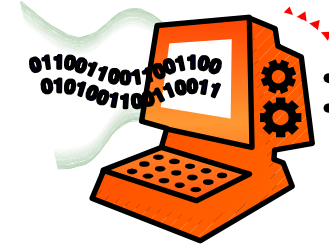Odette FTP
Oscar
ParGRES
SNAP
Speedo
SURF
Tribe
XAPool
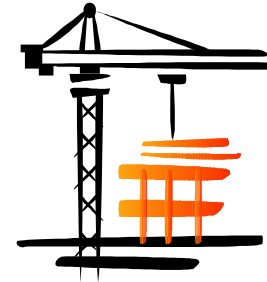XQuare

OSCi Presentation v0,1

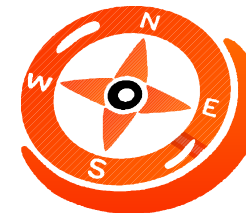# OW2 Activities

➲ **Projects**
- Technology Innovation

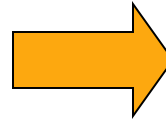➲ **Initiatives**
- Business Leverage

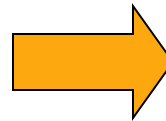➲ **Local Chapters**
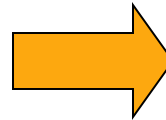- Global Governance

IPR Policy Guidelines

1. No OW Public License ➡ *Different licenses for different contexts*

2. Revocable Non-Assertion ➡ *Allows patented software into open source*
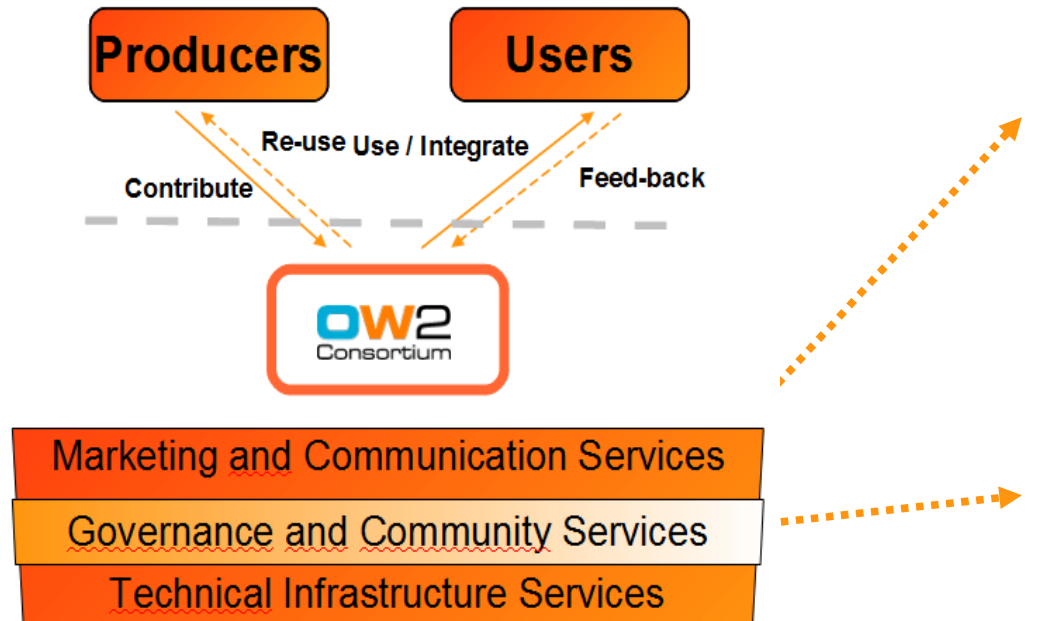
3. Dual-Licensing Admitted ➡ *Business-friendly*

The OW2 Infrastructure

- **Forge**

- **Mailing lists**

- **Instant messaging server (jabber) / IRC**

- **Atlassian tools**
  - *JIRA Bug tracker*
  - *Fisheye, source browser*
  - *Bamboo, Continuous integration server*

- **JCP TCK access**

- **Static web site (www.ow2.org, www.ow2.org.cn)**

- **Collaborative web site (wikis), social networks**

- **Software Quality Thrust**
  - *Code Quality: Trustie, CSTC, Sonar, Qualipso*
  - *IP Verification: FOSSology, Antelink, OW2 OSLC*

A business ecosystem platform

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OW2 Strategy

Cloud on peak of inflated expectations
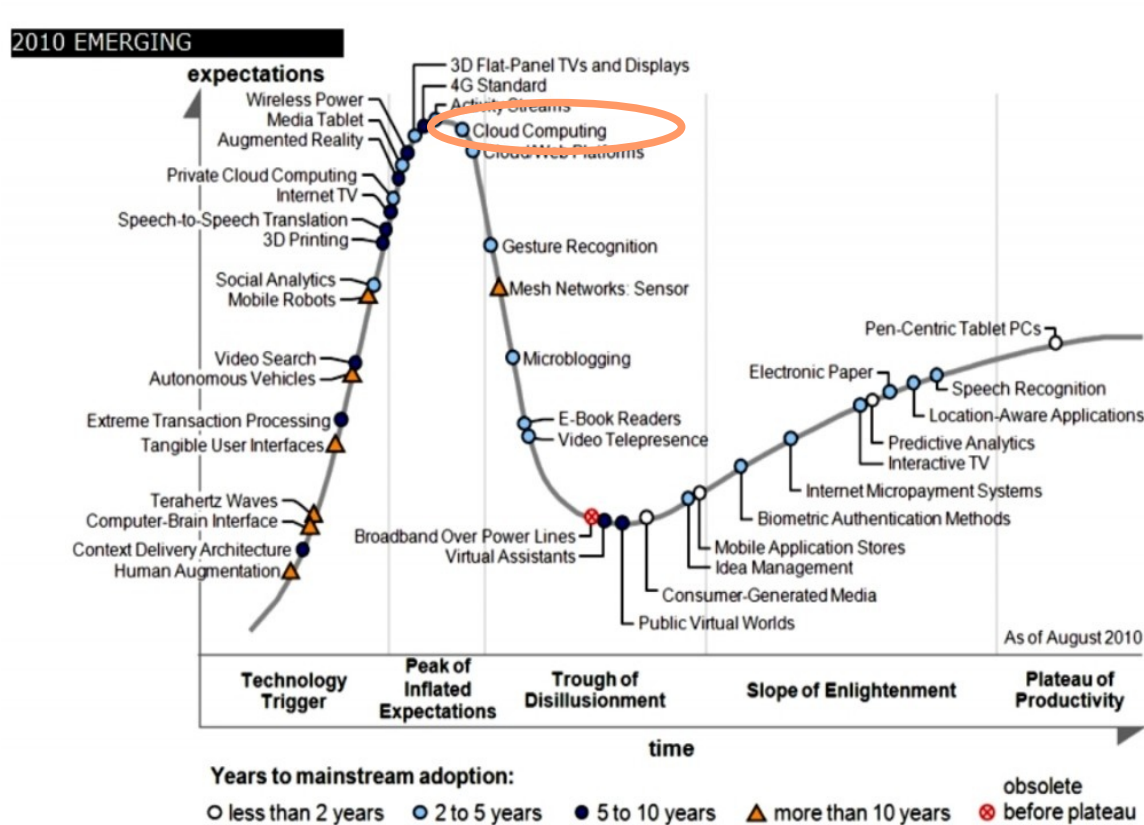
According to professional weathermen

Cloud computing is a long-term business opportunity

Worldwide IT Cloud Revenue
by Product/Service Type

Source IDC, September 2009
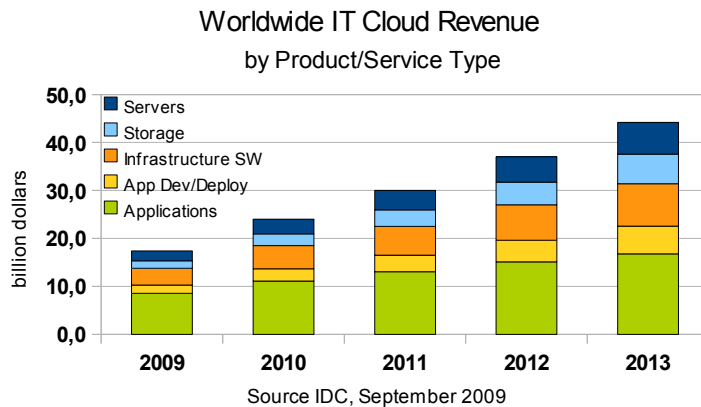
Five-year annual growth rate of 26 percent--over six times the rate of traditional IT offerings.

