



Free / Open Source Software & Cloud Computing

Jean-Pierre Laisné, OW2 / Bull
jean-pierre dot laisne at ow2 dot org

**Agence nationale de la sécurité
des systèmes d'information (ANSSI)**



Paris, 18 octobre 2010



OW2 Overview

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



Diversified-code organizations



Product line organizations



Technology-oriented communities



Legal resources organizations



Open Source Initiative



Standards organizations



Advocacy and lobbying organizations



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

ObjectWeb



OrientWare

- ➔ **Founded in 2004**
- ➔ **Sponsored by the Chinese Ministry of Science and Technology (MOST)**
 - Chinese National High Tech. Program (863 Program)
 - US\$1billion+ investment



OW2
Consortium

In 2007, ObjecWeb and OrientWare merge to form OW2

Structure Overview

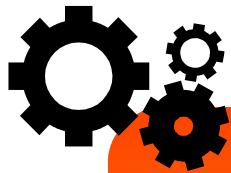
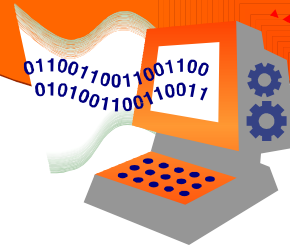


Community



Governance

**Code
Base**

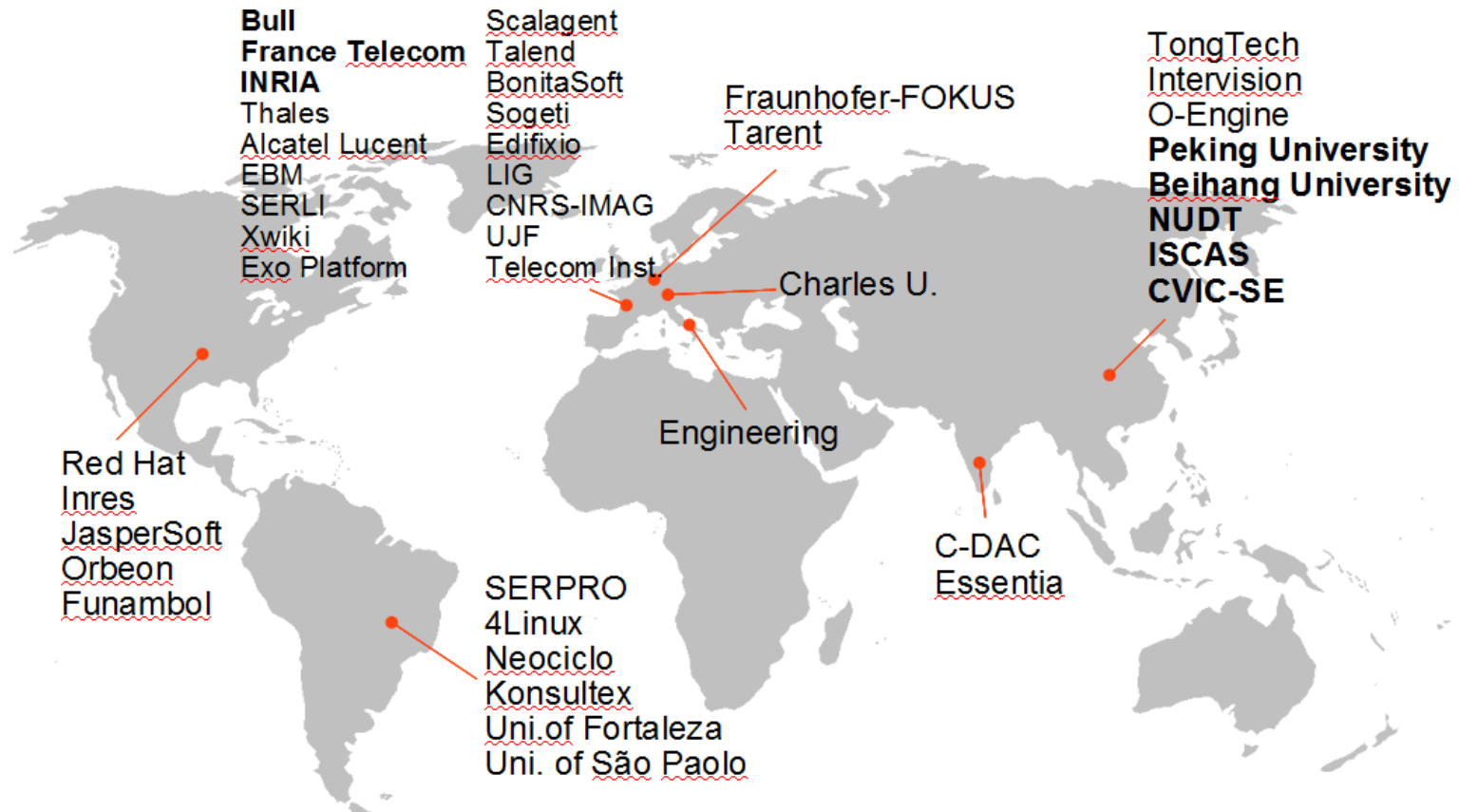


Activities



**Membership
Fees**

A truly global membership



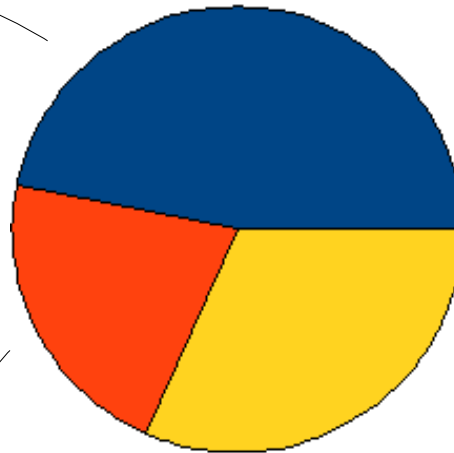
Some 80 Open Source Projects

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



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
 DryverI
 EclipseJDO
 Enhydra XMLC
 GOTM
 HOWL
 Introspector
 Jalistio
 Jonathan
 JORM

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

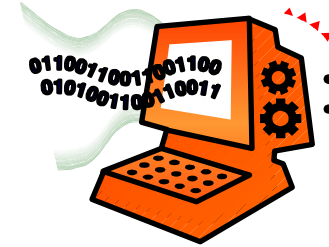


*2,5 million downloads
 per year since 2007*

OW2 Activities

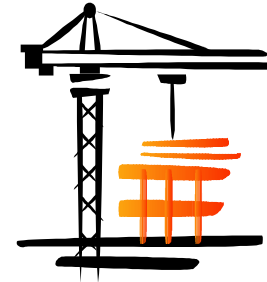
➔ Projects

- Technology Innovation



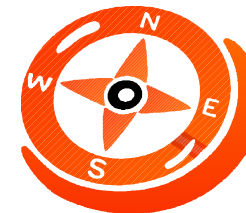
➔ Initiatives

- Business Leverage



➔ Local Chapters

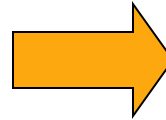
- Global Governance



IPR Policy Guidelines

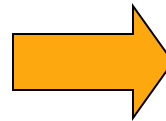


1.No OW Public License



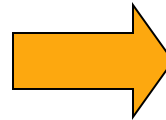
Different licenses for different contexts

