ProActive Parallel Suite and OW2 OSCi: From Multi-Cores to Multi-Clouds

D. Caromel, et al.

Agenda

1. CLOUD Computing & Virtualization
2. OSCi 4 Domains
3. ProActive Parallel Suite
   Programming, Scheduling, Resourcing
4. Use Cases & Demos
5. Conclusion: Cloud Revolution ?

Cloud Computing Revolution ?

CLOUD Revolution ?

- 1990: PCs
- 2000: Internet for Companies
- 2010: Cloud for Companies

Concept: John McCarthy in 1961 originally coin the expression "Utility Computing" (Electricity, Water, Gas)

Today: How could we do without Internet and Google Search ?

In 2020: Cloud taken for granted ?

Today: We buy Network, Hardware, Software, Services
Tomorrow: Cloud Services (hiding N, H, S)

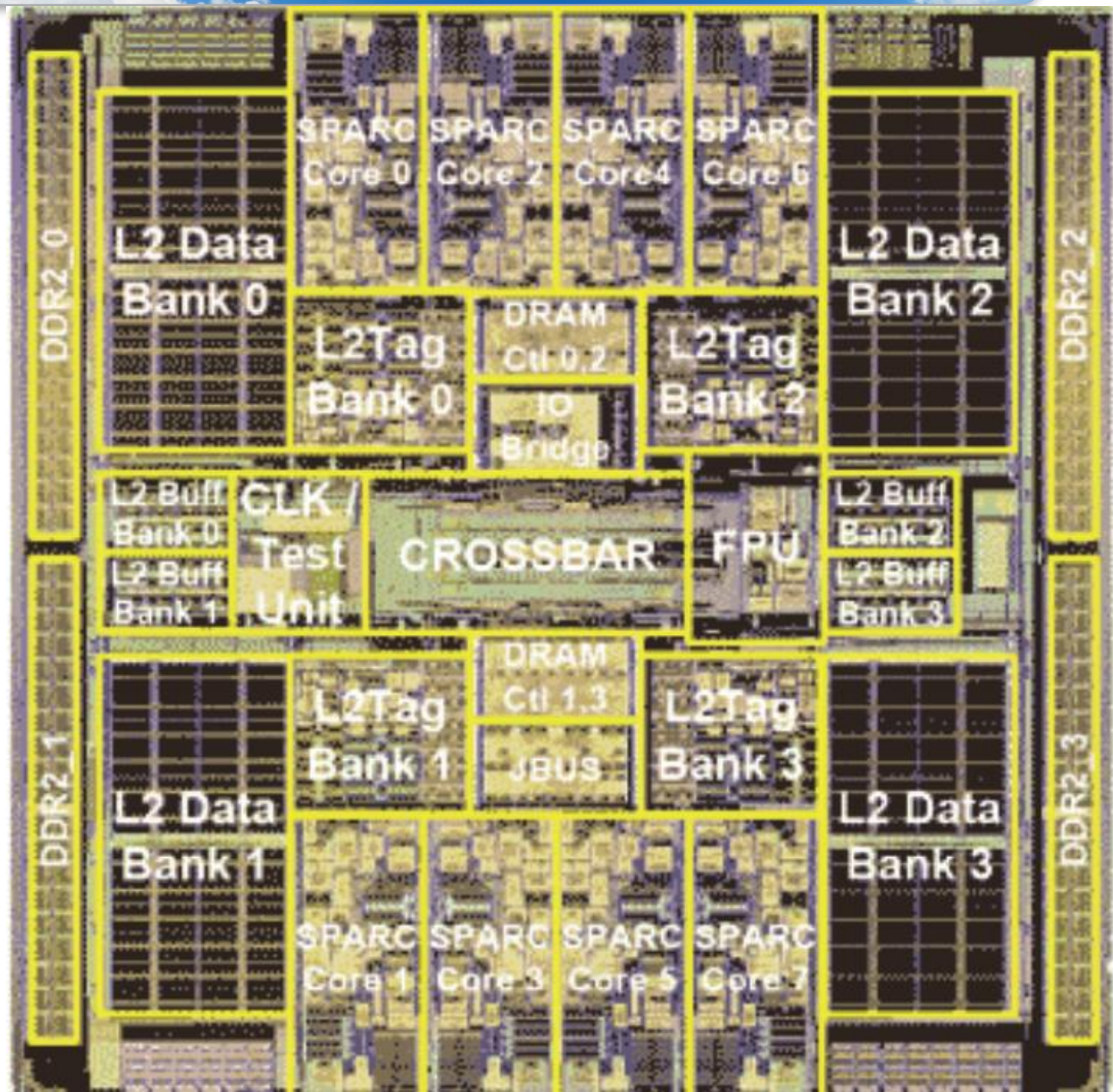
ProActive Parallel Suite


CLOUD: the Multi-Core Push

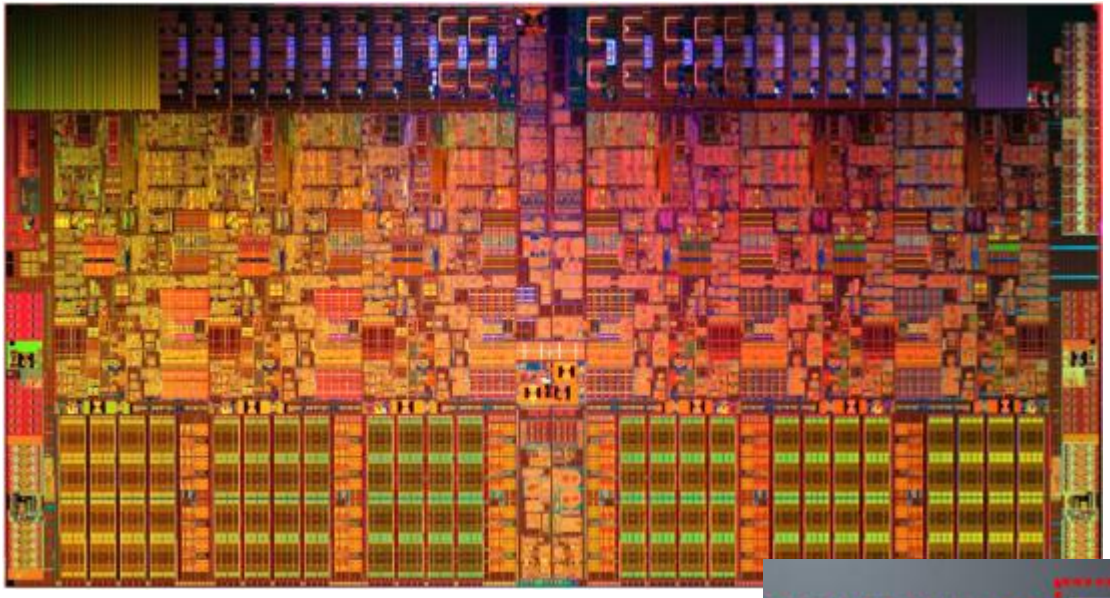
Symetrical Multi-Core: 8-ways Niagara II

- 8 cores
- 4 Native threads per core

- Linux see 32 cores!