⮕ A disruptive innovation driven by two key industry trends

- **Commoditized enterprise IT**: hardware, software and networks and standardized enterprise usage

- **New Internet-based IT usage**: new economic models to absorb fluctuating or peak demands

According to OW2's weathermen

Software commoditization forms

Common Specifications
- Marginal product differentiation
- Recognized quality standards
- Substituable goods

Not process specific
- Economies of scope
- Input in many different end-products or usage
- Added value is created downstream
- Minimize addition to end-user cost

Offshore

Open source

Cloud computing

Mature products
- Marginal innovation
- Well known production process
- Multiple alternative providers

Volume trading
- Economies of scale
- Industry-wide price levelling
- Additional margins through additional volume

Free / open source software critical for cloud computing openness and freedom

- ➲ **While openness seems still a distant reality...**
  - ▪ Different meanings
  - ▪ Proprietary core business
  - ▪ Few consensus on standards

- ➲ **...Free / Open Source Software is now critical for Cloud Computing ...**
  - ▪ General consensus on reduction of costs and barriers to adoption
  - ▪ Open APIs for pragmatic reasons
  - ▪ F/OSS and open standards

- ➲ **… but Cloud Computing is also a risk for F/OSS**
  - ▪ Openness not dependant on software exclusively

- ➲ **F/OSS Cloud momentum**
  - ▪ Virtualization technologies: *Xen, KV, OpenVZ, VirtualBox, etc.*
  - ▪ Infrastructure management: *OpenNebula, Eucalyptus, Libcloud, OpenStack, etc.*
  - ▪ Platform environment: *Heroku, etc.*

- ➲ **F/OSS a unique proposition for**
  - ▪ Interoperability
  - ▪ Sovereignty
  - ▪ Transparency / Privacy / Security

  - ▪ De facto open standards
  - ▪ Sustainable ecosystems

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Challenges and Opportunities

Commodity Software Delivery

Software access vs Service access

Back to the drawing board!

Cloud Architecture Requires Innovation

Open Cloud Requires Open Source

Open Source for Open Cloud

OW2 to drive open source *innovation* for open cloud architecture

OW2 Strategy: the Open Source Cloudware Initiative

VISION & GOALS

OW2 Technology Vision

From Middleware to Cloudware

Open Source for Open Cloud

Open Source Empowerment

OW2 projects

3rd party projects

Collaborative projects
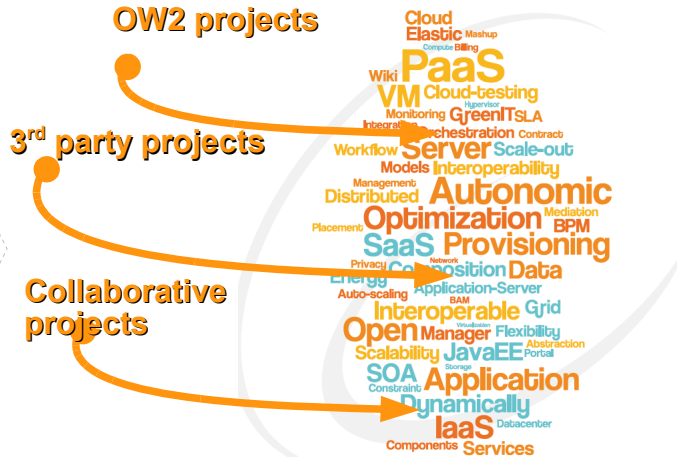
STAKEHOLDERS

- •Software Vendors
- •Systems Integrators
- •Academia
- •Enterprises
- •Telcos
- •SMEs
- •Public Entities

Initiative bedrock

JOnAS

ProActive Parallel Suite

JASMINe

CLIF

JORAM

talend *open data solutions*

bonitasoft *open your process*

ebm WEBSOURCING

eXo

JASPERSOFT

orbeon

ubikis

REQUEA

SCALAGENT *Distributed Technologies*

INGRES

XWIKI

北京航空航天大学

INRIA

BuLL

france telecom

The OW2 Open Source Cloudware Initiative

OW2 Members

Non Members

Expert Group

Open Source Cloudware Initiative

OW2 Projects

SotA

SotA

3rd Party Projects

Agenda

Roadmap

Domains

Self Sizing

Massive Data

Green

Collaborative Projects

Distributed Services

Integration Projects

P2P

Scalability

Elasticity

Security

Domains

Open Source Cloudware

Open Cloud

Centralized Hierarchical

Free Cloud

Massively Distributed

SotA: State of the Art

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Open and free

- **Open as in open source**
- **Open Standards & APIs**
  - Interoperability, safety, quality of services
- **Centralized & Hierarchical**
  - At the heart of cloud
  - Huge investments
  - Net specialization
- **US leadership**
  - Proprietary services & open core solutions
  - VARs & SaaS vendors

- **Free as in free software**
- **Free software & P2P**
  - Sovereignty, security, privacy
- **Massively distributed**
  - At the edge of cloud
  - Low costs solutions
  - Net neutrality
- **New challenges**
  - Academy, industry and states in collaboration
  - Innovative eco-system

Open Cloud   **Free Cloud**

OW2 to bridge the gap

Mission in 3 points

(1) Define a <u>research agenda</u> for enhancing state of the art of free / open source cloudware

- Free / Open Source Cloudware for Open Cloud (XaaS) based on free / open source software and open standards
    - With specificity such as Elastic, Powerful, Green, …
    - Addressing Massive distribution, Scalability, Security, Safety, Privacy, QoS, …
    - Including Development / Deployment / Test Tools, …

(2) Propose a <u>standard F/OSS architecture</u> for cloud

- **Promote and integrate** « best of breed » F/OSS for cloud (OW2 projects and 3rd party projects)
- Participate in **collaborative Cloud Projects** with OSCi partners

(3) Support <u>collaboration</u> based on common understanding and goals

- **Workshops** with R&D Labs and 3rd Party Projects to exchange about projects, domains and synergies to be explored / covered in OSCi
- **Roadshow** in France, Europe, China, Brazil, US to promote OSCi and to attract new contributions
- **Seminars** with Cloud users to promote OSCi and identify user's needs

A business ecosystem at work

ActiveEon
Bonitasoft
Buaa
Bull
Cohesive FT
Cvic
Ecole Mines Nantes
Edifixio
Engineering
Fraunhofer Fokus
Gsia

Ingres
Inria
Iscas
Jaspersoft
Konsultex
Neociclo
Nudt
O-Engine
Orange Labs
Pku
Petals Link
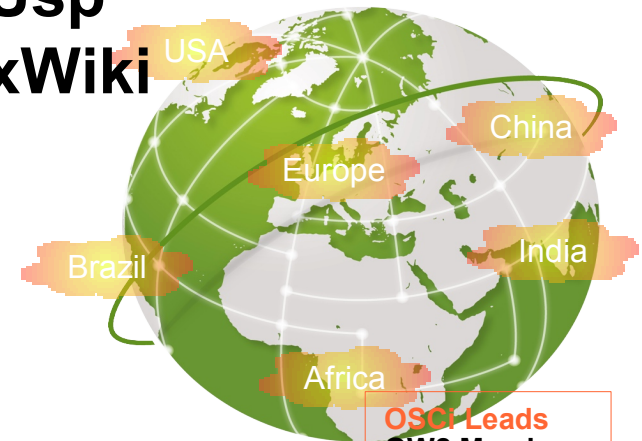
Talend
Technical University Berlin
Institut Telecom
Ucm
Unifor
UshareSoft
Usp
xWiki

USA
China
Europe
India
Brazil
Africa

OSCI Leads
OW2 Members
Non Members

Organization by Domains

1 **Self-sizing & Green PaaS**
- Improve overall platform efficiency

SHORT TERM Work in Progress

2 **Distributed interoperability architecture**
- Enable interoperability between heterogeneous service domains/clouds

3 **BI 4 Cloud**
- Provide BI capabilities for and over cloud

4 **Massively Distributed Clouds**
- Enable next generation cloud architecture

LONG TERM Discussions in Progress

More domains to be defined as the initiative grows

Domain: Definition

- **OSCi's entity under which identified technologies are grouped to cover all specific aspects addressed by this domain**
    - Domain may evolve and be enriched by new contributions, specifications etc.
- **A domain**
    1) Integrates different technologies: OW2 projects and 3rd party projects (only F/OSS)
    2) May need new technologies to be developed
    3) Gathers partners who work altogether to develop this domain
        - Partners identify altogether type of resources to make this work sustainable: Integration Project or Collaborative Project
- **A domain is characterized by**
    a) Goal(s): define clearly the objectives and boundaries
    b) Challenge(s): identify gaps and locks to be covered by domain
    c) Use Case: a very well identified and powerful use case justifying the existence of these technologies
- **A domain has a status in term of time frame and life cycle**
    1) Short term (1 to 2 years) / Long term (2 to 5 years)
    2) Production ready / Work in progress / Discussions in progress