2.Revocable Non-Assertion



Allows patented software into open source

3.Dual-Licensing Admitted



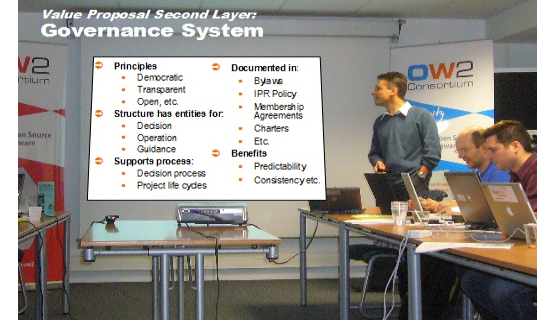
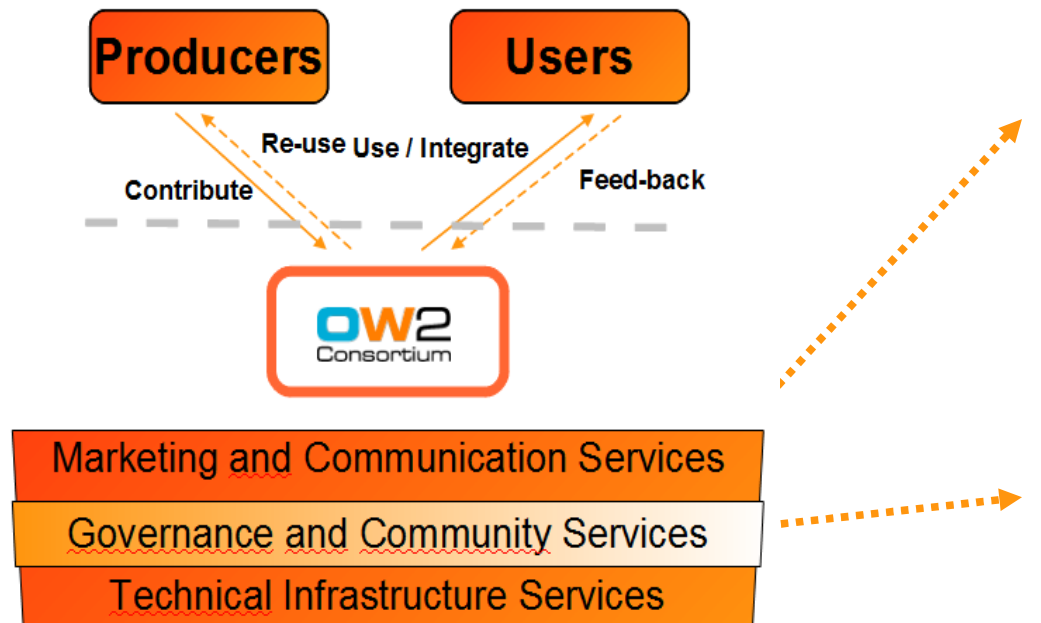
Business-friendly

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

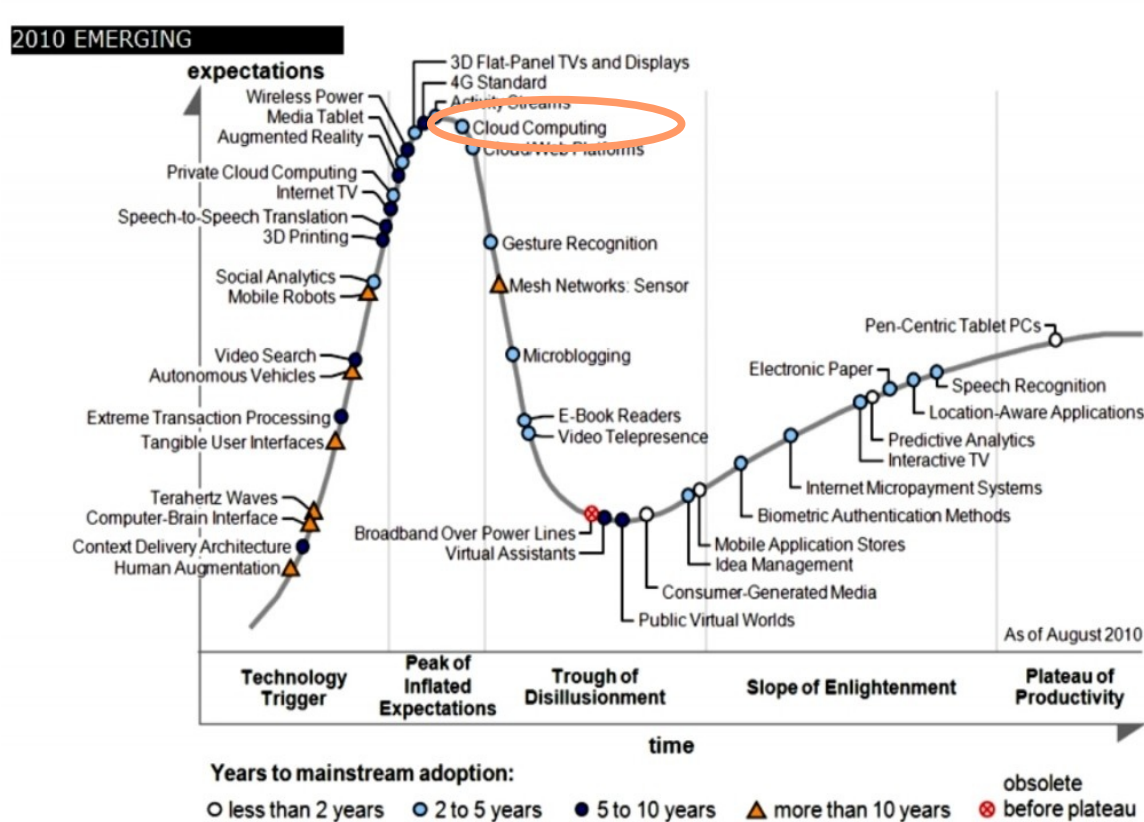


A business ecosystem platform



OW2 Strategy

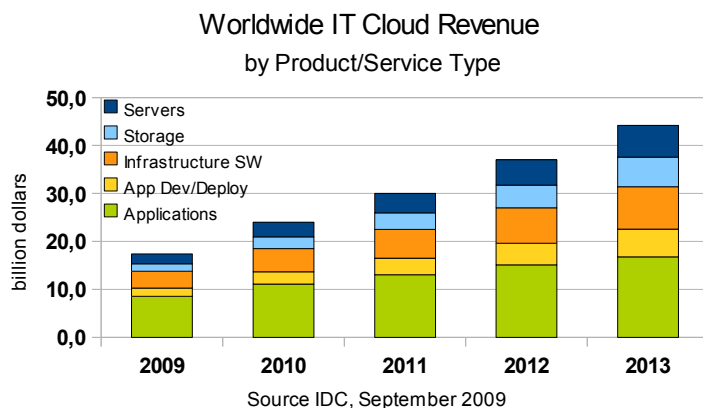
Cloud on peak of inflated expectations



Gartner

According to professional weathermen

Cloud computing is a long-term business opportunity



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

Software commoditization forms



Common Specifications

- Marginal product differentiation
- Recognized quality standards
- Substitutable goods

Mature products

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

Offshore

Open source

Cloud computing

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

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, KVM, 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

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

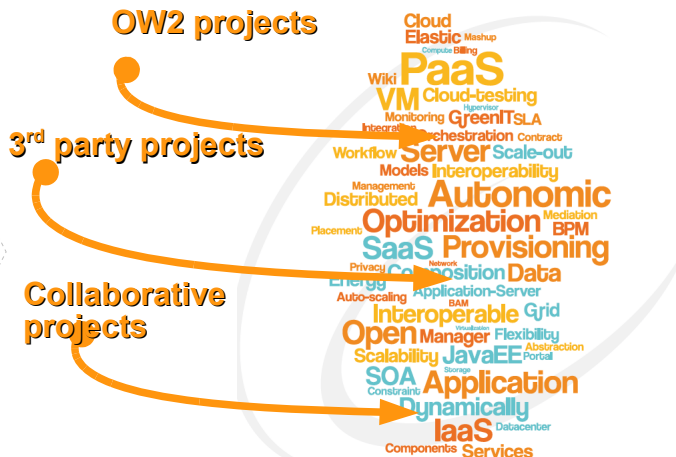
OW2 to drive
open source
innovation for
open cloud
architecture

OW2 Strategy: the Open Source Cloudware Initiative



VISION & GOALS

OW2 Technology Vision
 From Middleware to Cloudware
 Open Source for Open Cloud
 Open Source Empowerment