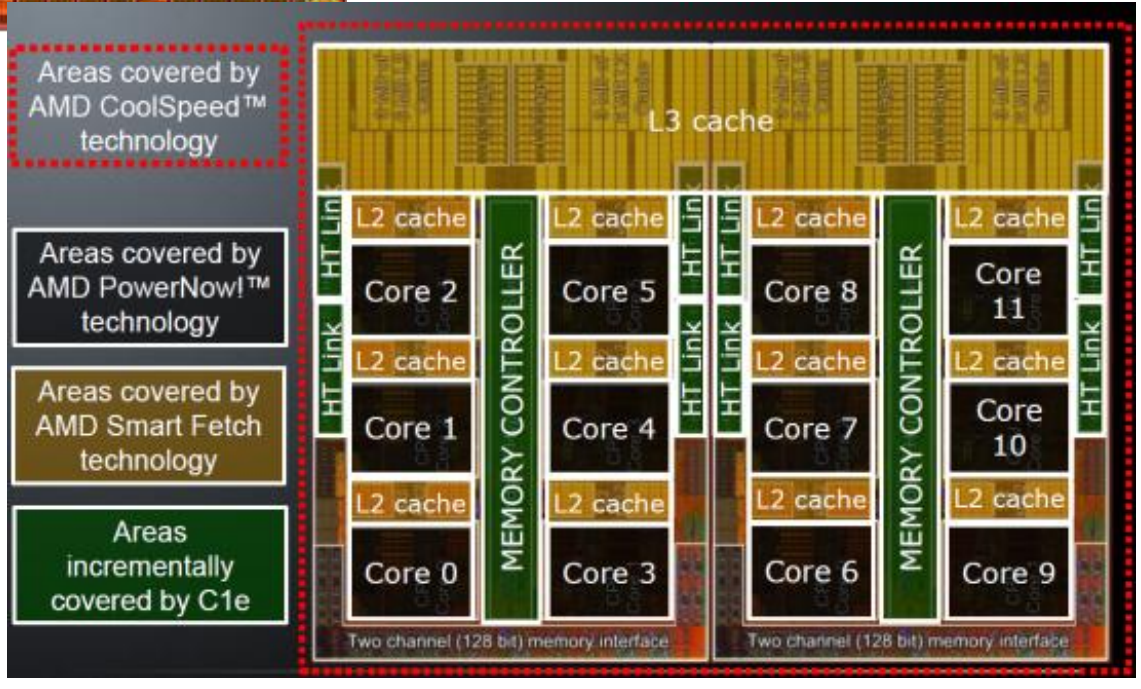


Today Off The Shelf Multi-Cores, 3 GHz



AMD's Opteron 6174,
"Magny-Cours",
12 cores

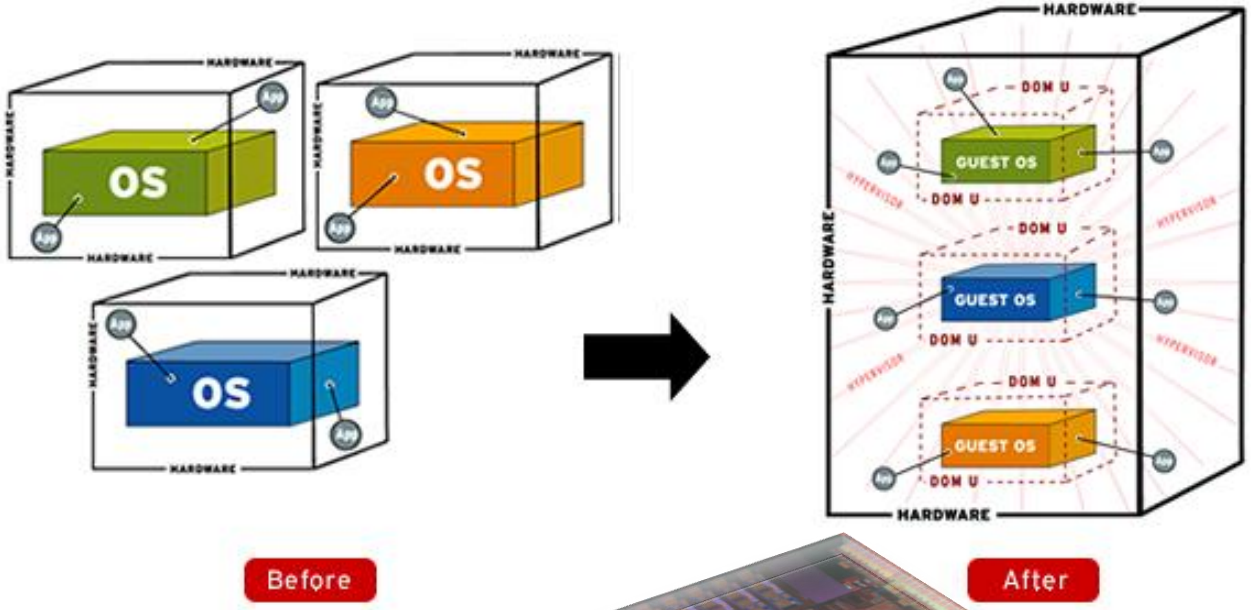
Intel Xeon 5670,
6 cores

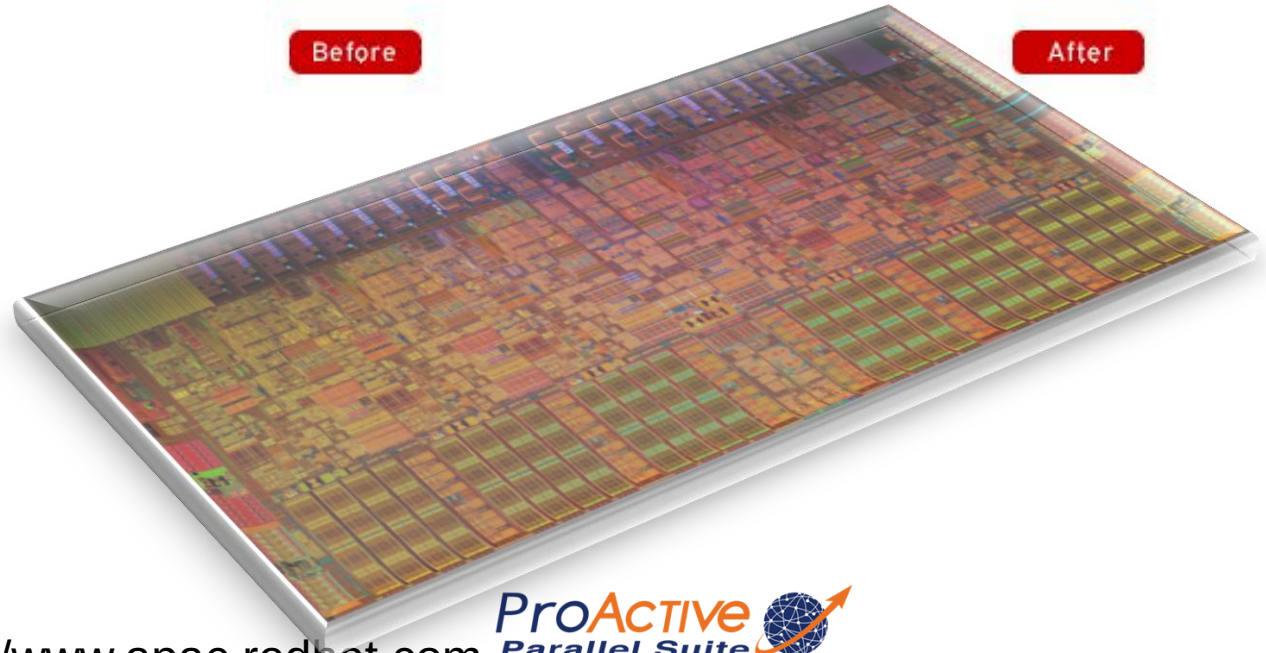


- **Moore's Law rephrased:**
  Nb. of Cores double /18-24 months
- **Key expected Milestones:**
  Cores per Chips (OTS)
  - **2012: 32 to 64**
  - **2014: 64 to 128**
- **1 Million Cores Parallel Machines in 2014**