Domain 1:
Self-sizing and green PaaS

- **Goal: improve the platform efficiency**
  - Performance
  - Energy cost
- **Challenges**
  - Cluster growth/shrink capabilities according to workload
  - Data center multi-tenancy with limited capacities requires arbitration policies
  - Data center placement for minimizing the energy consumption
- **Use case: Orange Infrastructure**
  - Large-scale data centers (+40,000 x86 servers)
  - JavaEE JOnAS middleware stack: +250 applications, +1,000 application server instances
  - Static server consolidation (12/1) through virtualization: Utilization level increased from 20% to 75%
- **Technologies**
  - OW2: JOnAS, Jasmine, ProActive, Clif, Entropy
  - 3rd party: Xen, KVM + Collaboration in progress: OpenStack, OpenNebula, Ubuntu
  - Technology to be developed:
- **Partners**
  - Bull, Ecole Mines Nantes, Inria, Orange, ActiveEon O-Engine, Iscas, Buaa, PKU, UCM, ...
- **Resources**
  - Collaborative Projects: SelfXL (ANR), 4caast (FP7), Easi-Clouds (ITEA2), Compatible One (FU10), Internetware (863),...
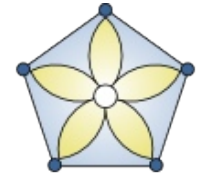
SHORT TERM
Work in Progress

Domain 1, the OW2 Initiative Bedrock Technologies

- **JOnAS** (http://www.ow2.org/xwiki/bin/view/ActivitiesDashboard/JOnAS)
  - Enterprise OSGi & Java EE 5 certified server
- **JASMINe** (http://jasmine.ow2.org)
  - Management tools for SOA platform
  - Monitoring module (probe, mediation, graphs)
  - Decision module (rules engine based)
  - Virtual Machine Management (Xen, VMware, ...)
- **CLIF** (http://clif.ow2.org)
  - Load testing
  - Selfbenchmarking
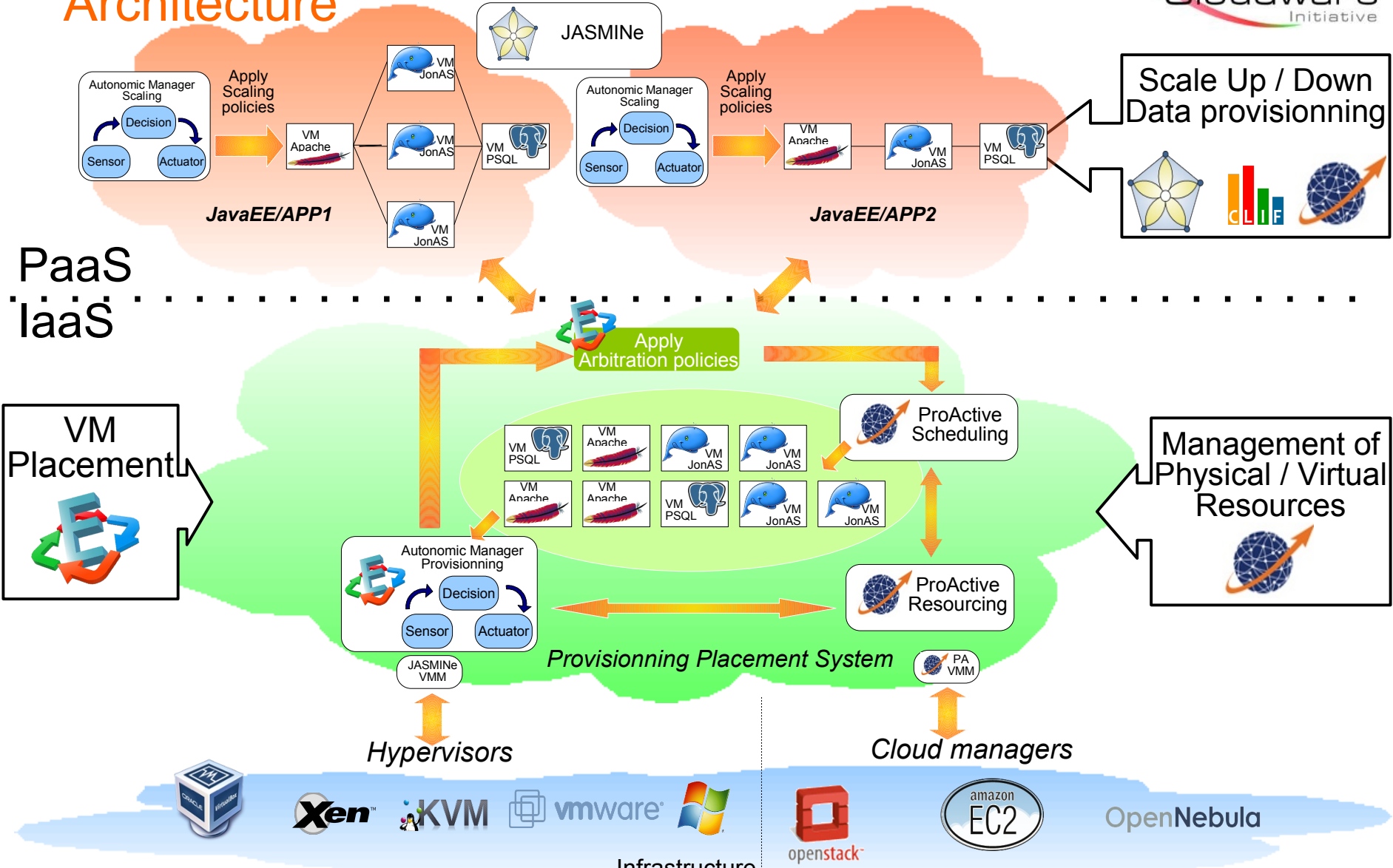- **ProActive** (http://www.ow2.org/xwiki/bin/view/ActivitiesDashboard/ProActive)
  - Scheduling
  - Resource management
  - Parallel library
- **Entropy (in progress)**
  - Dynamic VM placement

Self-sizing and green PaaS
Architecture

JASMINe

PaaS
IaaS
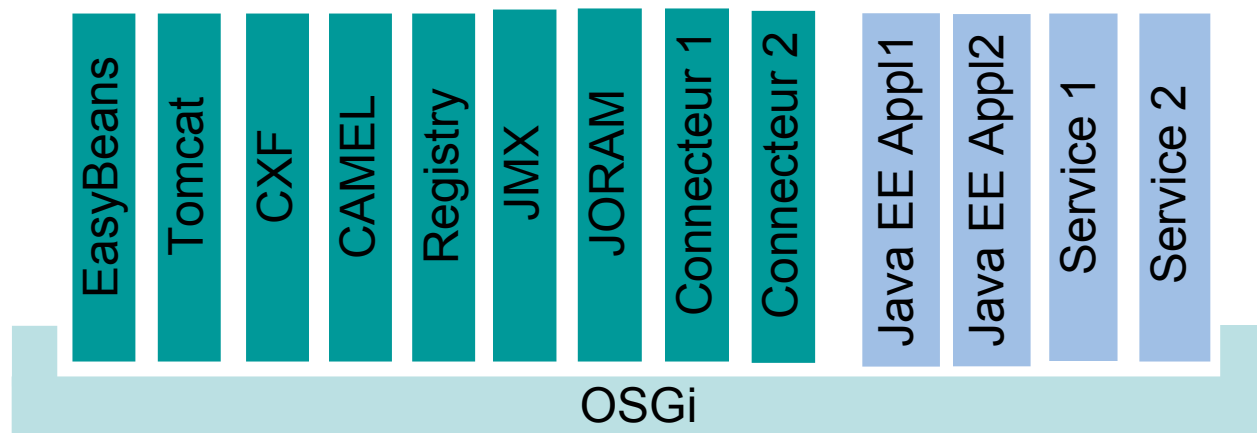
Autonomic Manager Scaling
Decision
Sensor
Actuator

Apply Scaling policies

VM Apache

VM JonAS

VM JonAS

VM JonAS

VM PSQL

JavaEE/APP1

Autonomic Manager Scaling
Decision
Sensor
Actuator

Apply Scaling policies

VM Apache

VM JonAS

VM PSQL

JavaEE/APP2

Scale Up / Down Data provisionning

VM Placement

Apply Arbitration policies

VM PSQL
VM Apache
VM JonAS
VM JonAS
VM Apache
VM Apache
VM PSQL
VM JonAS
VM JonAS