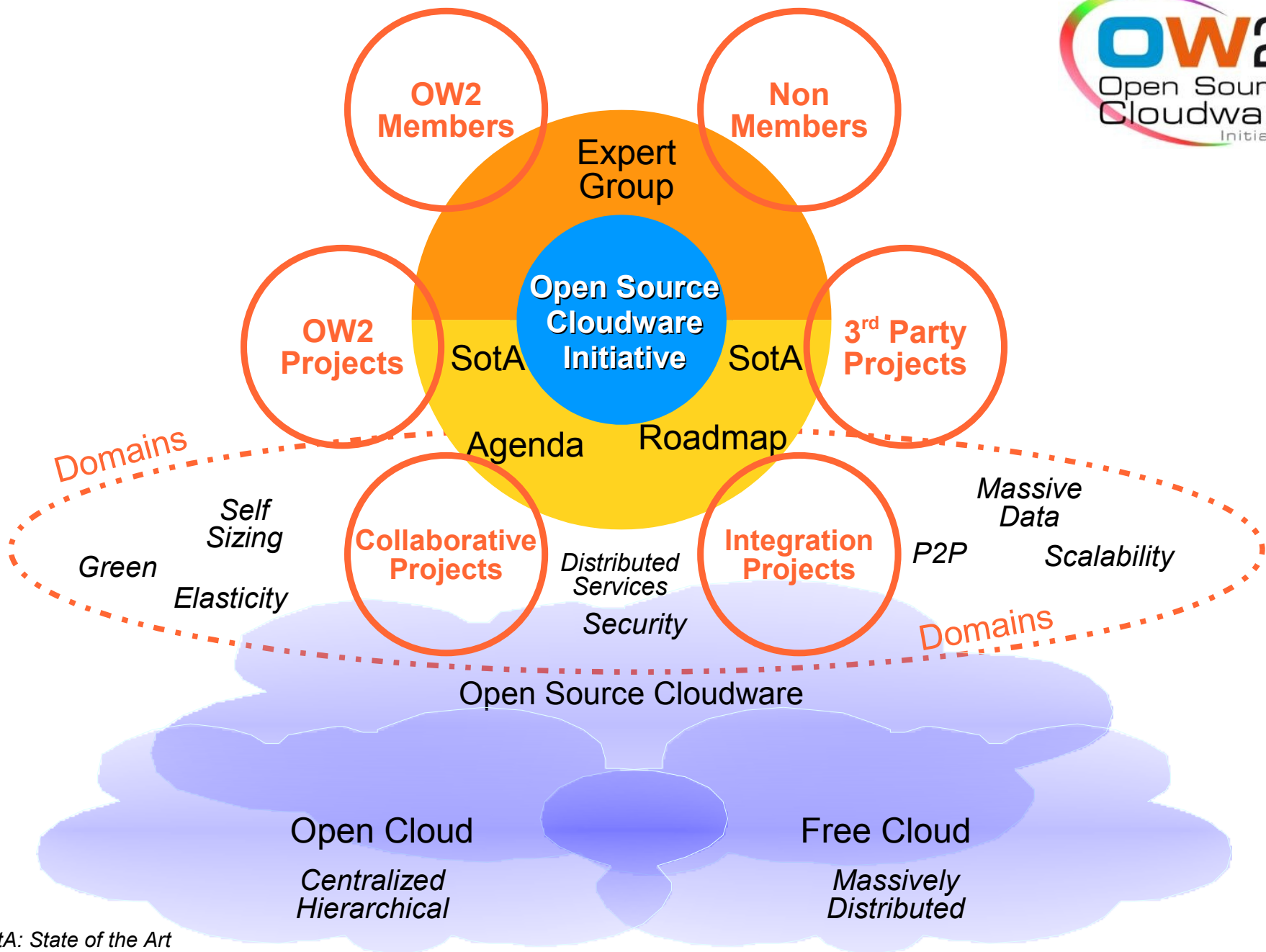


STAKEHOLDERS

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



The OW2 Open Source Cloudware Initiative



SotA: State of the Art

Open and free

- ➔ **Open as in open source**
- ➔ **Open Standards & APIs**
 - Interoperability, security
- ➔ **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, 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 research agenda 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 standard F/OSS architecture 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 collaboration 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 global business ecosystem

ActiveEon (FR)

Bonitasoft (FR)

Buaa (PRC)

Bull (FR)

Cohesive FT (US)

Cvic (PRC)

Ecole Mines Nantes (FR)

Edifixio (FR)

Engineering (IT)

Fraunhofer Fokus (DE)

Gsia (PRC)

Ingres (US)

Inria (FR)

Iscas (PRC)

Jaspersoft (US)

Konsultex (BR)

Neociclo (BR)

Nudt (PRC)

O-Engine (PRC)

Orange (FR)

Pku (PRC)

Petals Link (FR)

Talend (FR)

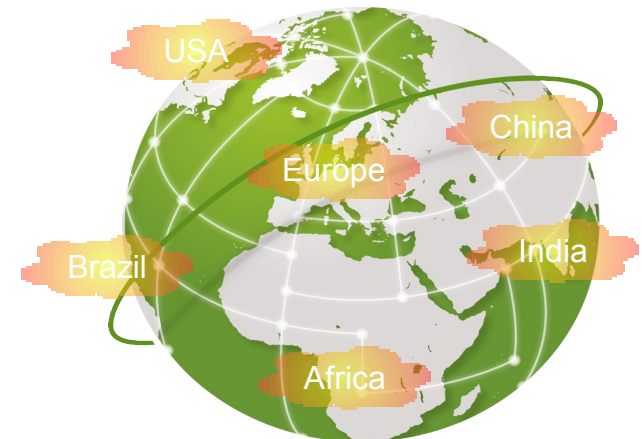
Institut Telecom (FR)

Ucm (SP)

Unifor (BR)

Usp (BR)

xWiki (FR)



Organization by Domains

1 Self-sizing & Green PaaS

- Improve overall platform efficiency

SHORT TERM
Work
in Progress

2 Interoperable Distributed Services

- 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), Interneware (863)

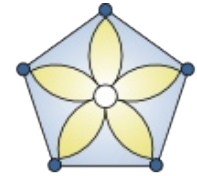


SHORT TERM
Work
in Progress

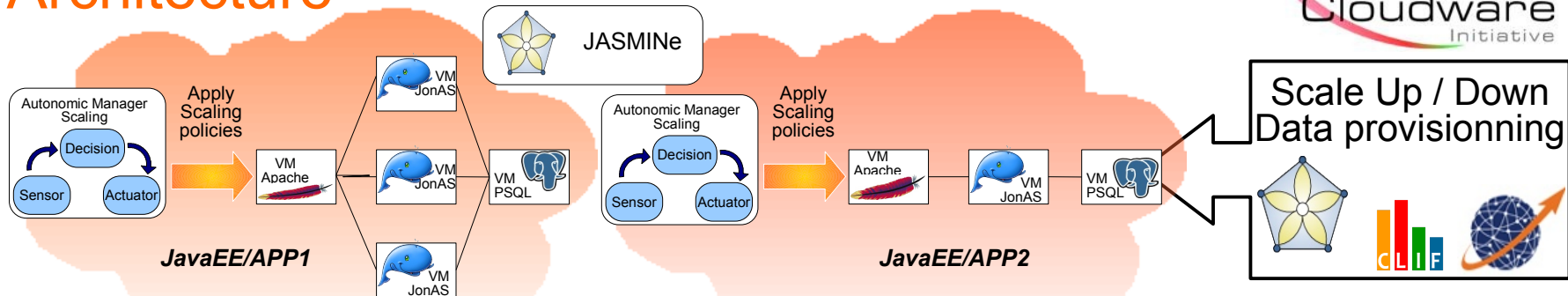
Domain 1, the OW2 Initiative Bedrock Technologies