ProActive Parallel Suite

Virtualization

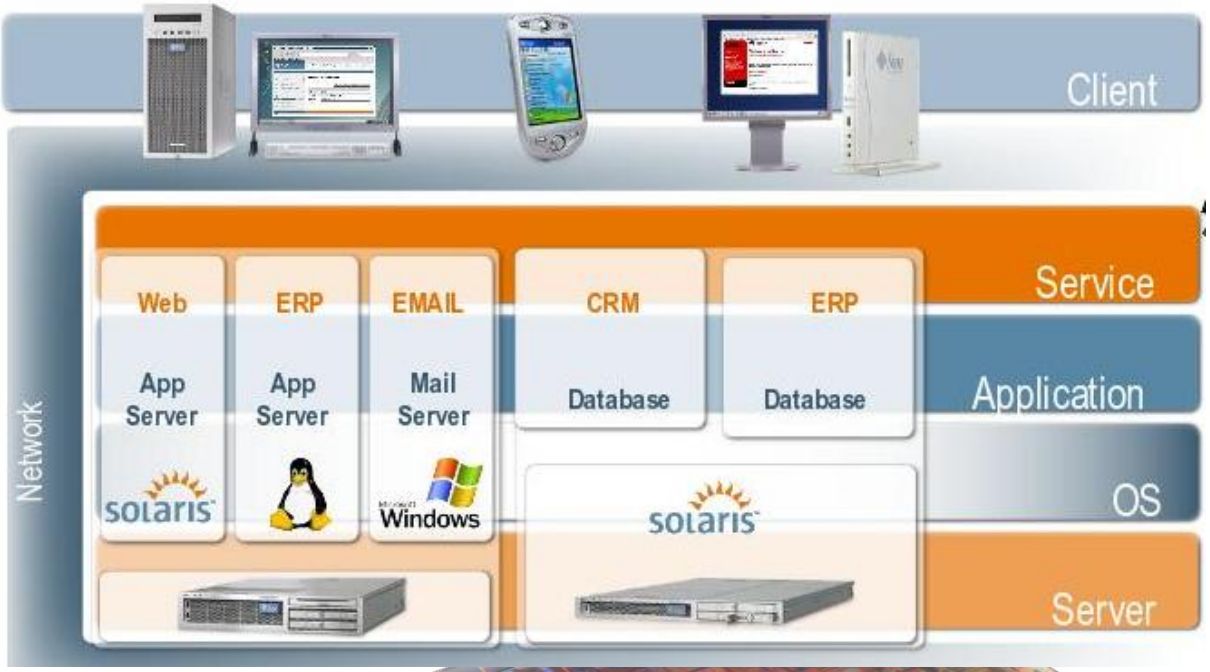




Source: http://www.apac.redhat.com

ProActive Parallel Suite

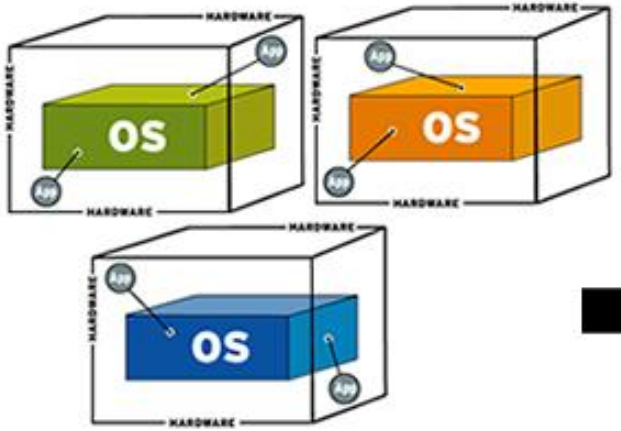
Virtualization

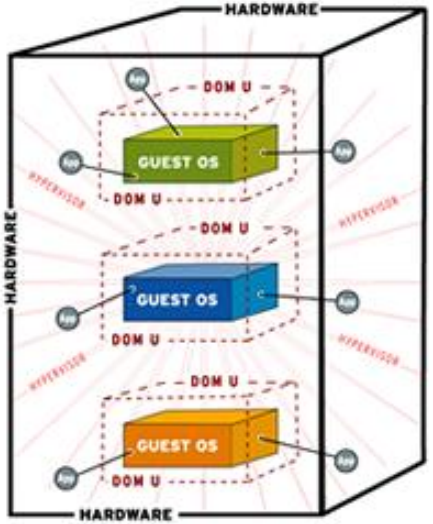


Sun, Blog [Marc Hamilton]

ProActive Parallel Suite

Virtualization





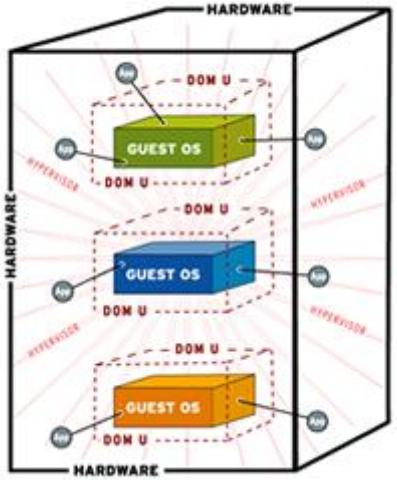
Before

After

What we Used to do as Syst. Admin.

ProActive Parallel Suite

With Virtualization + Software Appliance



ProActive Parallel Suite

ProActive Parallel Suite

OW2 OSCi
Open Source Cloud initiative

4 Strategic Domains

- Self-sizing and green PaaS
- Massively Distributed Services
- BI 4 Cloud
- Massively Distributed clouds

talend
open data solutions
bonitasoft
open your process
ebm WEBSOURCING
SCALAGENT
REQUEA
eXo
JASMINe
cLIF
ProActive
JASPERSOFT
orbeon
ubikis
INGRES
XWIKI
北京航空航天大学
INRIA
BULL
france telecom

Domain 1:
Self-sizing and green PaaS

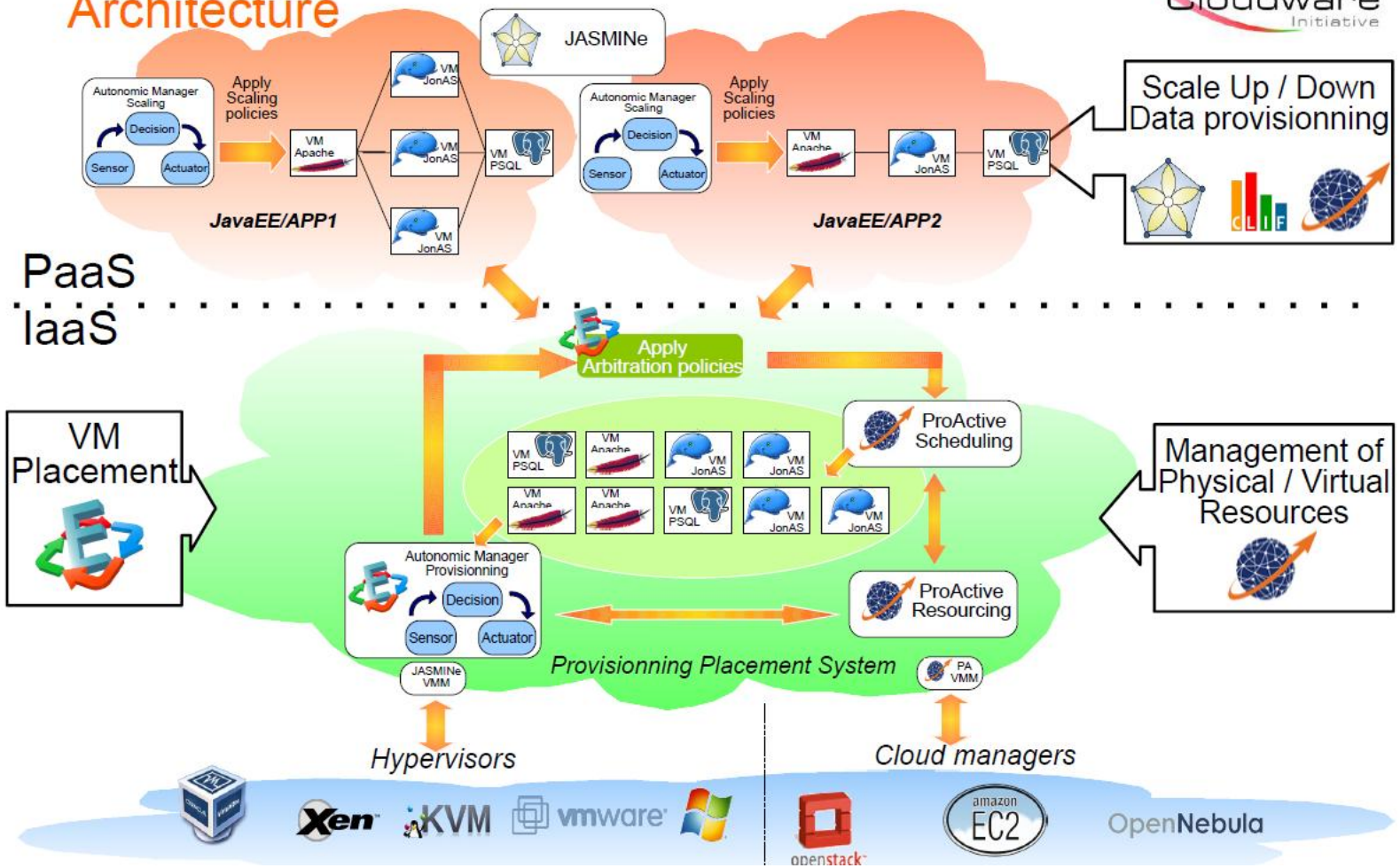
- **Goal: improve the platform efficiency**
  - Performance
  - Energy cost
- **Challenges**
  - Cluster growth/shrink capabilities according to workload
  - Data center multi-tenancy with limited capacities requires arbitration policies
  - Data center placement for minimizing the energy consumption
- **Use case: Orange Infrastructure**
  - Large-scale data centers (+40,000 x86 servers)
  - JavaEE JOnAS middleware stack: +250 applications, +1,000 application server instances

- **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, …

SHORT TERM
Work
in Progress

Self-sizing and green PaaS

Architecture



Domain 2: Massively Distributed Services

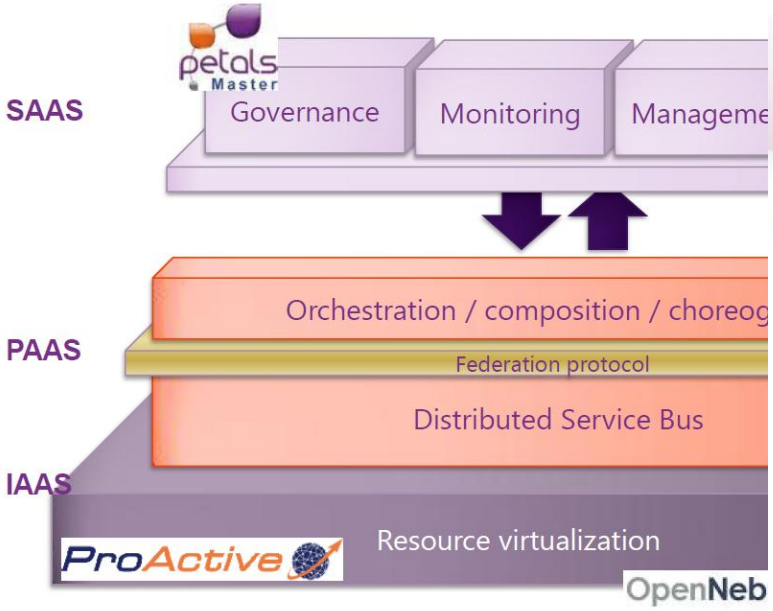
- **Goal: Massive Heterogeneous Services with clouds**
  - Distributed Service Bus (DSB) made of Petals nodes organized in domains/clouds
  - Highly distributed service architectures
- **Challenges**
  - Large scale P2P distributed registry
  - QoS policy management over heterogeneous domains
  - Inter clouds interoperability