ProActive Scheduling

Autonomic Manager Provisionning
Decision
Sensor
Actuator

JASMINe VMM

ProActive Resourcing

Provisionning Placement System

PA VMM

Management of Physical / Virtual Resources

Hypervisors

Cloud managers

Xen   KVM   vmware   openstack   amazon EC2   OpenNebula

Infrastructure

JOnAS, Jasmine: Toolset for SaaS
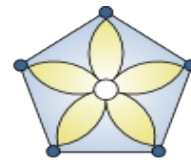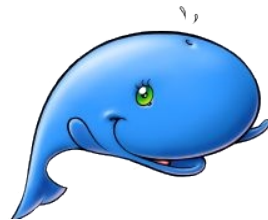
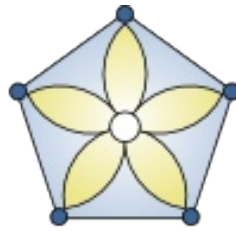- **Deploy dynamically complex applications and services on Clouds**
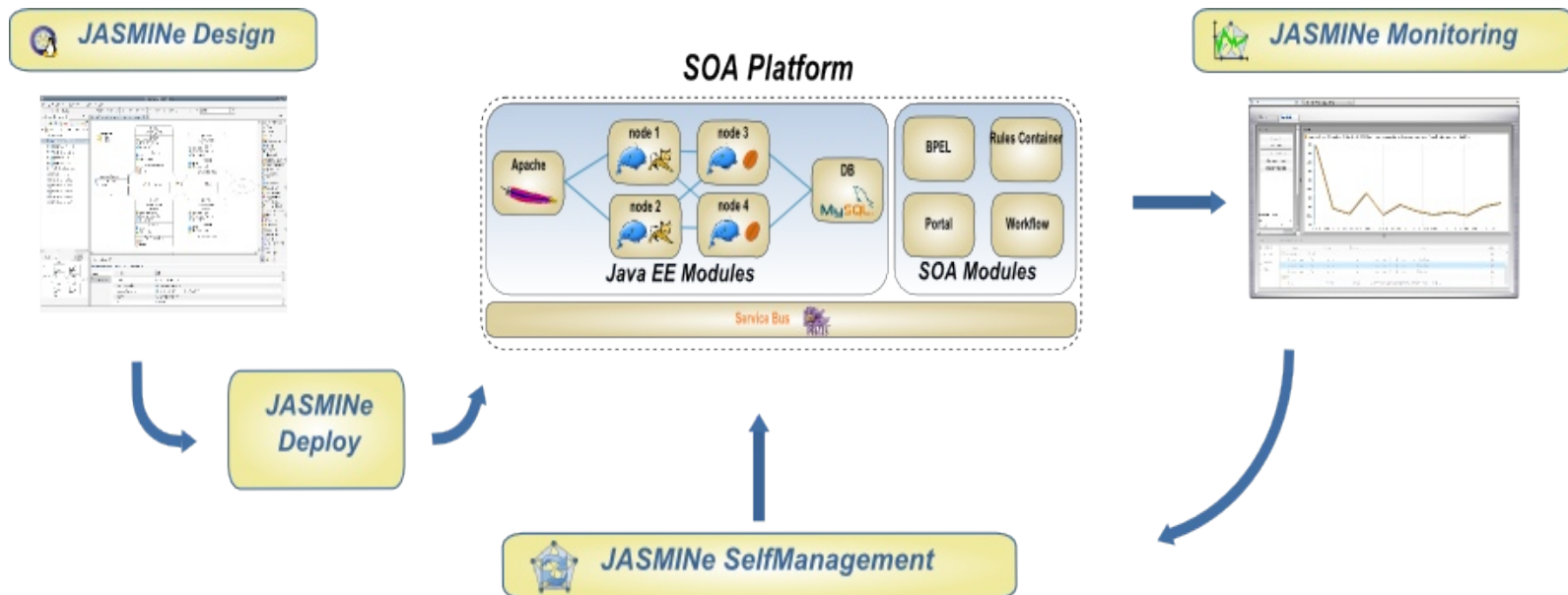- **Smart Administration:**
  - Supervision
  - Self-management
- **Technologies**
  - JavaEE
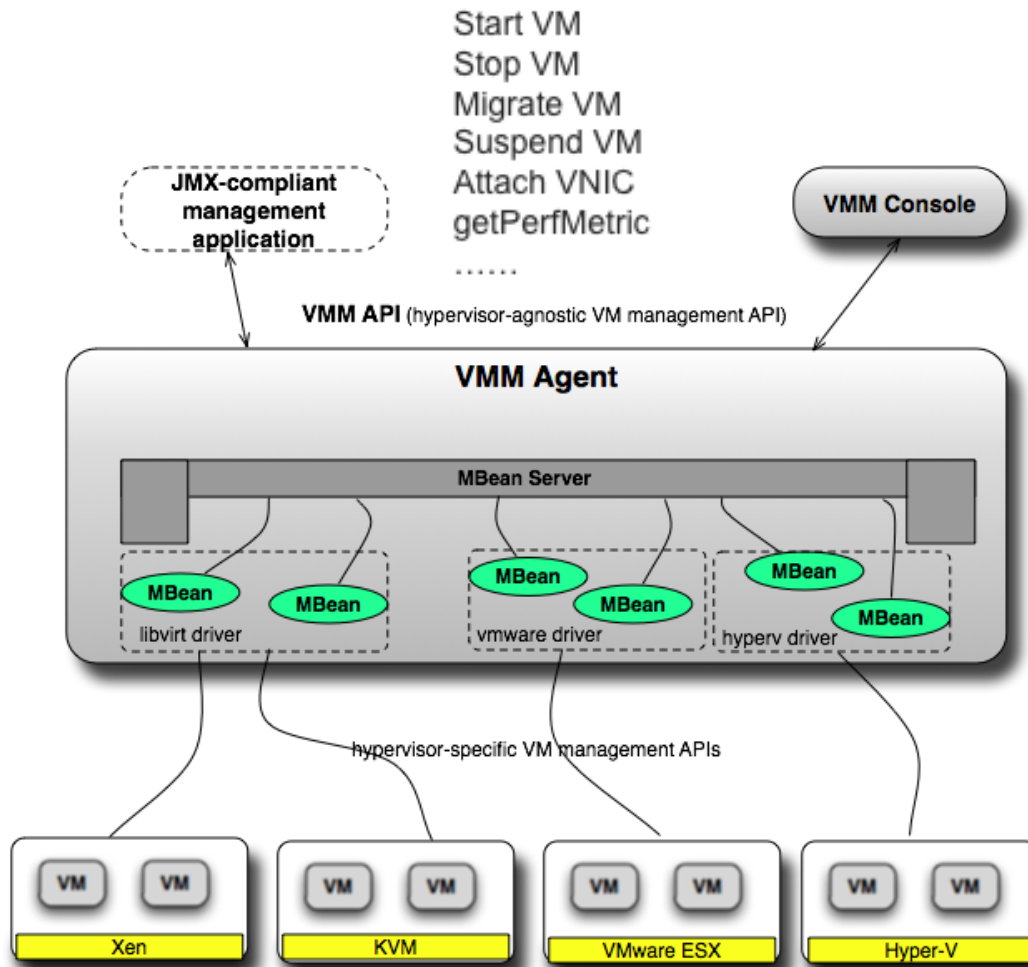 - OSGi
  - JOnAS
  - JASMINe
  - Orchestra

EasyBeans	Tomcat	CXF	CAMEL	Registry	JMX	JORAM	Connecteur 1	Connecteur 2	Java EE Appl1	Java EE Appl2	Service 1	Service 2