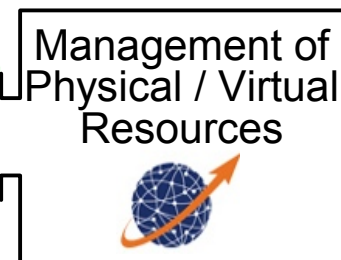
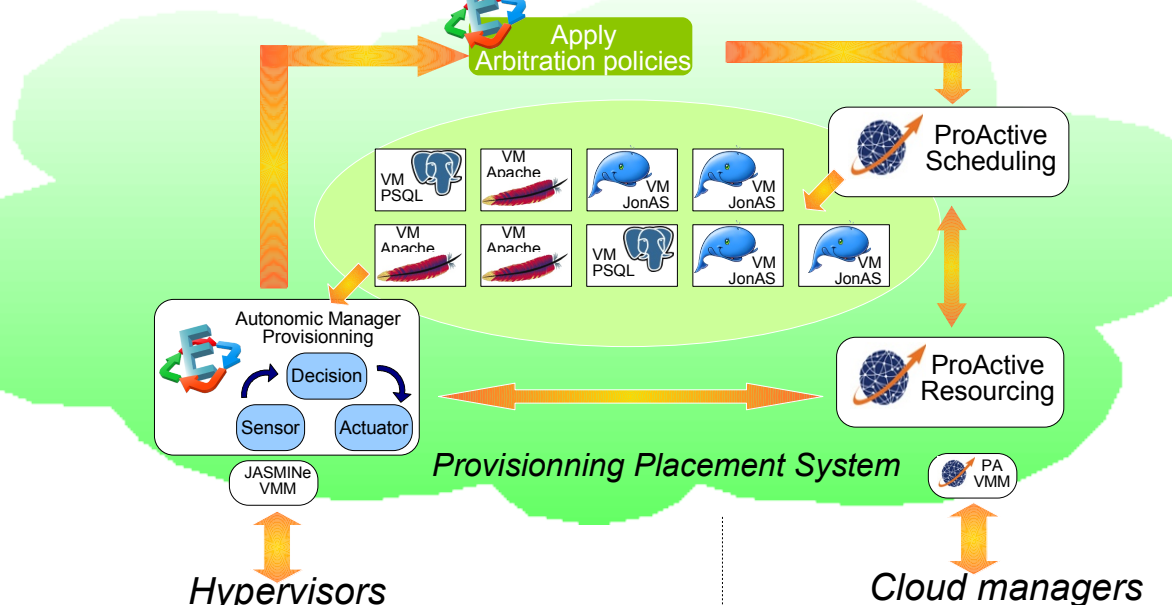
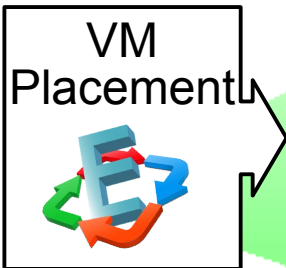
- ➔ **JOnAS** (<http://www.ow2.org/xwiki/bin/view/ActivitiesDashboard/JOnAS>)
 - Enterprise OSGi & Java EE 5 certified server
- ➔ **JASMINE** (<http://jasmine.ow2.org>)
 - Management tools for SOA platform
 - Monitoring module (probe, mediation, graphs)
 - Decision module (rules engine based)
 - Virtual 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



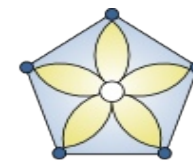
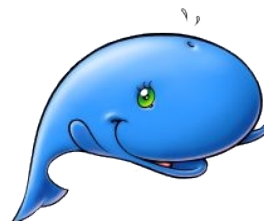
PaaS
IaaS



OpenNebula

Infrastructure

JOnAS, Jasmine: Toolset for SaaS



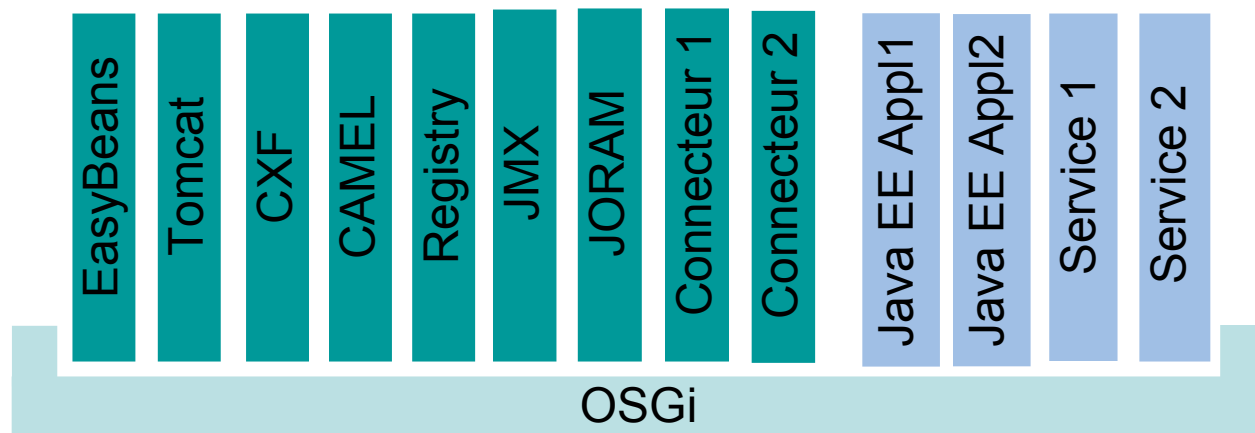
➔ **Deploy dynamically complex applications and services on Clouds**

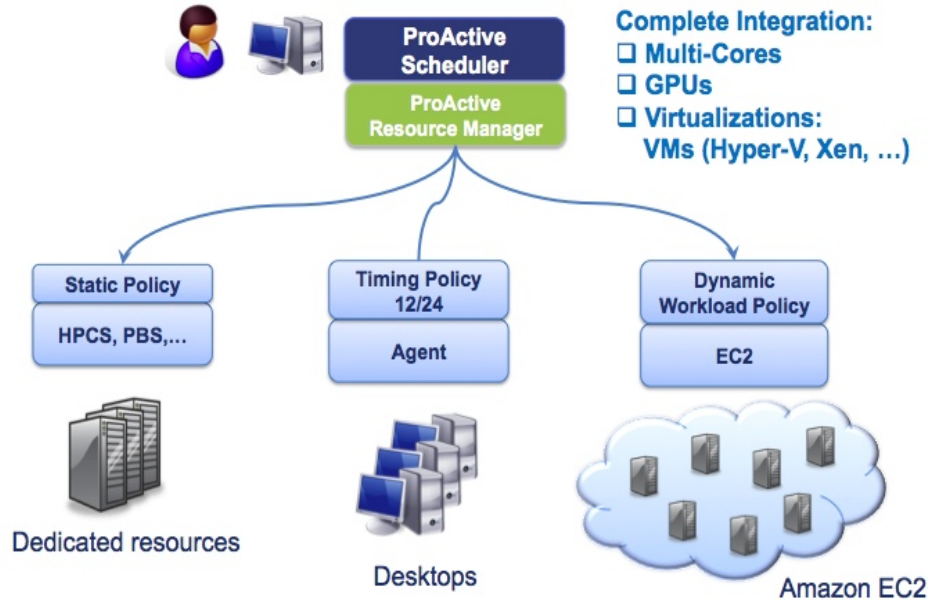
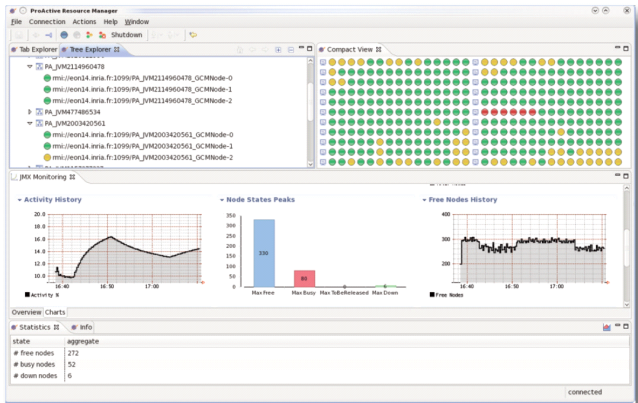
➔ **Smart Administration:**

- Supervision
- Self-management

➔ **Technologies**

- JavaEE
- OSGi
- JOnAS
- JASMINe
- Orchestra





"Infinite" resources 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



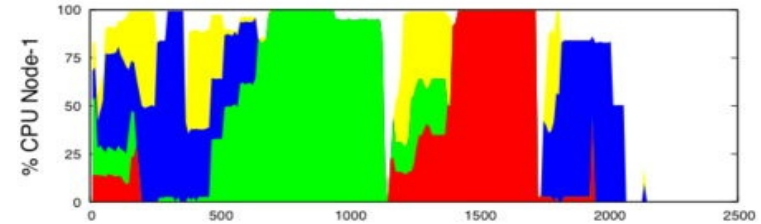
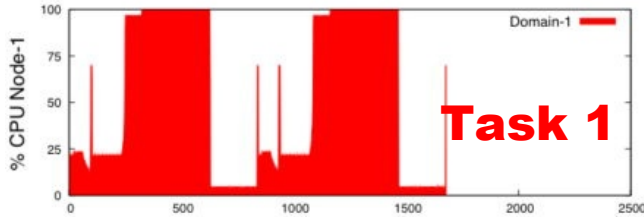
25% Energy Savings