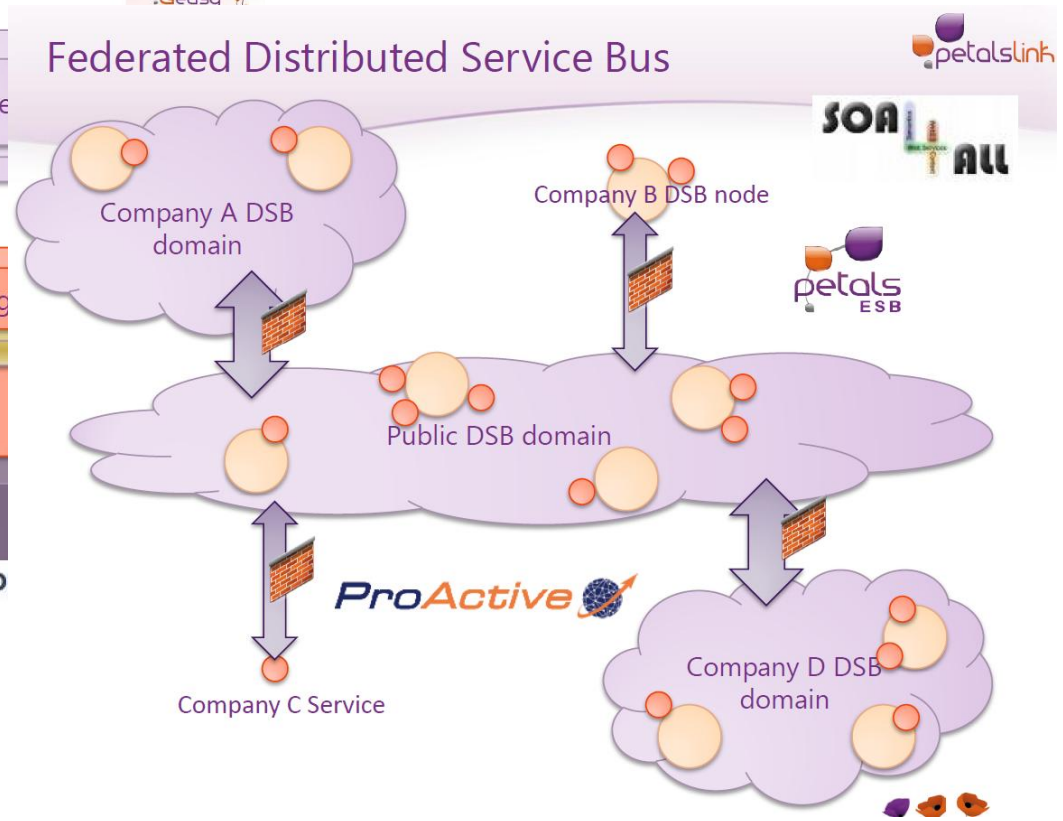
- **Technologies**
  - OW2: Petals ESB, ProActive
  - 3rd Party: Eucalyptus, OpenNebula, NiftyName, OpenStack, ...
  - Technology to be developed:...
- **Partners**
  - Petals Link, ActiveEon, Inria, USP, Fokus

SHORT TERM

Domain 2: Massively Distributed Services

Architecture / Technologies





Domain 3:
OW2 BI4Cloud initiative

BI4cloud, providing images pre-compiled with components for Business Intelligence from industry's leading vendors

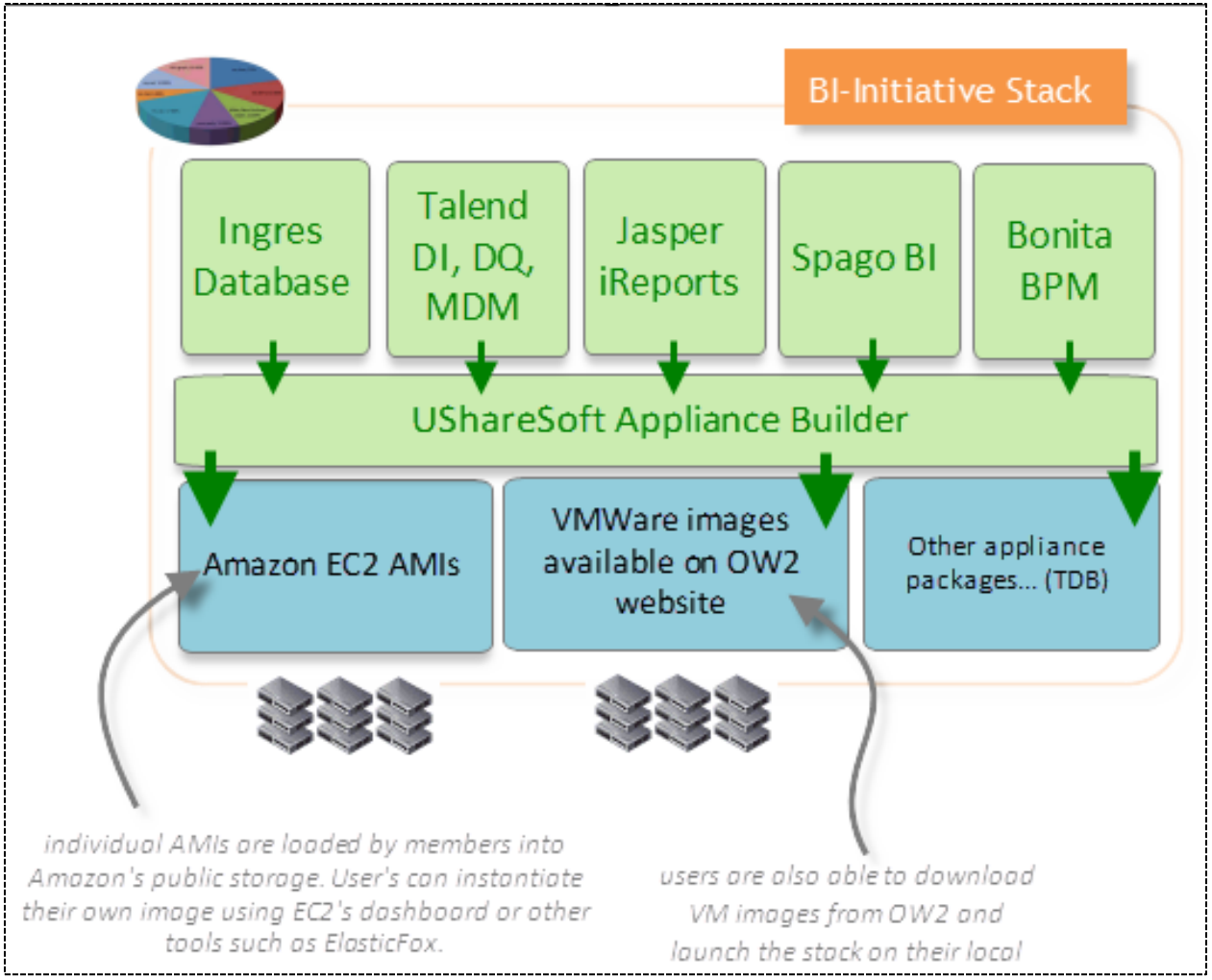
OW2 members:

- Ingres
- Talend
- Jaspersoft
- Engineering/SpagoBI
- BonitaSoft

3rd Party/non OW2 partners:

- usharesoft

Domain 3:
OW2 BI4Cloud initiative



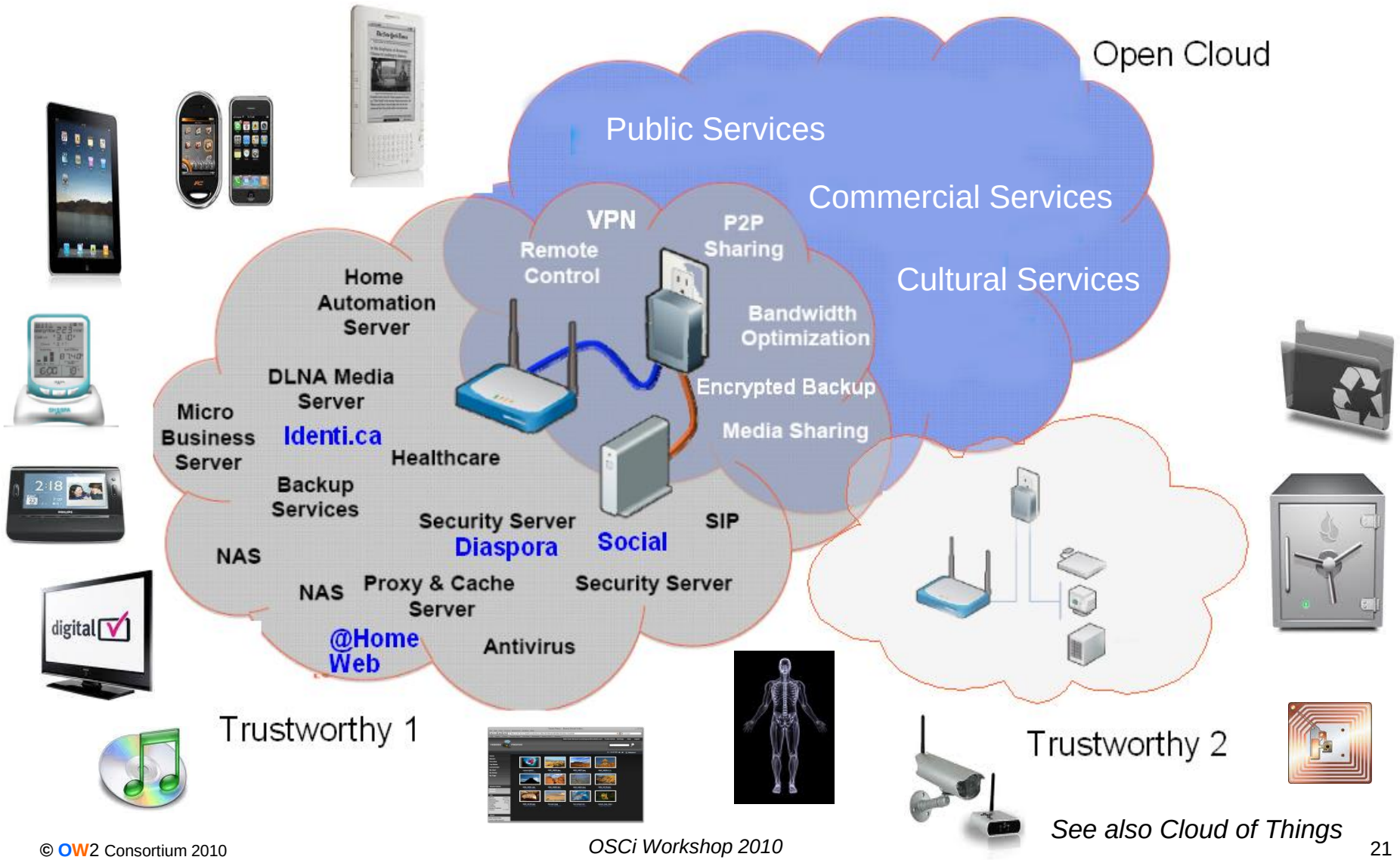
Domain 4: Massively distributed clouds

- **Goal: improve sovereignty and privacy**
  - non hierarchical and massively distributed cloud
  - Next generation cloud architecture
- **Challenges**
  - Large scale distributed clouds, super elasticity for massively decentralized systems
  - Security, safety and privacy e.g. cryptography for the masses, personal control
  - High speed public network
- **Use Case: domestic cloud for citizens**

- **Technologies**
  - Key R&D trend for next 5 years
  - Technology to be developed:...
- **Partners**
  - INRIA Sardes (JB Stefani), other partnership to be developed including 3rd party technology providers (e.g. Hedera Tech)

LONG TERM
Discussions
in Progress

Massively distributed clouds
Architecture (as for 2015 - Draft)

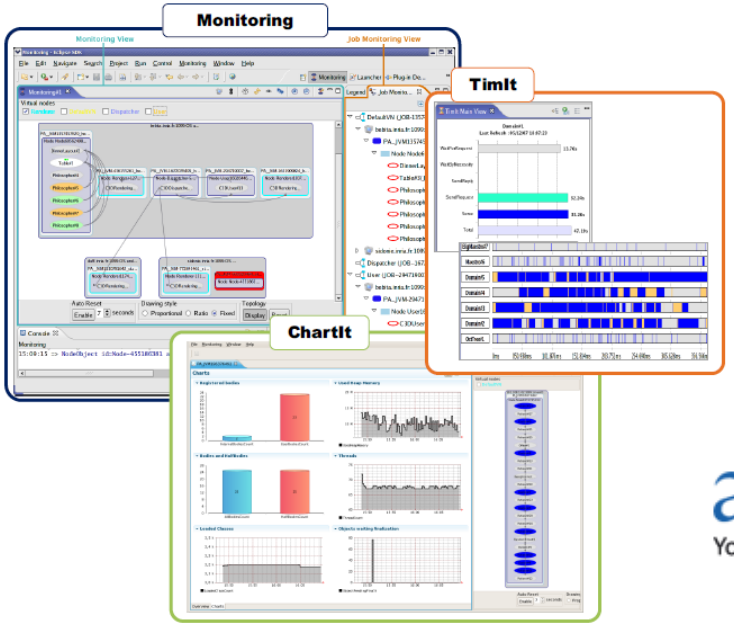


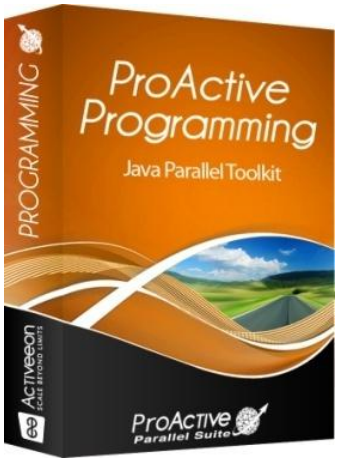
See also Cloud of Things

3. ProActive Parallel Suite

Cloud Solution: ProActive Parallel Suite

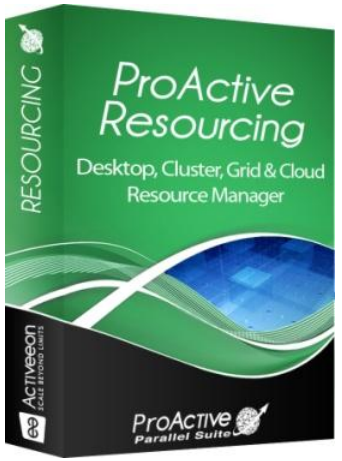
ProActive Parallel Suite





Java Parallel Toolkit

Multi-Platform Job Scheduler



Resource Manager

amadeus
Your technology partner

Used in Production Today:
50 Cores → 300 Cores 2010

Strong Differentiation:

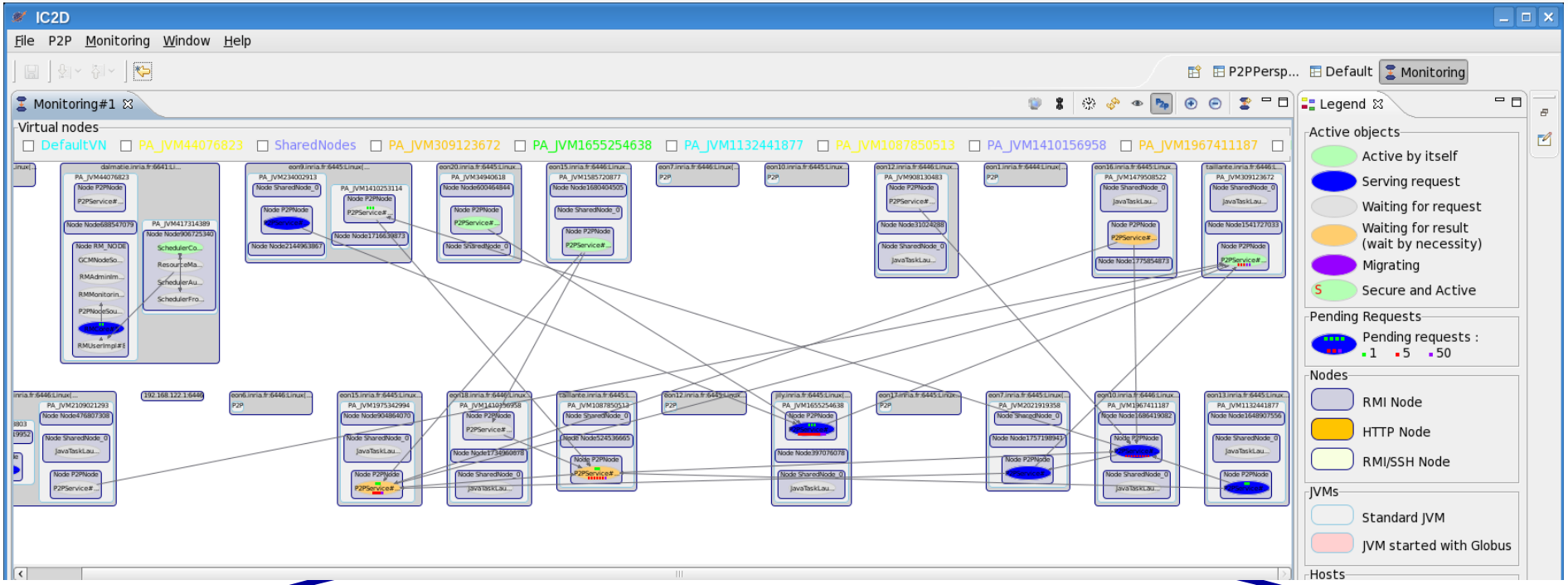
- ❑Java Parallel Programming + Integration +
- ❑Portability: Linux, Windows, Mac +
- ❑Versatility: Desktops, Cluster, Grid, Clouds = Perfect Flexibility