OSGi

JASMINe

- **Management tools for SOA platform**
- **Cross-platform (JOnAS AS prime target)**
- **Four main features: Design, Deploy, Monitoring, Self-***
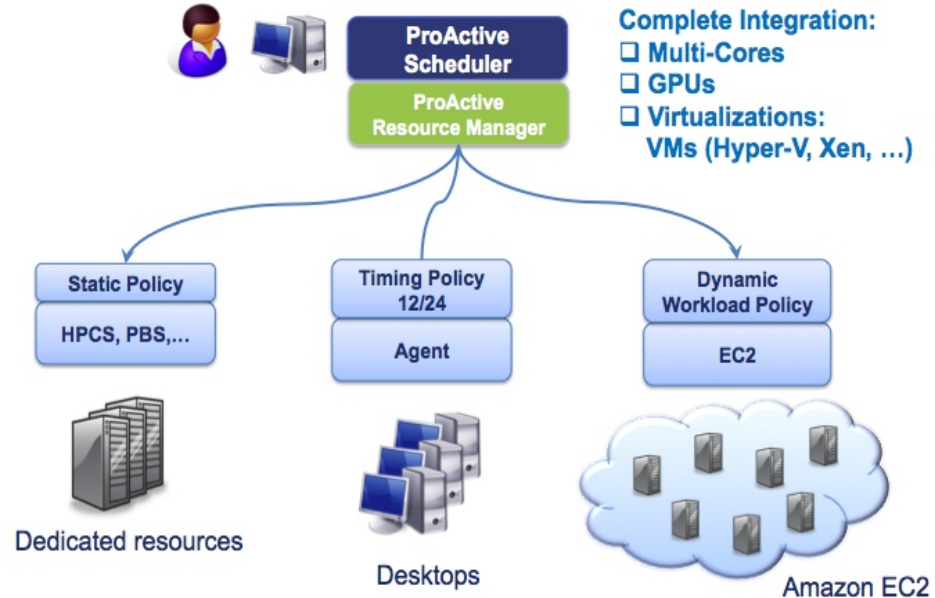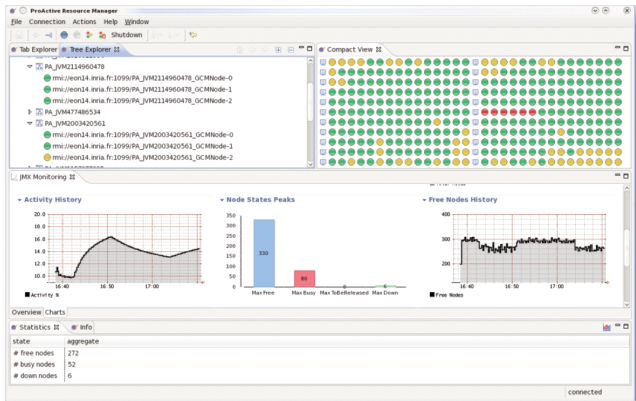
JASMINe Virtual Machine Management (VMM)

⮞ **Support for multiple hypervisors:**
- Open-source Xen and KVM
- Citrix XenServer
- VMware virtualCenter 2.x
- Microsoft Hyper-V

⮞ **using xenapi, libvirt, VI API, wmi**
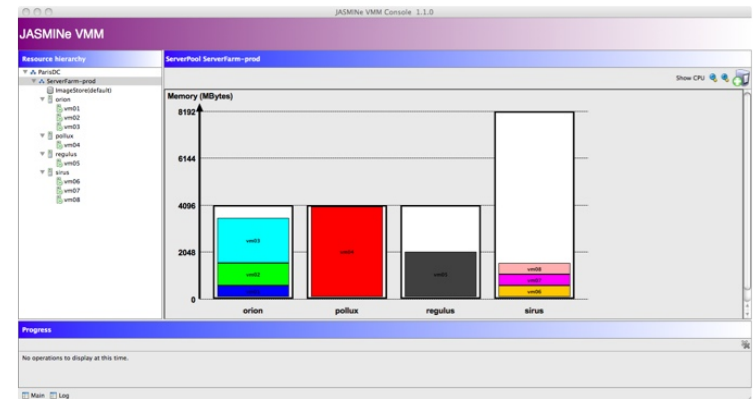
"Infinite" ressources management

⮑ **Provisionning of new ressources in case of capacity overflow**

Java EE PaaS as a virtual ressource

⮑ **Java applications deployment and services execution (EJBs, WS, OSGi, …)**

Java EE PaaS performance optimization

⮑ **EJB3.1 and asynchronous methods support**
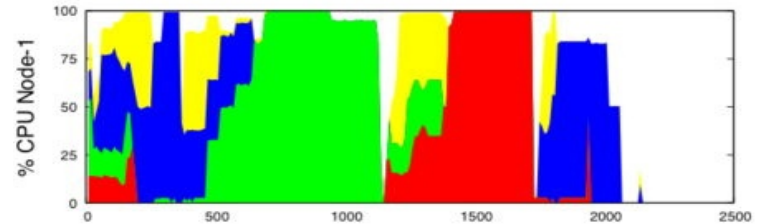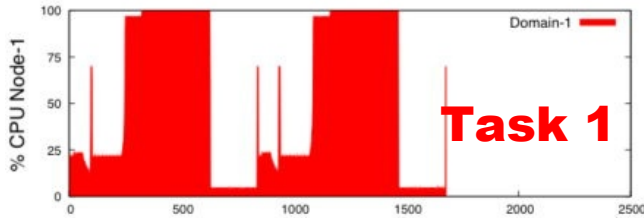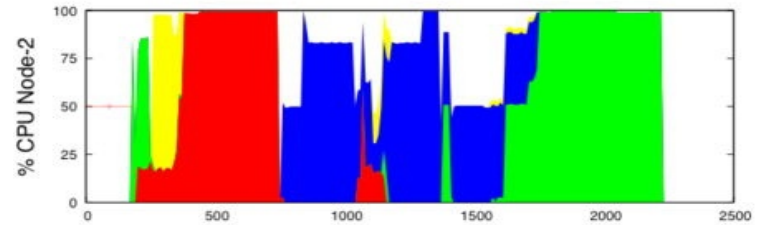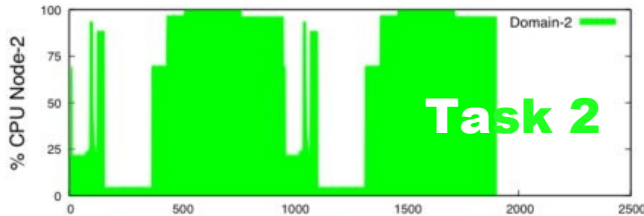⮑ **Proactive Parallel library deployed as an OSGI service**

25% Energy Savings

Before

After
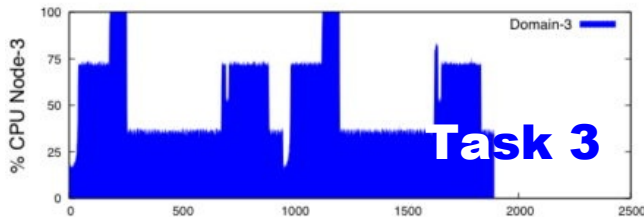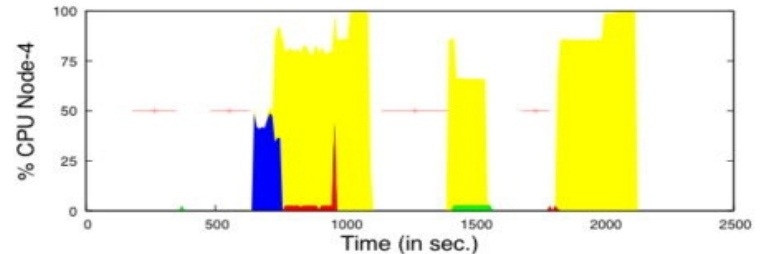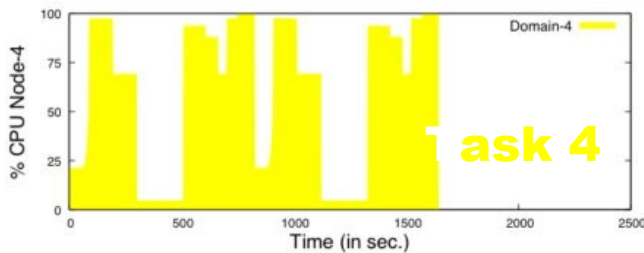
Server 1