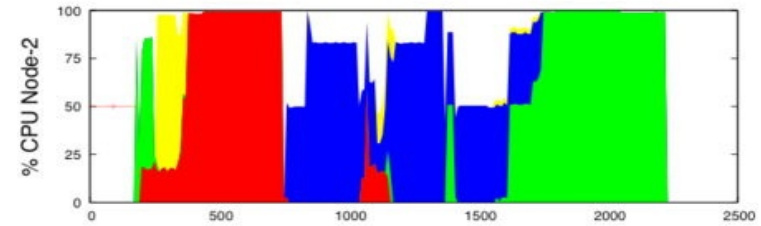
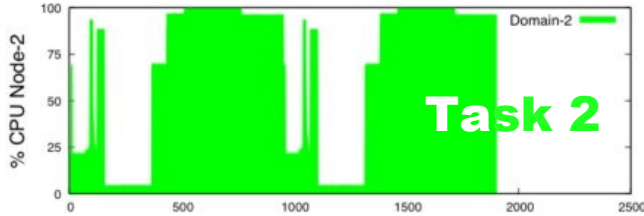
Before

After

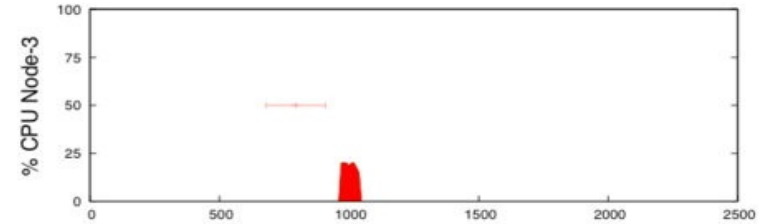
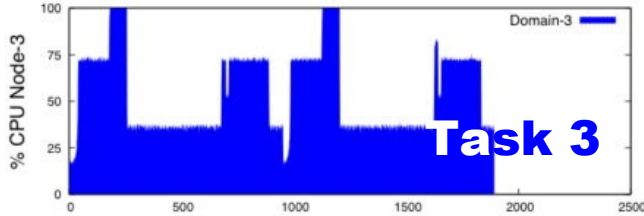
Server 1



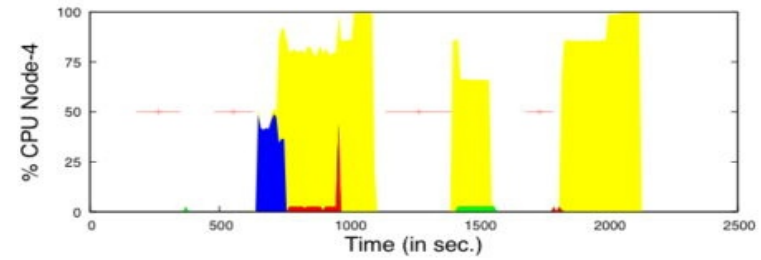
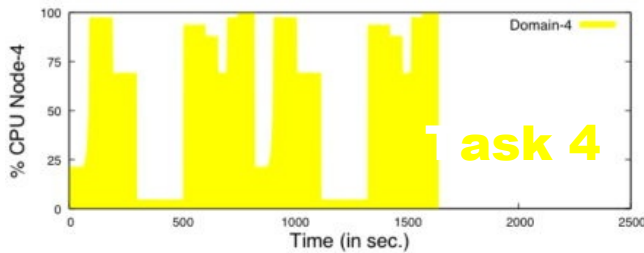
Server 2



Server 3



Server 4



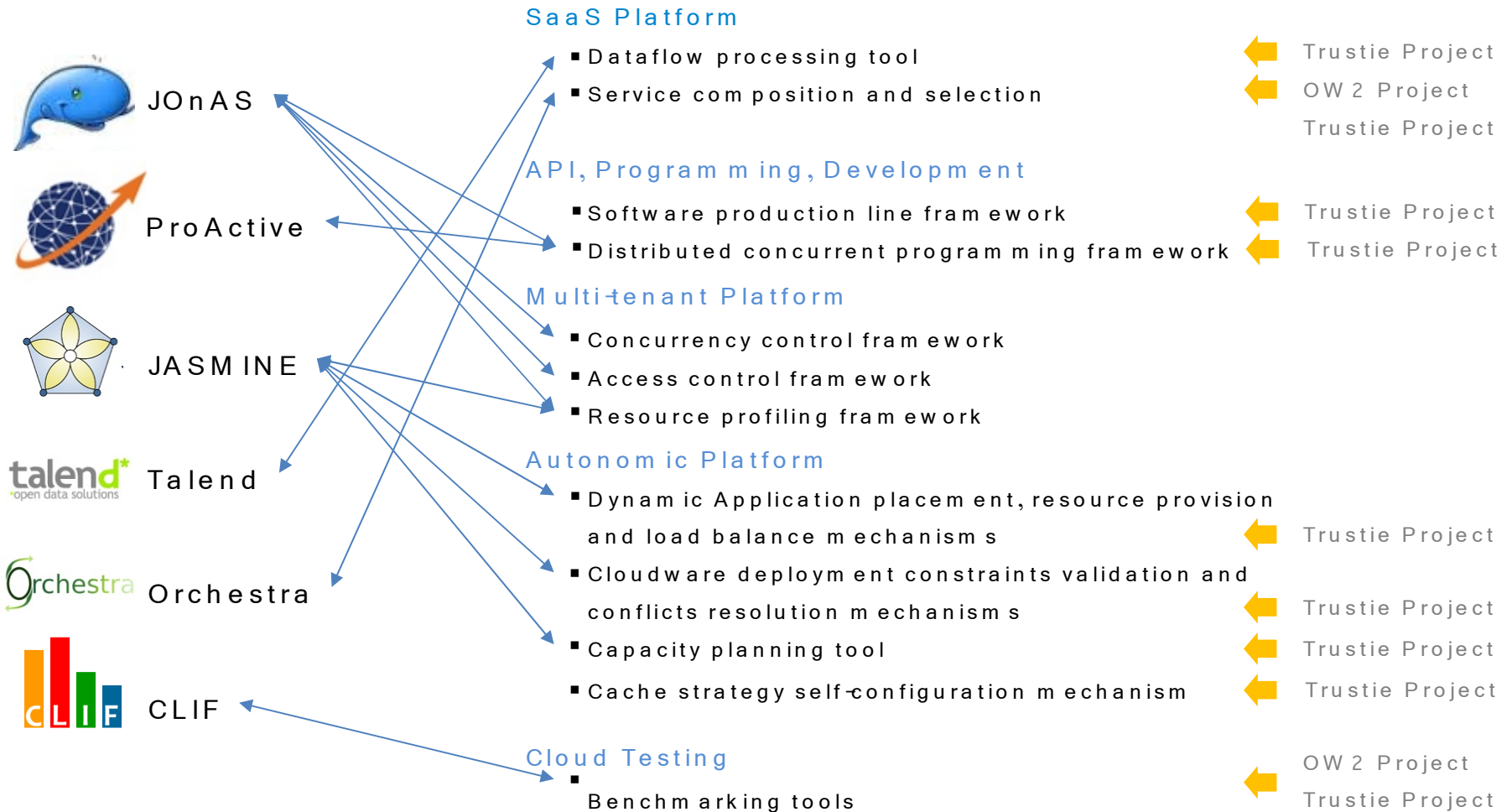
Synergies envisioned by ISCAS

(Institute of Software, Chinese Academy of Science)



OW2 Code Base

ISCAS technology 4 Cloudware



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 led 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, XtremFS, ...
- File Systems:
CloudStore, GlusterFS, Gpfs, Hdfs, Pohmelfs, ...
- Auto scalability:
Scalr, ...
- Data processing:
Hadoop, MapReduce, Pig Zookeeper, ...
- Green IT / Smart Grid:
Nedo, ...
- Billing:
Jbilling, ...

COMPATIBLE ONE



Projet FU10 labellisé par  **SYSTEM@TIC**
PARIS-REGION
Pôle de compétitivité



Objet :

Fournir un cloudware open source avec les services essentiels de la pile cloud traditionnelle (IaaS et PaaS) en tirant parti des solutions existantes afin de permettre, à faible coût, de créer, déployer, administrer et faire évoluer des clouds publics ou privés.