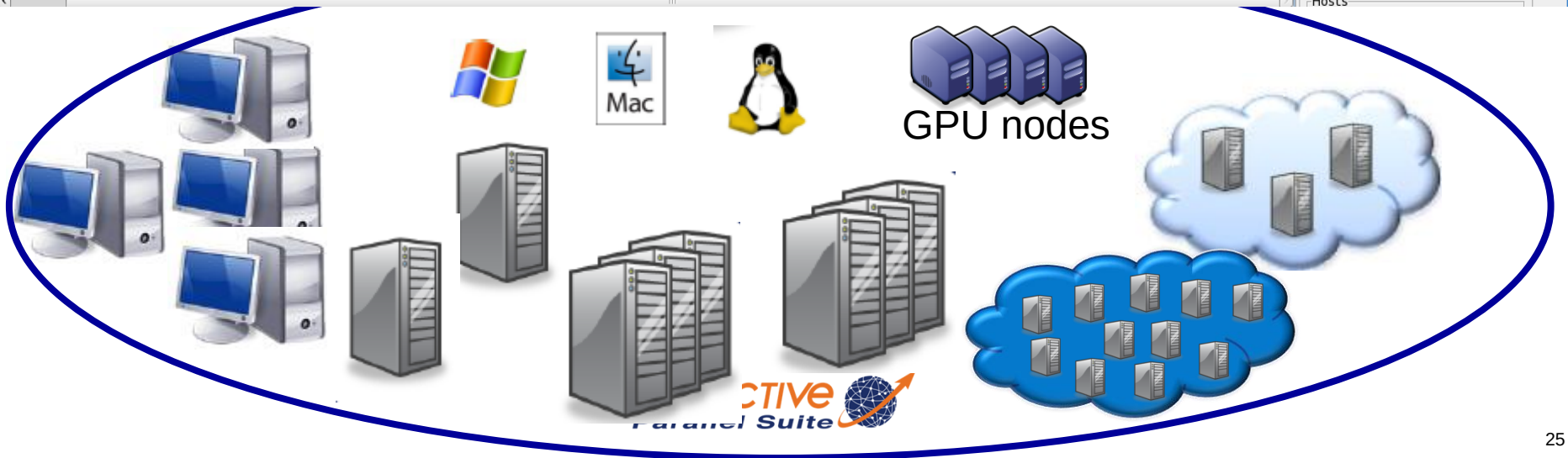
ProActive Parallel Suite

ProActive Programming: Active Objects

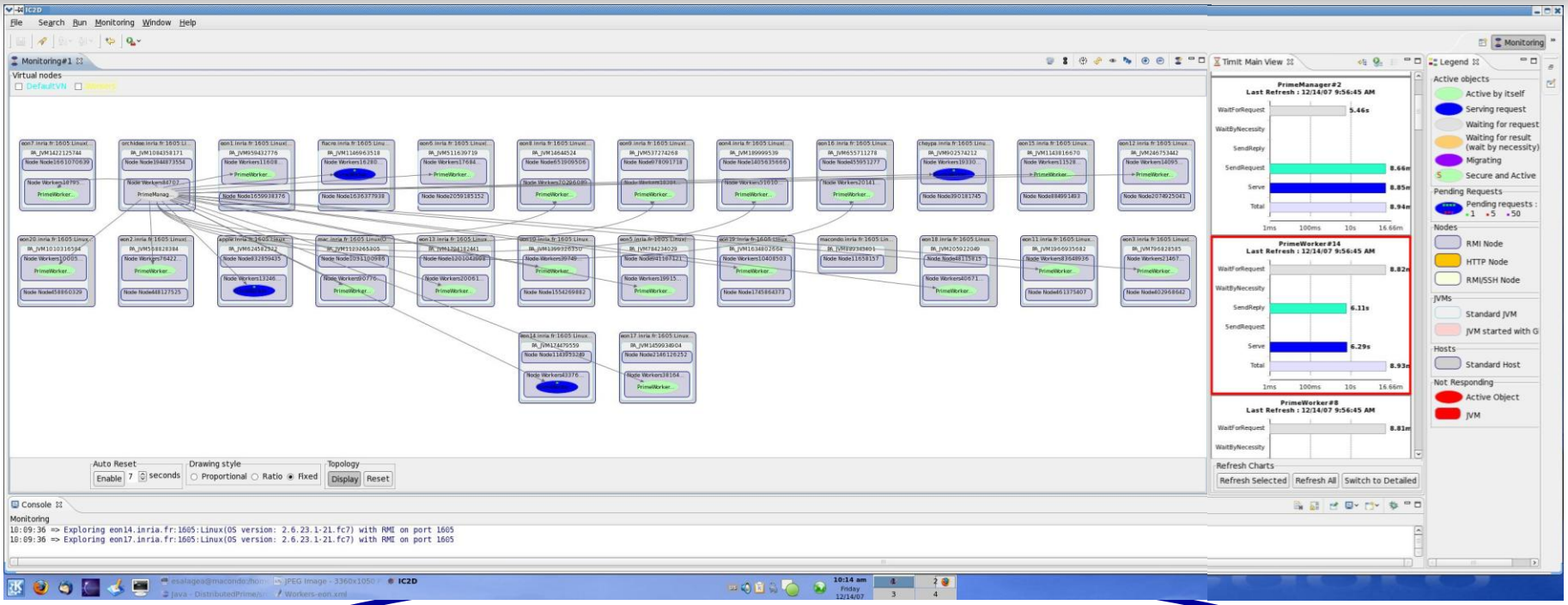
ProActive Parallel Suite

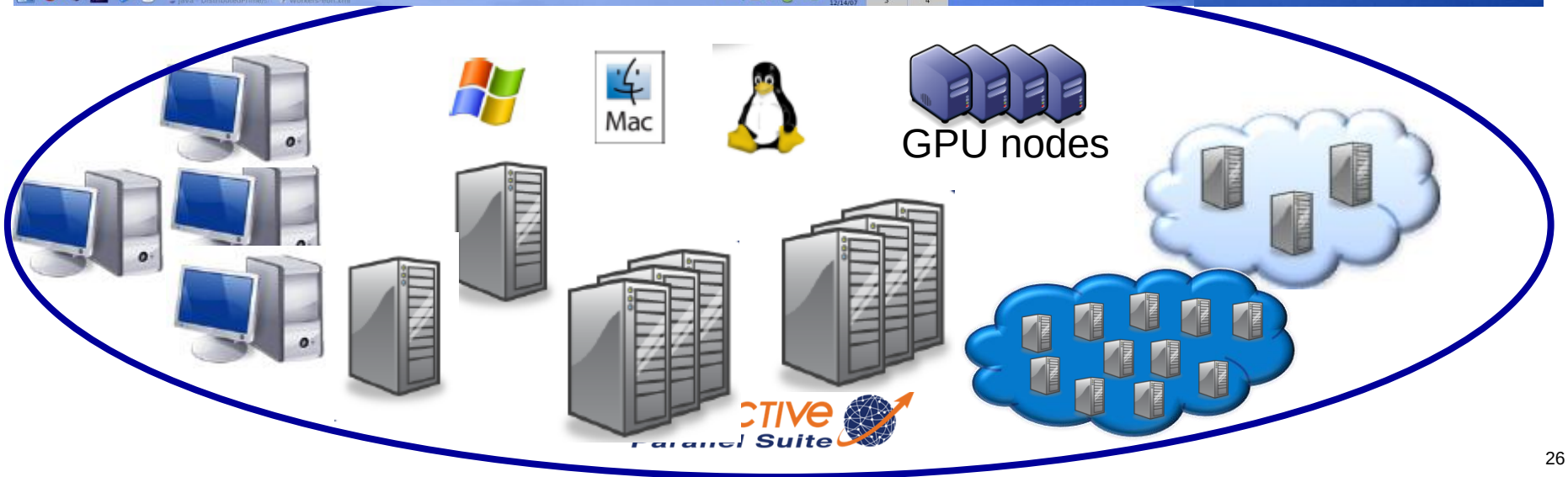
ProActive Programming View





ProActive Programming View