Server 2

Server 3
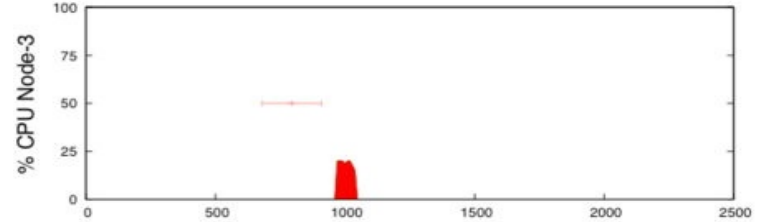
Server 4

Domain 2: Distributed interoperability architecture

- ➲ **Goal: improve interoperability between heterogeneous service domains/clouds**
  - Distributed Service Bus (DSB) made of Petals nodes organized in domains/clouds
  - Highly distributed service architectures
  - Beyond first generation cloud
- ➲ **Challenges**
  - Large scale P2P distributed registry
  - QoS policy management over heterogeneous domains
  - Inter clouds interoperability
- ➲ **Use Case: Deployment on Grid 5000 (?)**
  - An infrastructure distributed in 9 sites around France,
    for research in large-scale parallel and distributed systems
- ➲ **Technologies**
  - OW2: Petals ESB, ProActive
  - 3rd Party: Eucalyptus, OpenNebula, NiftyName, OpenStack, ...
  - Technology to be developed:...
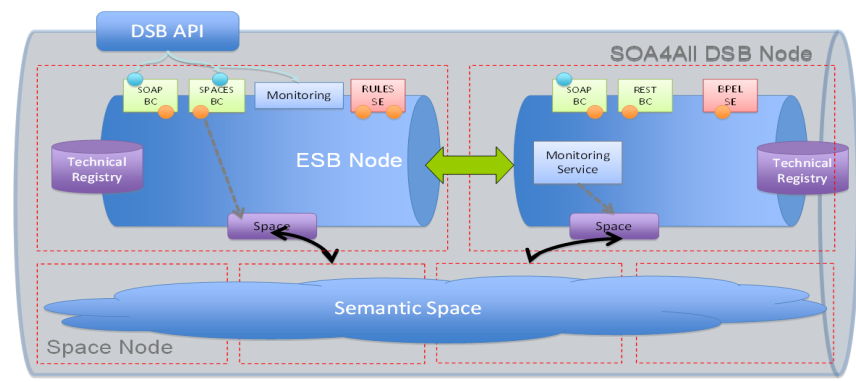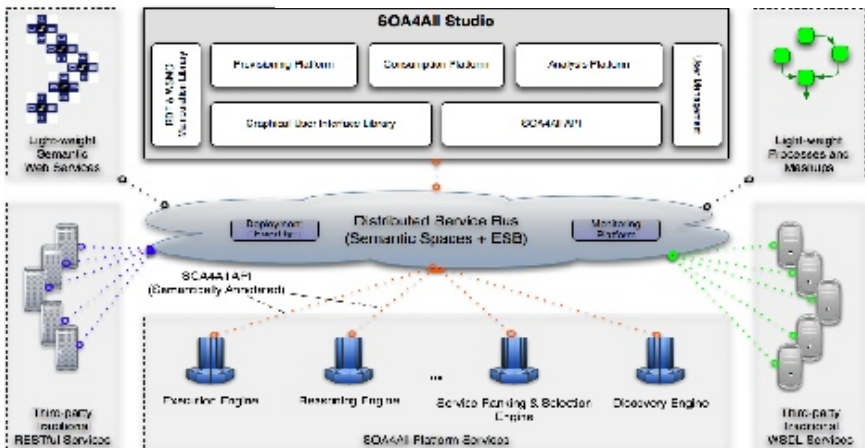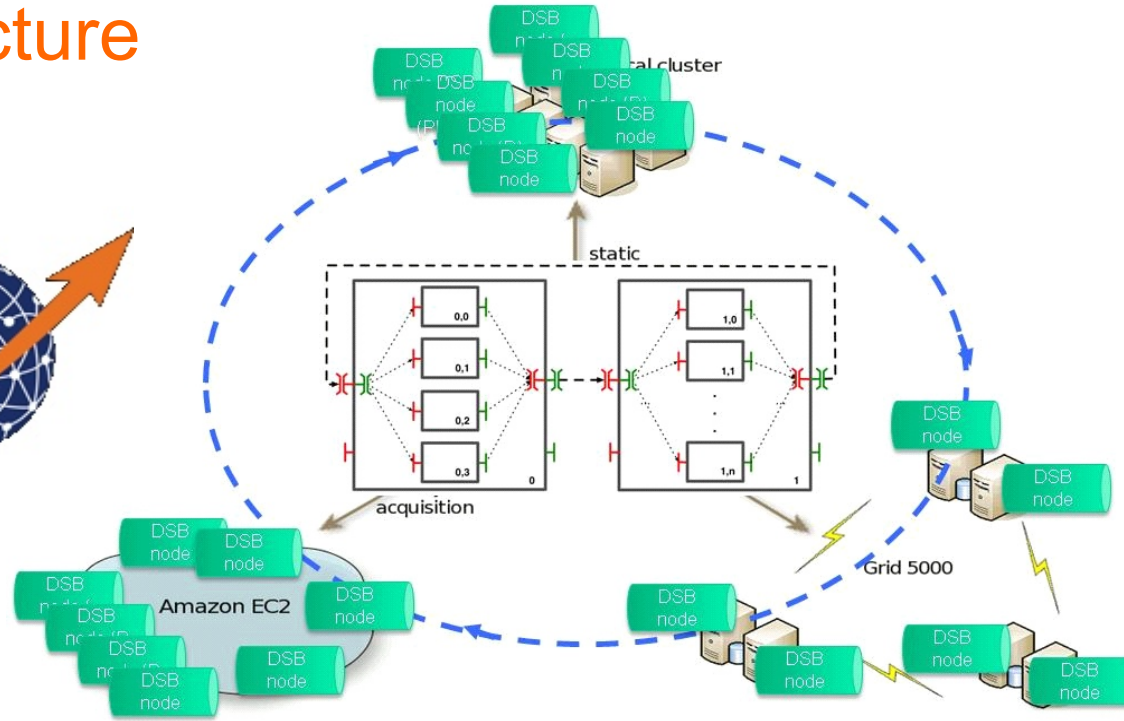- ➲ **Partners**
  - Petals Link, ActiveEon, Inria
- ➲ **Resources**
  - Collaborative projects: Soceda (ANR), Soa4all (FP7), Choreos (FP7), ...

SHORT TERM
Work
in Progress

# Distributed interoperability
Architecture

Domain 3:
BI 4 Cloud

- **Goal: Provide a framework to develop agile and robust Business Intelligence systems on the Cloud**
  - Provide cloud images pre-compiled with components for BI from industry's leading vendors
  - Provide expandable, scalable, interconnected, and robust Cloud images
  - Create separate images for database layer, data processing, reporting, monitoring and metadata exchange
- **Challenges:**
  - Sharing resources and metadata by all applications
  - Global licensing model
  - Monitoring usage and automatically scaling up/down based on usage
  - Providing upgrades as different partners promotes newer versions individually
- **Use Case:**
  - A few client's project from different industries (TBD)
- **Technologies**
  - OW2: Bonita (BPM), SpagoBi, Talend(DI,DQ,MDM)
  - 3rd Party: Ingres(RDBMS), Jaspersoft (BI),
- **Partners**
  - OW2: Bonitasoft, Engineering, Ingres, Jaspersoft,Talend (DI,DQ,MDM)
  - Non-OW2 : Bitnami, non F/OSS: RightScale (F/OSS alternative TBD)
- **Resources: Integration project**
  - Integration project

SHORT TERM
Discussions
in Progress

BI 4 Cloud
Architecture
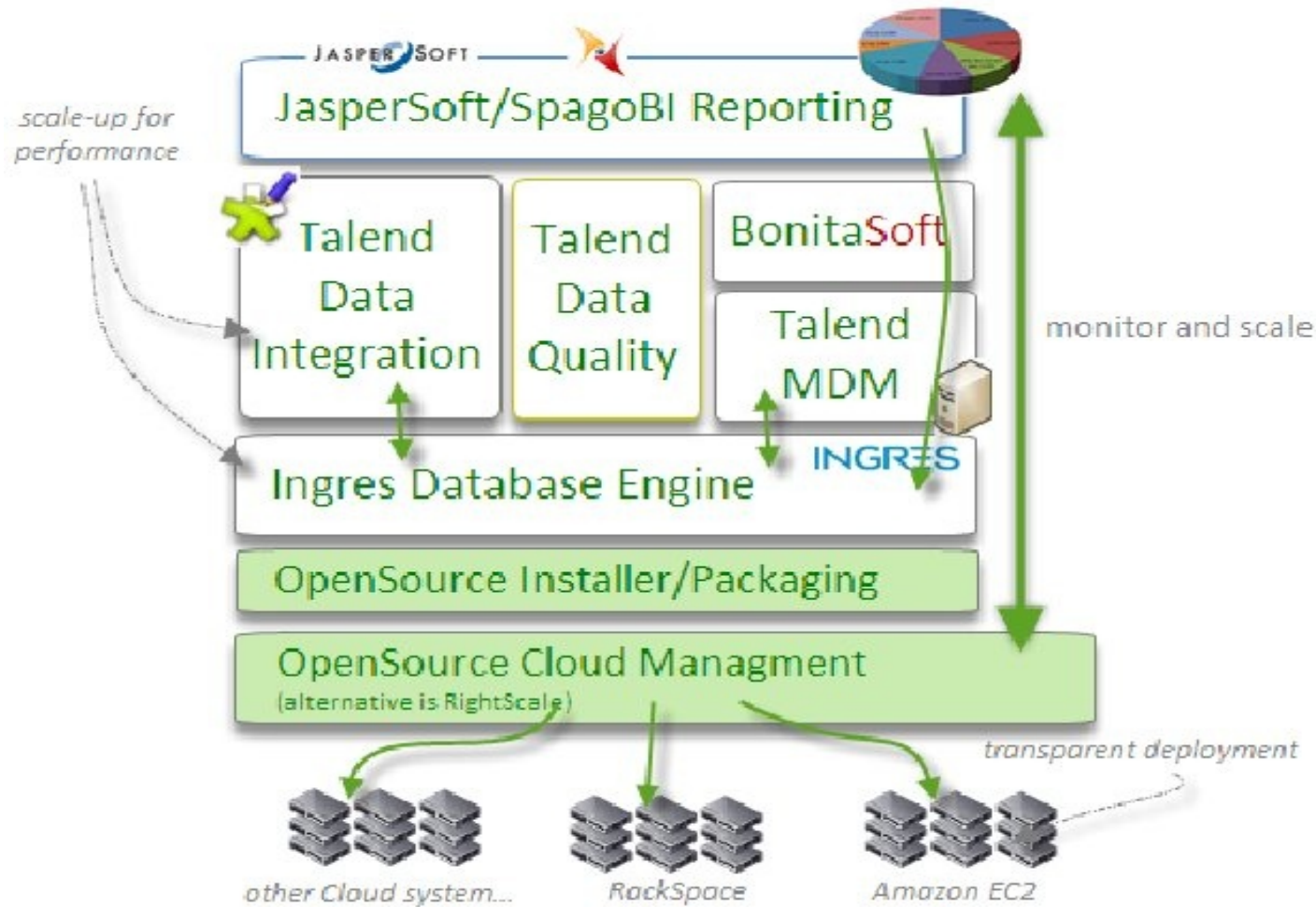
Domain 4:
Massively distributed clouds