Partenaires :

ActiveEon, Bull, CityPassenger, Enovance, Eureva, INRIA, Institut Télécom, Lost Oasis, Mandriva, Nexedi, Nuxeo, OW2, Prologue, Xwiki

Objectifs :

1. Établir les fondations nécessaires à de futures plates-formes de Cloud Computing ouvertes, interopérables et évolutives
2. Faciliter l'accès aux technologies fondamentales du Cloud tout en veillant à influencer sur l'état de l'art
3. Favoriser le développement durable d'écosystèmes d'affaires et la prolifération d'innovations ouvertes, en mêlant à la fois concepteurs de technologies, offreurs de Clouds et offreurs et consommateurs de services

Domain 2:

Massively distributed services

➔ 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, Fraunhofer Fokus, USP

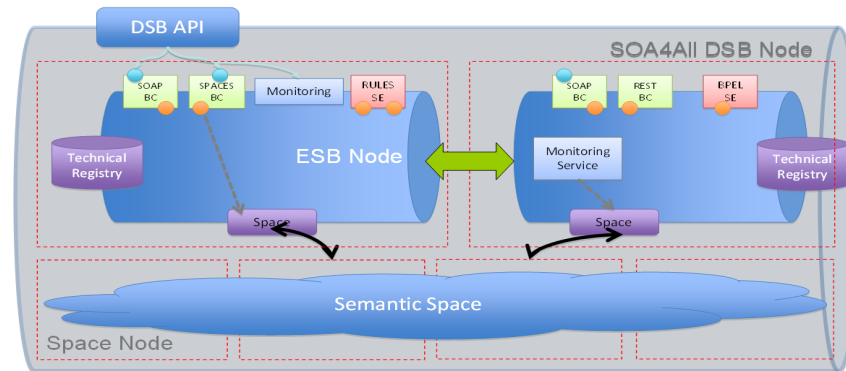
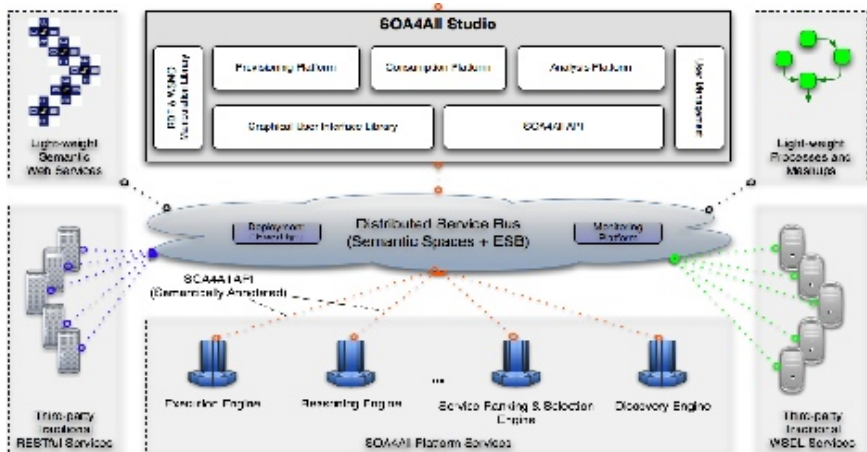
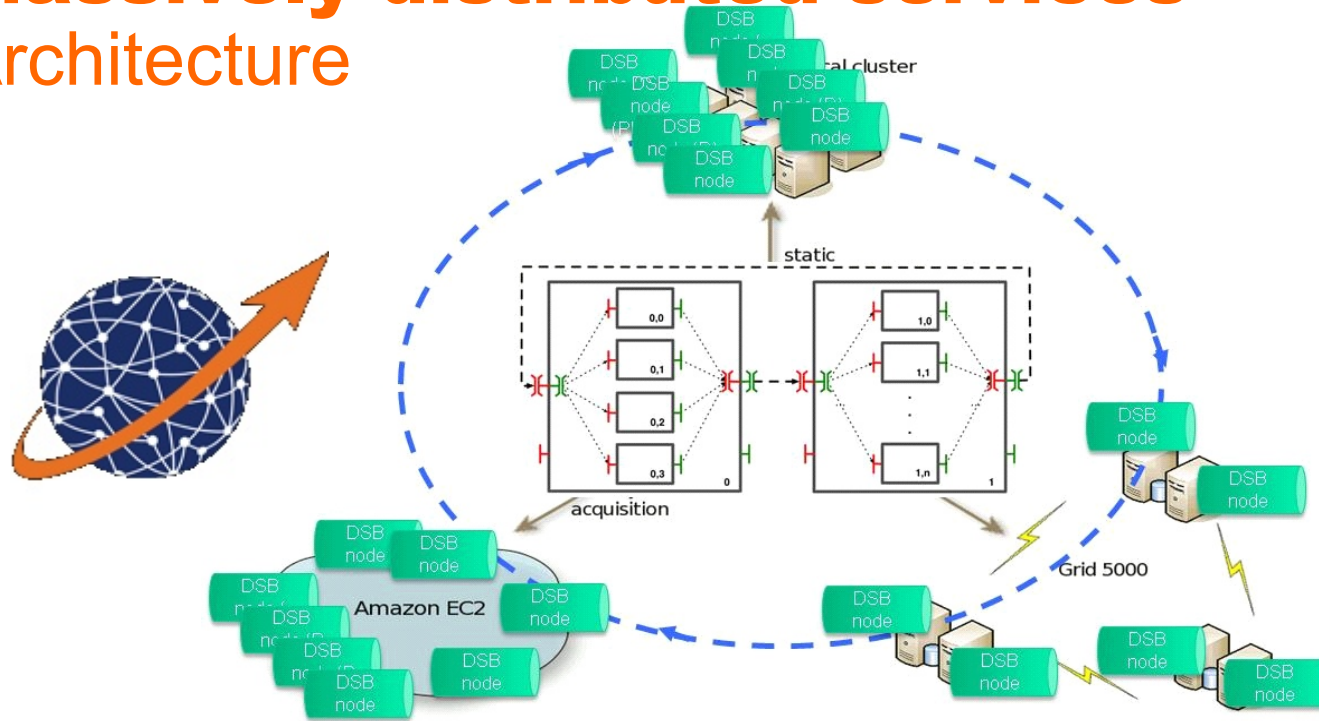
➔ Resources

- Collaborative projects: Soceda (ANR), Soa4all (FP7), Choreos (FP7), ...