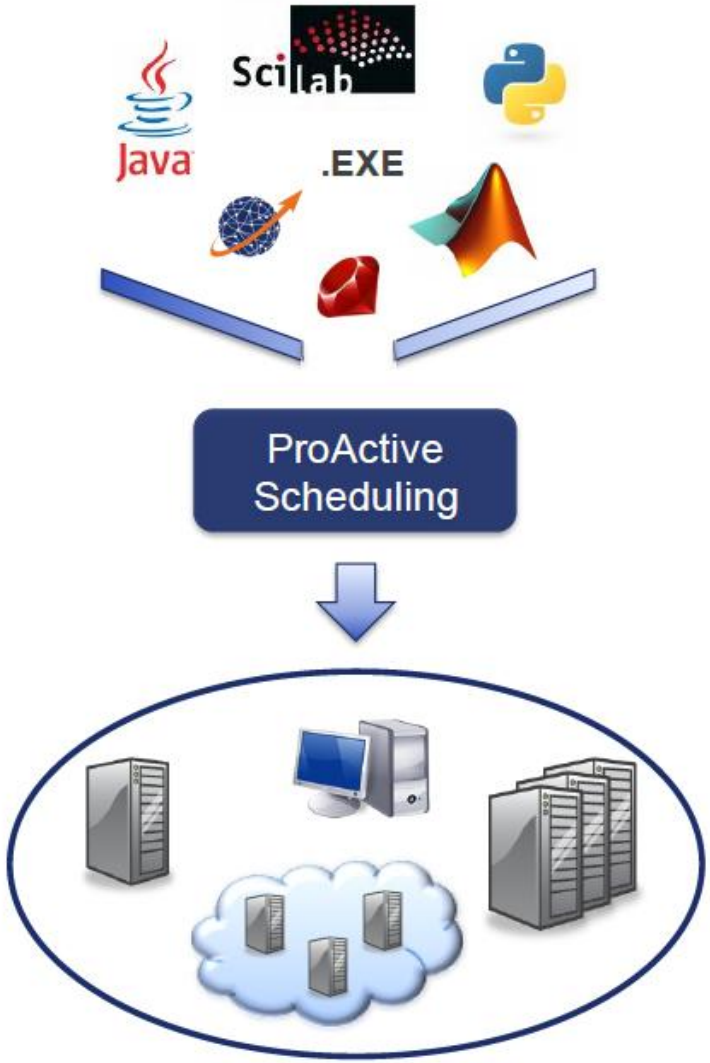




Scheduling & Resourcing

ProActive Parallel Suite

ProActive Scheduling



ProActive Parallel Suite

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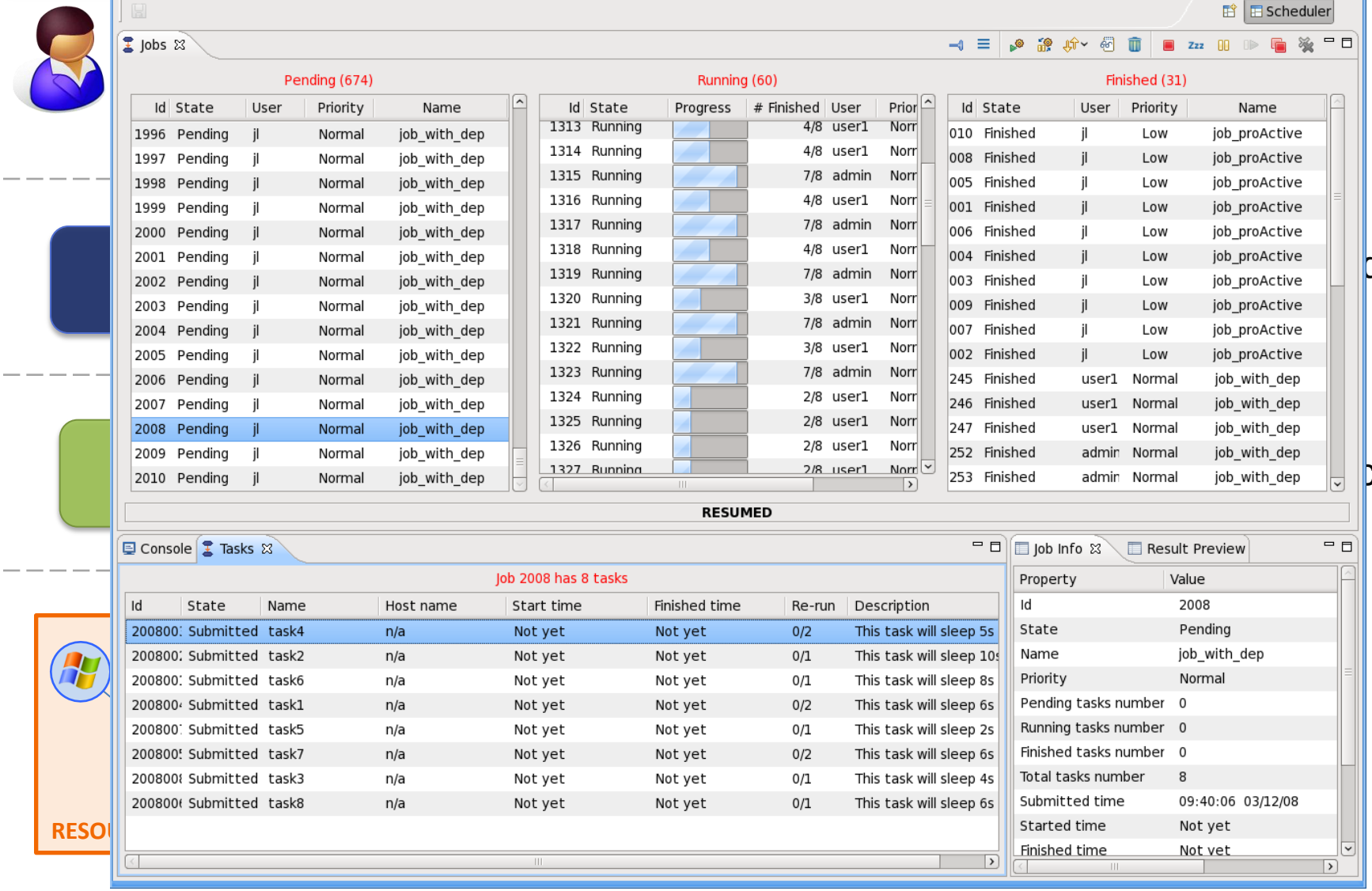
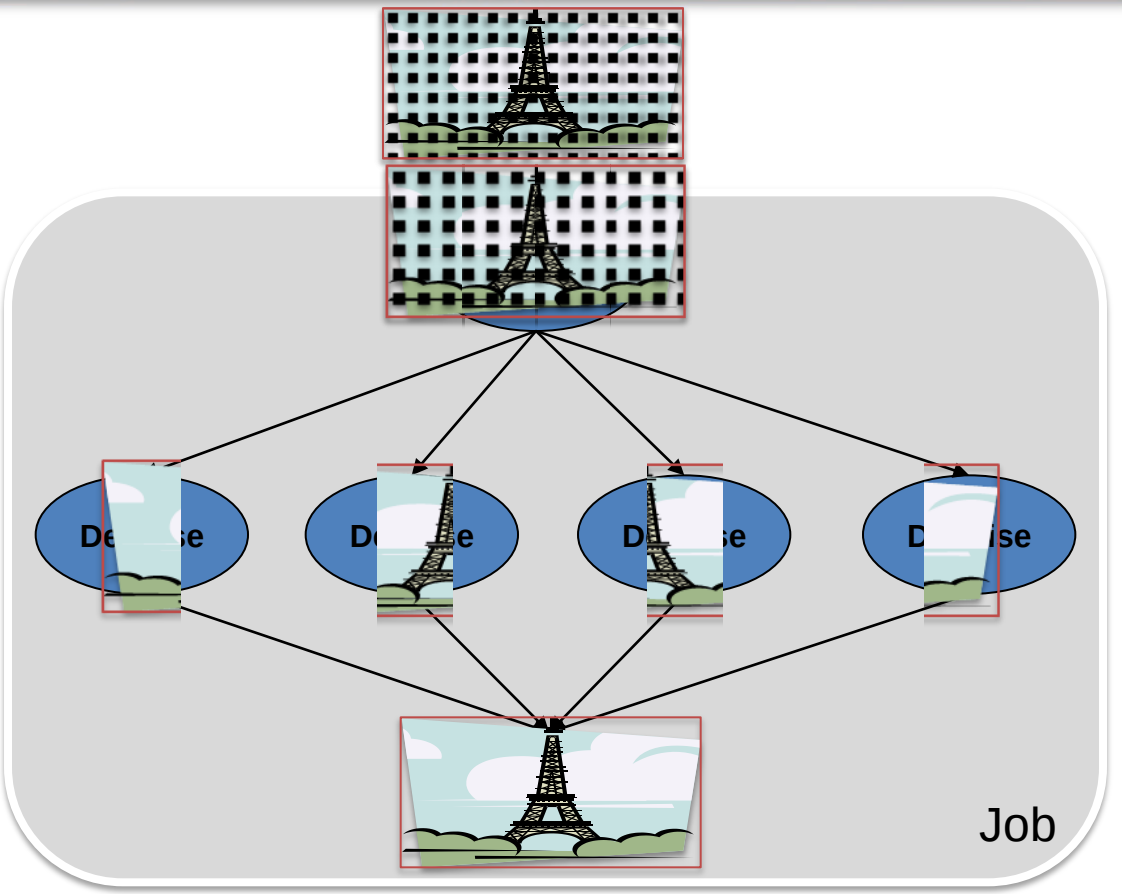
ProActive Scheduling Big Picture