- **Goal: improve sovereignty and privacy**
  - Non hierarchical and massively distributed cloud
    - "Freedom in the cloud" by E. Moglen, Feb 2010
      see http://www.2020flossroadmap.org/2010-version/
      - From Diaspora to SeaMicro, from Hedera Tech to ViFib, from Marvell ShivaPlug (VARs TonidoPlug, PogoPlug, Ctera CloudPlug, Axentra HipServ,Eyecon) to TI Beagle Board
  - Next generation cloud architecture
  - New home services (private cloud): *"access your applications, files, photos, music and media from anywhere via a web browser "*
- **Challenges**
  - Large scale distribution, super elasticity and automation for massively decentralized systems
  - Security, safety and privacy e.g. cryptography for the masses, personal control
  - Energy efficiency on massive scales
  - High speed public network
- **Use Case: domestic cloud for citizens**
- **Technologies**
  - Key R&D trend for next 5 years with technological challenges
- **Partners**
  - Research: INRIA (J-B. Stefani, F. Lefessant, P. Merle), CNRS (E. Benazera)
- **Resources**
  - Which collaborative projects? ANR, FP7, FUI, Grand Emprunt, Economie Digitale

LONG TERM
Discussions
in Progress

Massively distributed clouds
Specifications *(as for 2010)*

⮑ Features

- **Mobile**
  - pluggable on network
- **User friendly**
  - "wall wart" form factor
  - set-up by vendor services
- **Smart appliance**
  - automated boot
  - network connectivity (dynamic IP address)
  - data synchronization (personal data from any social networks)
  - encrypted backup to trustworthy clouds with multiple replication
  - secured connection with trustworthy clouds
- **Power efficient**
  - green computing device

Gigabit Ethernet
USB
Digital Media Storage
USB Camera
Ethernet
DAS box
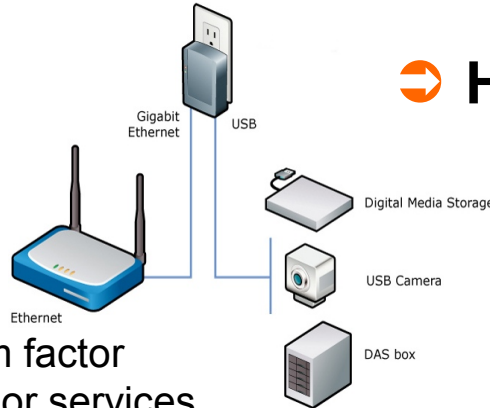
⮑ Hardware

- ARM 1.2GHz
- 512MB RAM
- 512MB Flash
- USB 2.0, SDIO
- Gigabit Ethernet
- 5 -7 Watts

Today $79
2015 $29
With SDK $99

⮑ Software

- OS: GNU Linux, TCP/IP, HTTP server (Apache, lighttpd, tiny httpd, ...), VPN, Backup + **SDK**
- OW2 cloudware: JOnAS, Petals
- Social: Plexus, Diaspora, Torrent,Identi.ca ...

3rd Party OSGI Bundles
3rd Party Apps | OSGI
OEM App | RainDrop API | Java VM
Customizable & Extensible Infrastructure
Kernel

fedora
debian
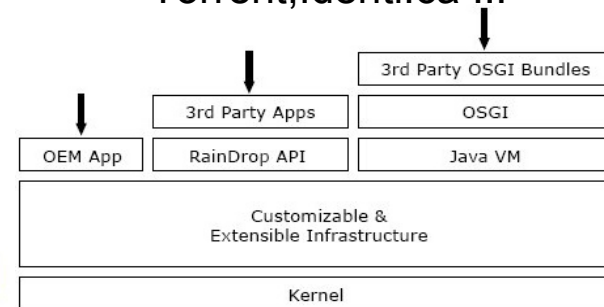
Massively distributed clouds
Architecture (as for 2010)

Source: http://www.openplug.org/
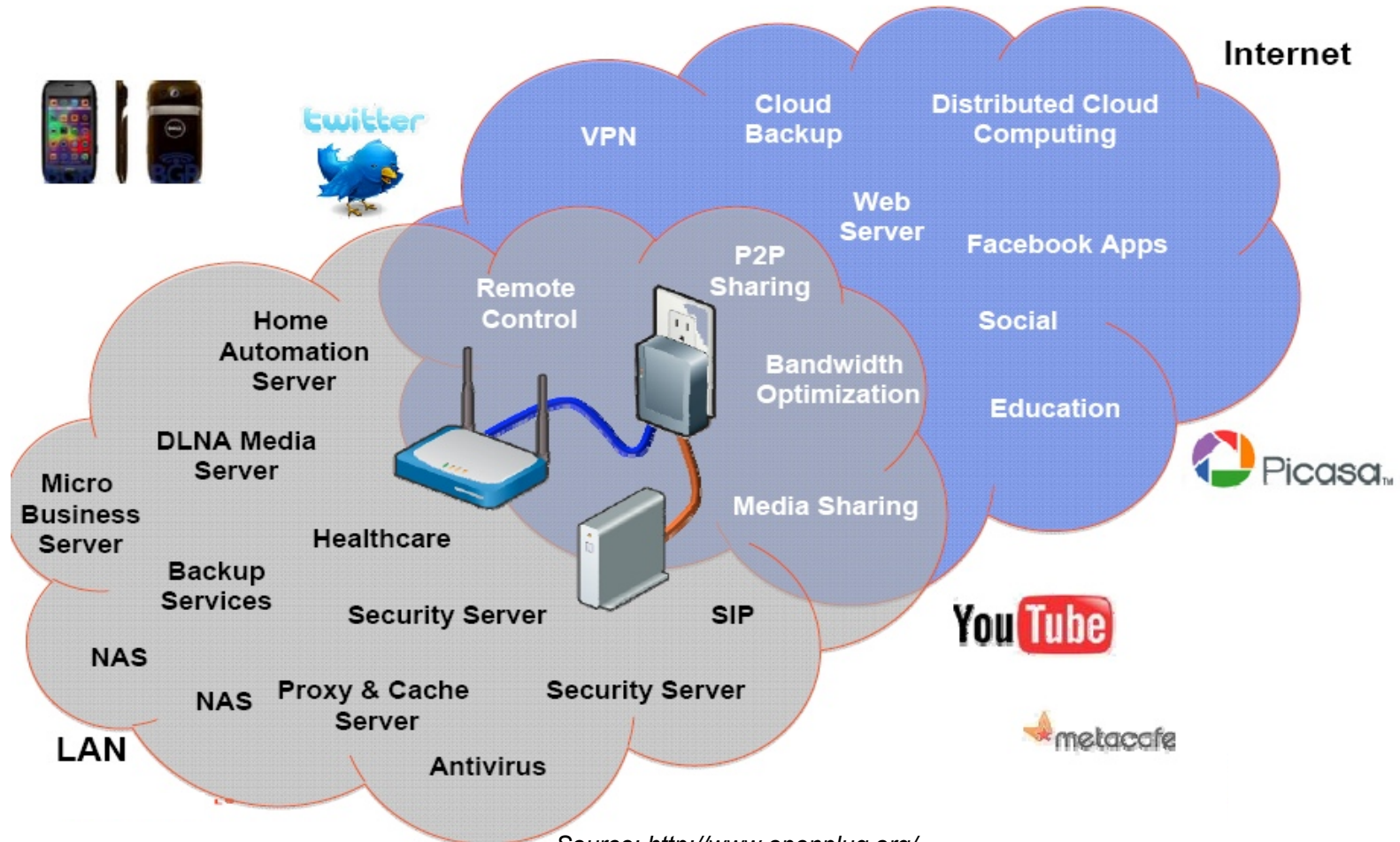
http://www.youtube.com/watch?v=3y72F3SDjM4&feature=player_embedded