SHORT TERM
Work
in Progress

Massively distributed services Architecture

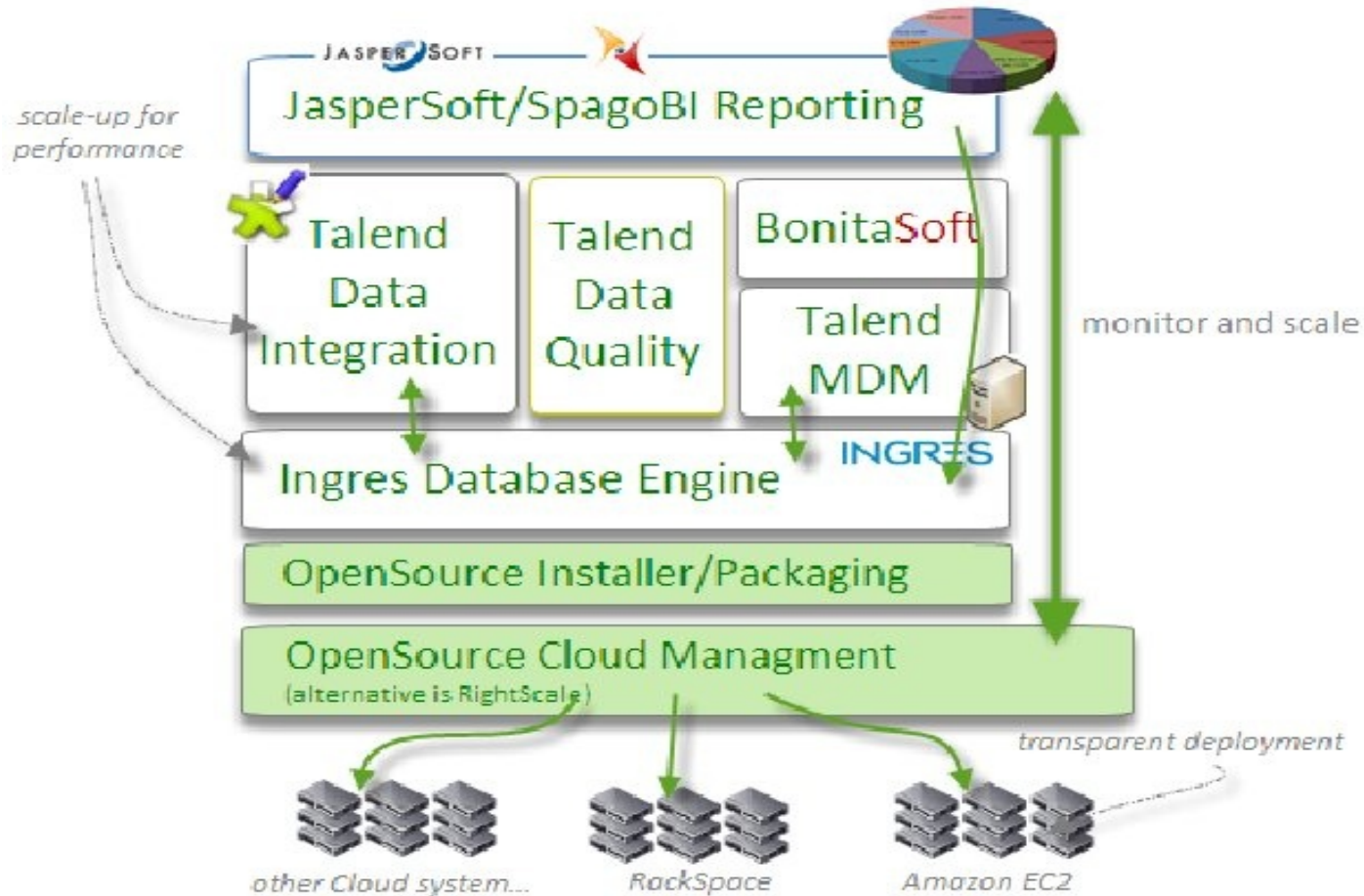


Domain 3: BI 4 Cloud

- ➔ **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 SeaMicro to ViFib or Hedera Tech, from Marvell ShivaPlug (TonidoPlug, PogoPlug, Ctera CloudPlug, Axentra HipServ, Eyecon, ...) to TI Beagle Board and Open Hardware
- 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