OSCi Presentation v0,1

Massively distributed clouds
Architecture (as for 2015 - Draft)

Open Cloud

Public Services

Commercial Services

Cultural Services

VPN
Remote Control

P2P Sharing

Home Automation Server

Bandwidth Optimization

DLNA Media Server

Encrypted Backup

Micro Business Server

Identi.ca

Media Sharing

Healthcare

Backup Services

Security Server

SIP

Diaspora

Social

NAS

NAS

Proxy & Cache Server

Security Server

@Home Web

Antivirus

Trustworthy 1

Trustworthy 2

Current Collaborative Projects

4Caast *(EU FP7) Bull, Bonitasoft, UCM*
Jonas, Jasmine, Orchestra, Bonita, OpenNebula

Choreos *(EU FP7) PetalsLink, USP, Inria, **OW2***
Petals

Compatible One *(FR FUI10) Inria, Bull, Institut Telecom,xWiki,**OW2***
Jonas, Jasmine, ProActive, Entropy
3rd party projects

EASI-Clouds *(EU EUREKA) Bull*
Jonas

InternetWare *(PRC 863) PKU*
Jonas, Jasmine,

OSAMI *(EU EUREKA) Large European consortium leaded by Telvent with Bull, Eteration*
Jonas, Easybeans, Jasmine, Eclipse WTP+STP

PLAY *(EU FP7) PetalsLink, INRIA, FT*
Petals, ProActive

SelfXL *(FR ANR) Bull, Inria, Ecoles Mines Nantes, FT*
Jonas, Jasmine, Clif, ProActive, Entropy

SOA4ALL *(EU FP7) Petals Link, Inria*
Petals, ProActive

SocEDA *(FR ANR) Petals Link, ActiveEon, FT, Inria*
*Petals, ProActive*

Trustie *(PRC P863) Buaa, Nudt, Iscas, Pku, Cvic*

3rd Party Projects (F/OSS)

- Libraries / APIs:
  Deltacloud, jCloud, libvirt, libCloud, ...

- VM:
  Abiquo, Convirt, KVM, OpenVZ, Qemu, VirtualBox, Xen, …

- Development:
  JEE, Eclipse, POJO, Spring, Seam, Struts, GWT, Groovy, JRuby, V8, ...

- IaaS:
  ControlTier, Enomaly, Eucalyptus, OpenNebula, NiftyName, Nimbus, OpenStack, OpenQRM, Puppet, RabbitMQ, Reservoir,Traffic Server, Ubuntu, ...

- PaaS:
  Appscale, Gearman, Heroku, Joyent, WaveMaker, …

- SaaS:
  Coadunation, Cornelios, eyeOS, Guacamol, TioLive, ...

- Deployment / Admin / Monitoring / Test:
  Bitnami, Capistrano, CDT, Cfengine, Chef, collectd, Bcfg2, Etics 2, Fabric, ganeti, Maven, Puppet, Zenoss, ...

- Storage and NO/SQL:
  Cassandra, CouchDB, DRDB, Drizzle, Flare, Memcached, MongoDB, Neopod, XtreemFS, ...

- File Systems:
  CloudStore, GlusterFS, Gpfs, Hdfs, Pohmelfs, ...

- Auto scalability:
  Scalr, ...

- Data processing:
  Hadoop, MapReduce, Pig Zookeeper, ...

- Green IT / Smart Grid:
  Nedo, …

- Billing:
  Jbilling, ...

OSCi Outreach

OpenNebula

OpenStack

NiftyName

Microsoft

Ubuntu

OSCi Presentation v0,1
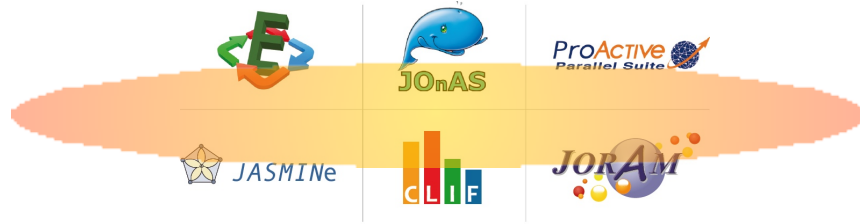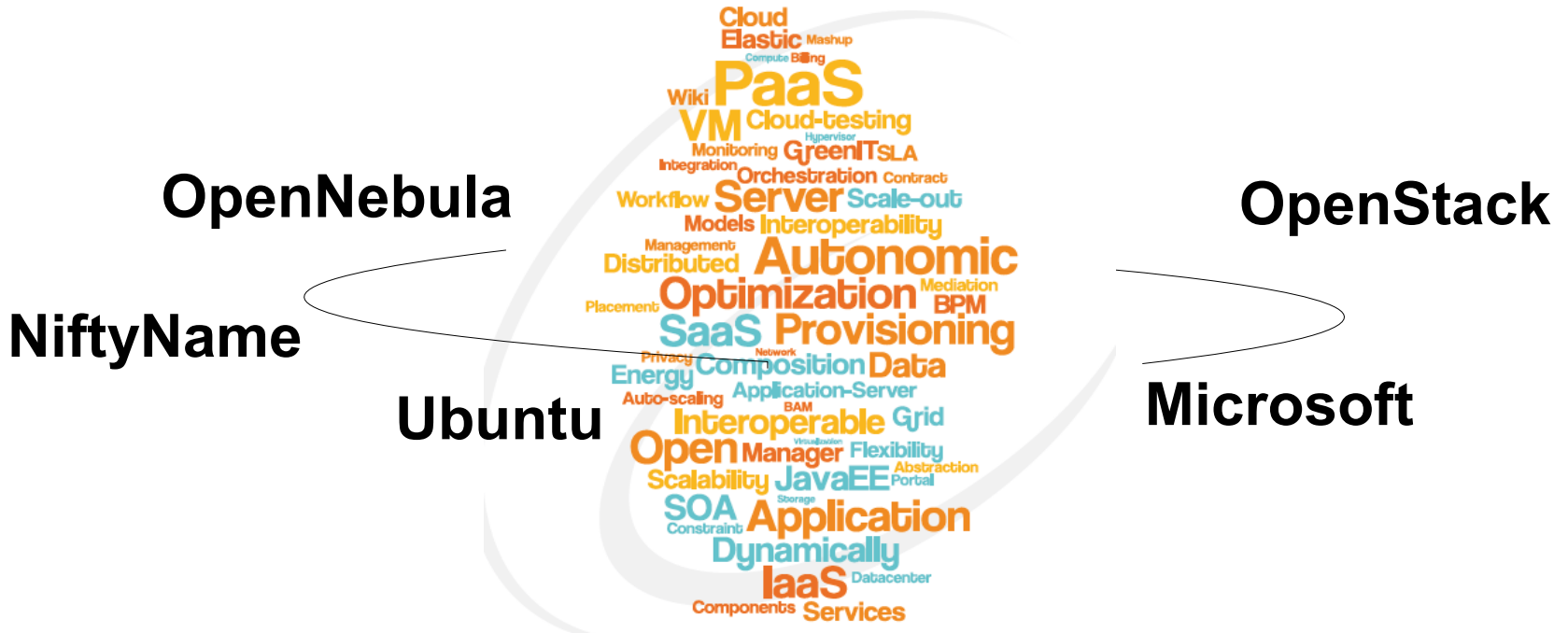
Timeline

- *May 2010:* Initiative launch and participant recruitment
    - *Invitation to OSCi Expert Group*
    - *Organize OSCi Community Management Team*
    - *Develop OSCi Research Agenda*
    - *Develop international collaborations*
    - *Organize integration and collaborative projects*

- *Sept 2010:* Workshops, seminars

- *Dec 2010: OSCi* R&D Agenda *(1st draft)*

- *Mid 2011:* First OSCi implementations

- *Dec 2011:* OSCi Summit

Be part of the action: Contact us now!

⮑ **Community Management**
- OSCi co-leaders: Jean-Pierre Laisné, Alexandre Lefebvre, Patrick Moreau
- OW2 Management Office: Cedric Thomas

⮑ **Communication**
- OW2 Management Office: Cedric Thomas

⮑ **Lobbying**
- Jean-Pierre Laisné
- Cedric Thomas
- Hongbo Xu

www.ow2.org

Enjoy the Technology!
...Join the Community!