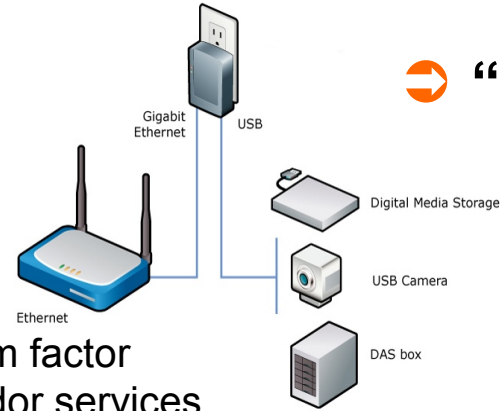
Massively distributed clouds

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



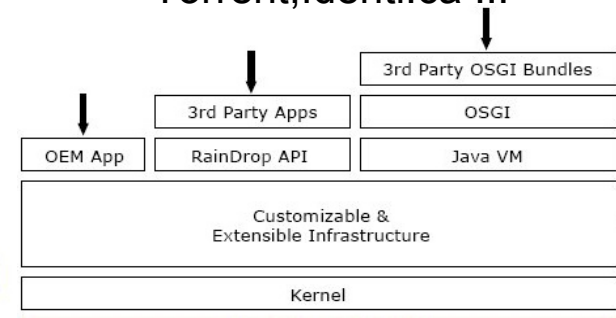
➔ “Open” HW

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

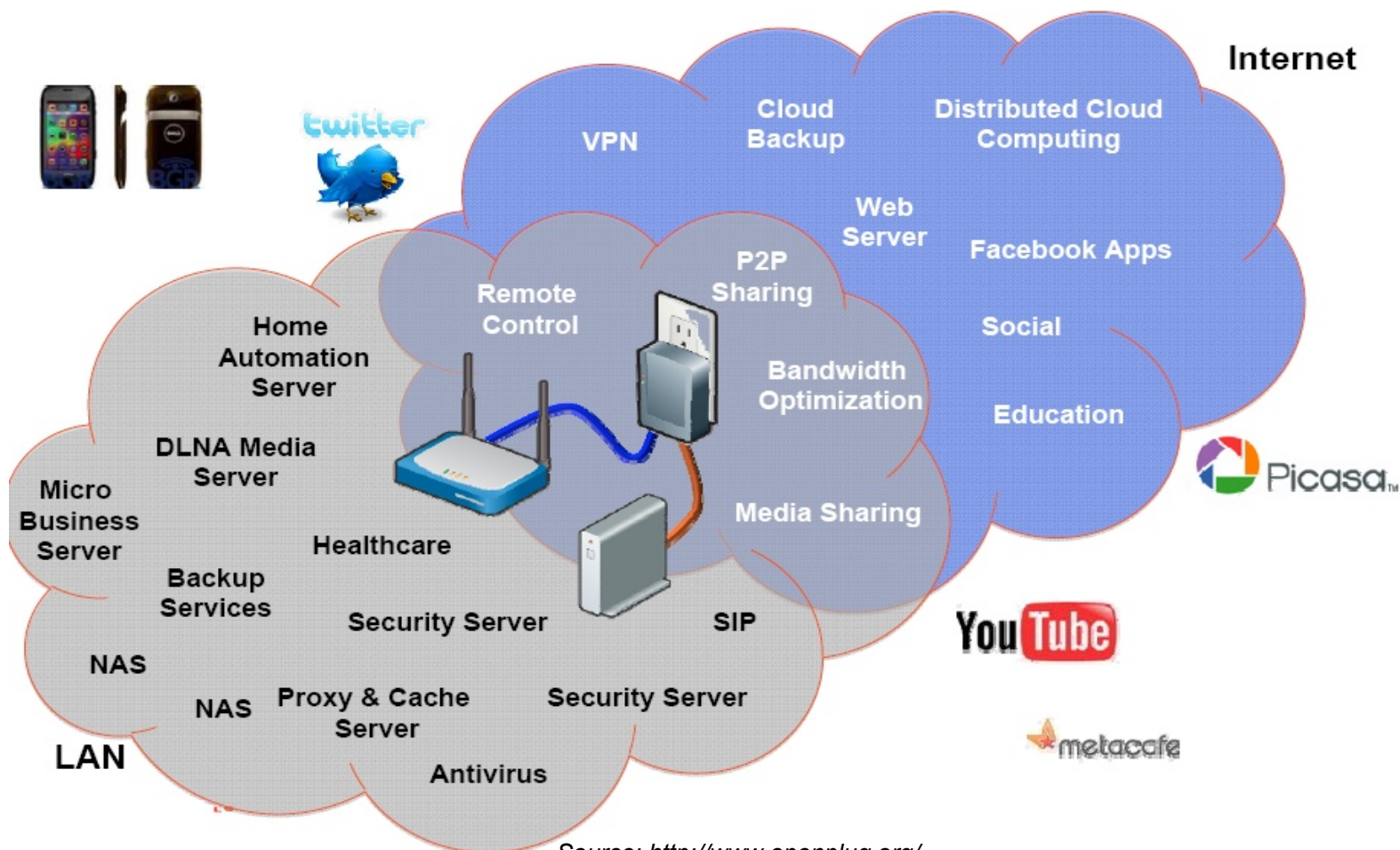


➔ F/OSS

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



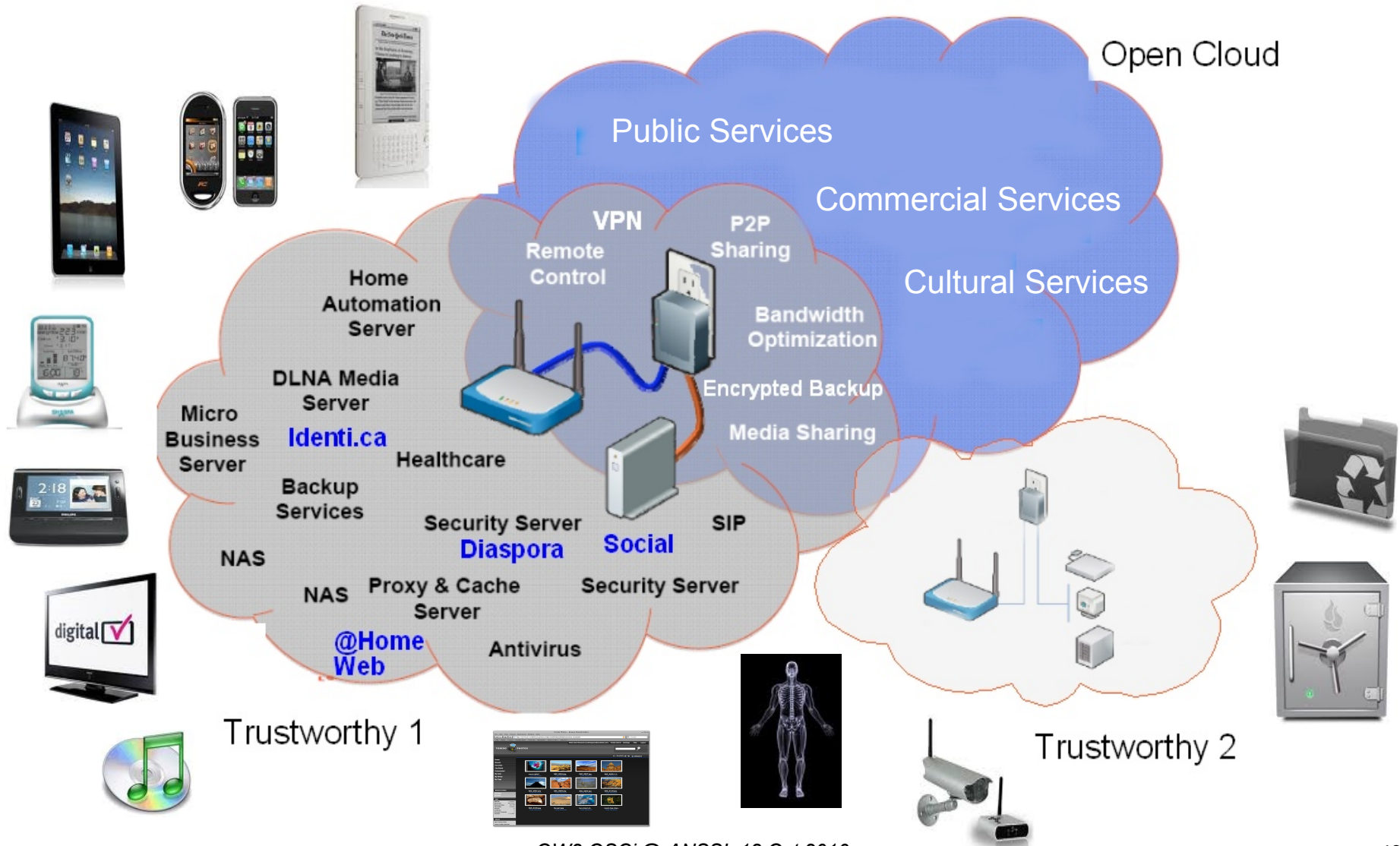
Massively distributed clouds Architecture (as for 2010)



Source: <http://www.openplug.org/>

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

Massively distributed clouds Architecture (as for 2015 - Draft)



OSCi Outreach



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*



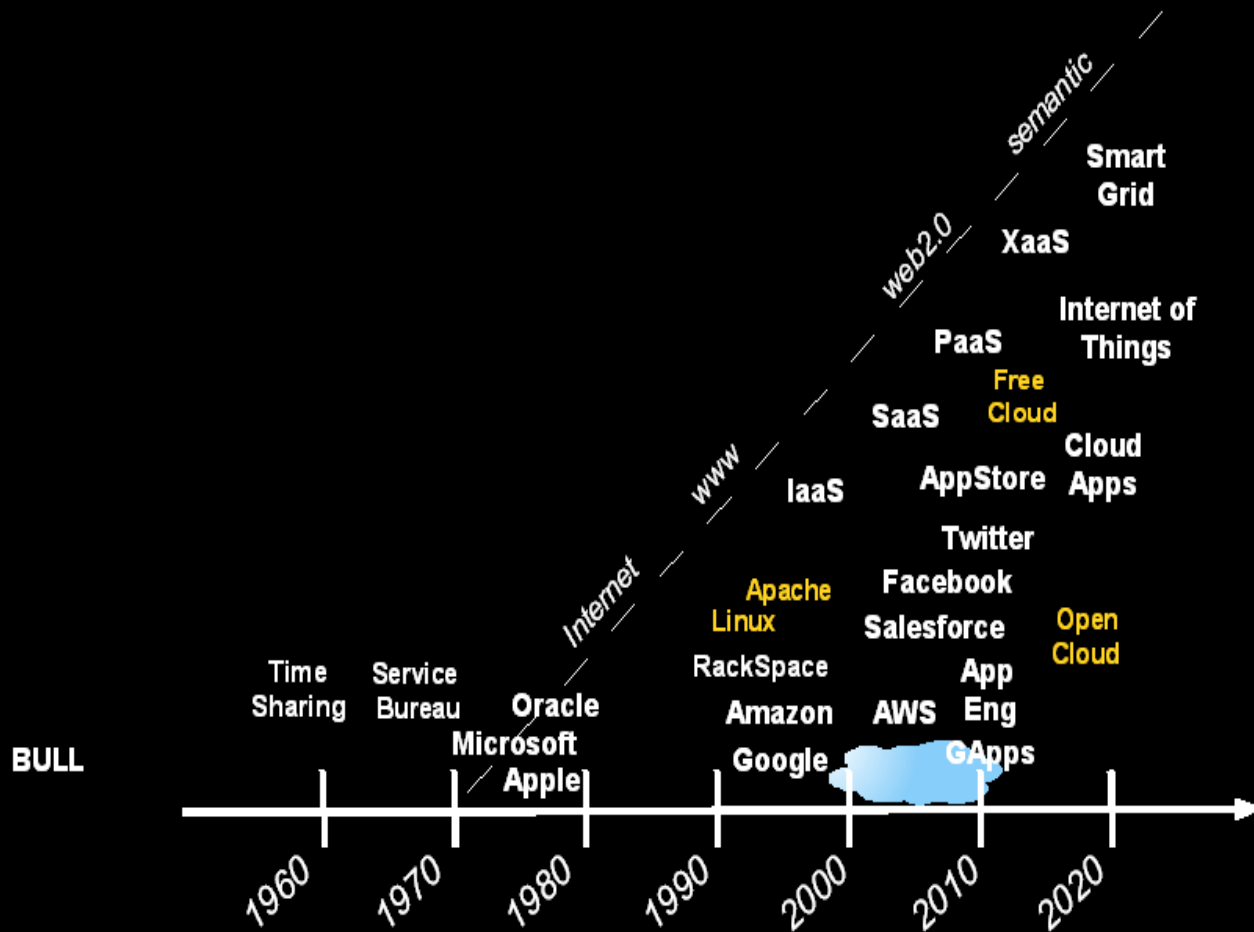


www.ow2.org

Enjoy the Technology!
...Join the Community!

BACK UP

Cloud Forecast



Cloudy but shiny

Public Cloud
Private Cloud
Hybrid Cloud

Integration
Value-Add
Applications

Virtualization
Storage
Cloud OS
DC Management
Cloud Management

On Demand
Broad Network Access
Resource Pooling
Rapid Elasticity
Measured Service

No Capex
Lower Costs
Greater Automation

Flexibility
Auto-scaling
Rapid provisioning
Auto-recovery

Cloud Services
IaaS / PaaS / SaaS / XaaS

An overcast sky



New trends, new usages, new business

- Apps vs. web pages
 - *Specialized apps vs. HTML5*
 - *Segmentation vs. Uniformity*
- User “friendly”
 - *Pay for convenience*
- New devices
 - *Phones, TV, appliances, etc.*
- **Global economic benefits of the Internet**
 - **2010: \$1.5 Trillion**
 - **2020: \$3.8 Trillion**

Information Technology and Innovation Foundation (ITIF)



Long live the Internet