ProActive Parallel Suite

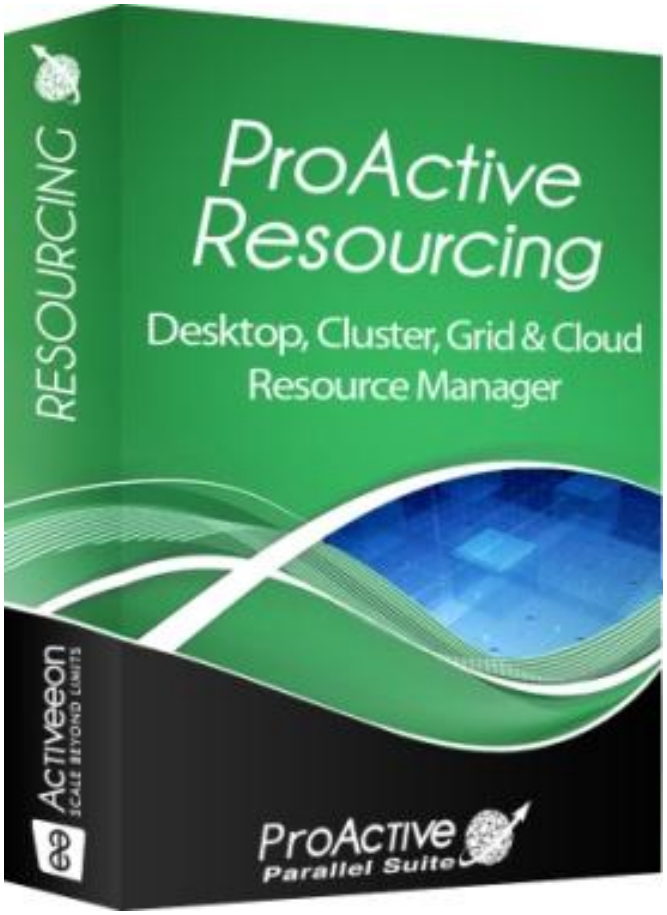
Workflow Example : Picture Denoising



- with selection on native executable availability (ImageMagik, GREYstoration)
  - Multi-platform selection and command generation
- with file transfer in pre/post scripts

ProActive Parallel Suite

ProActive Resourcing



ProActive Parallel Suite

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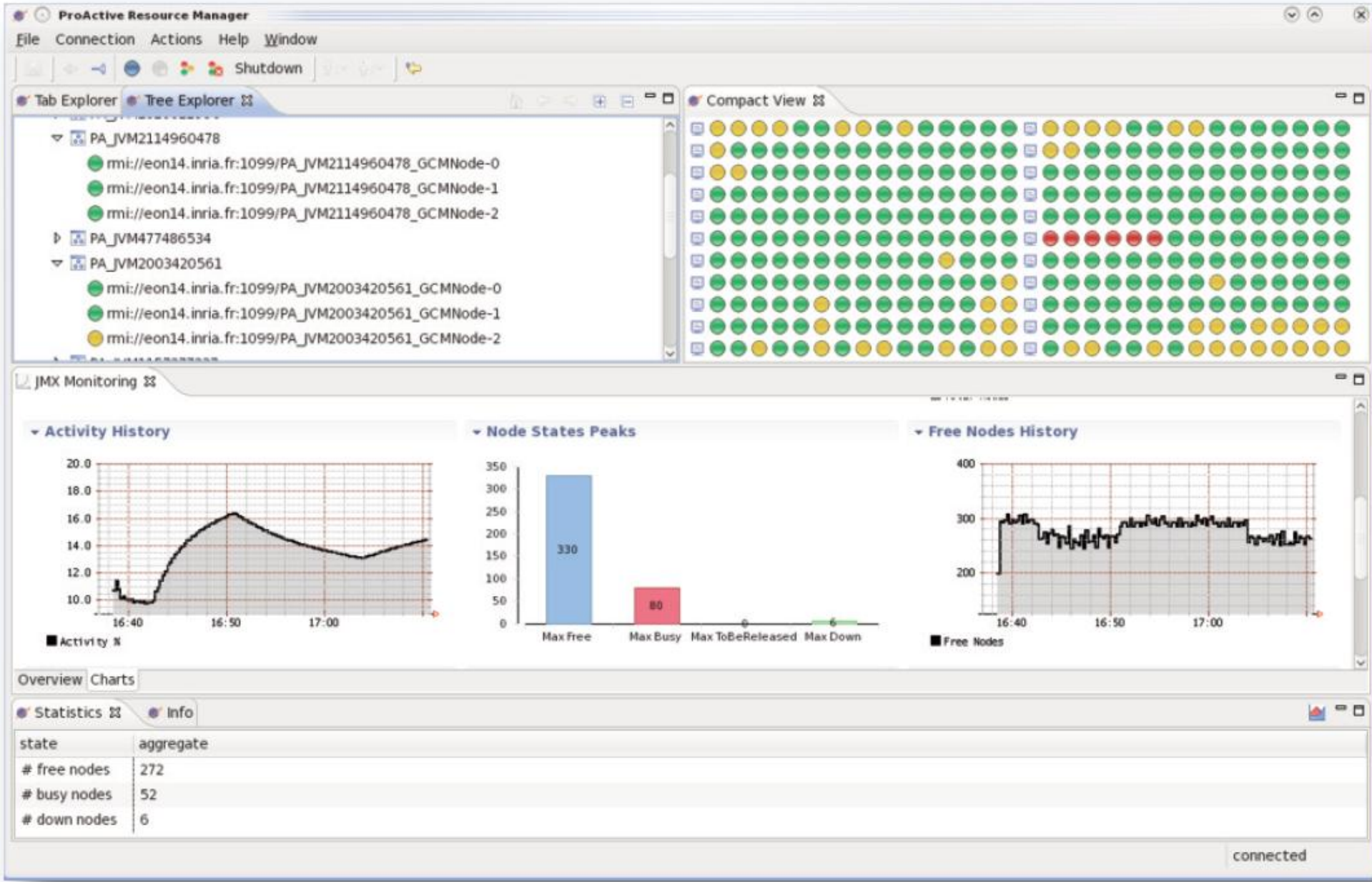
RESOURCING User Interface



Clusters to Grids to Clouds: e.g. on Amazon EC2

ProActive Parallel Suite

Private, Public & Hybrid Clouds

ProActive Scheduler

ProActive Resource Manager

"Cloud Bursting!"

Static Policy

LSF

Timing Policy 12/24

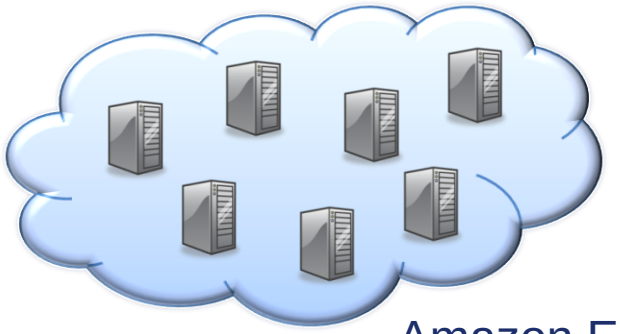
Desktops

Dynamic Workload Policy

EC2

Dedicated resources

Desktops



Amazon EC2

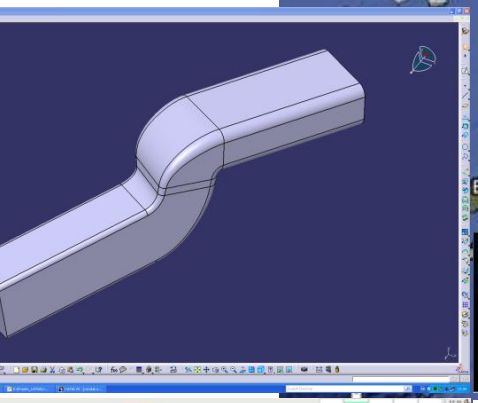
ProActive Parallel Suite

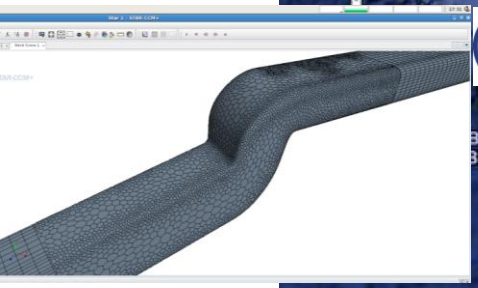
Use Case 1: OMD2

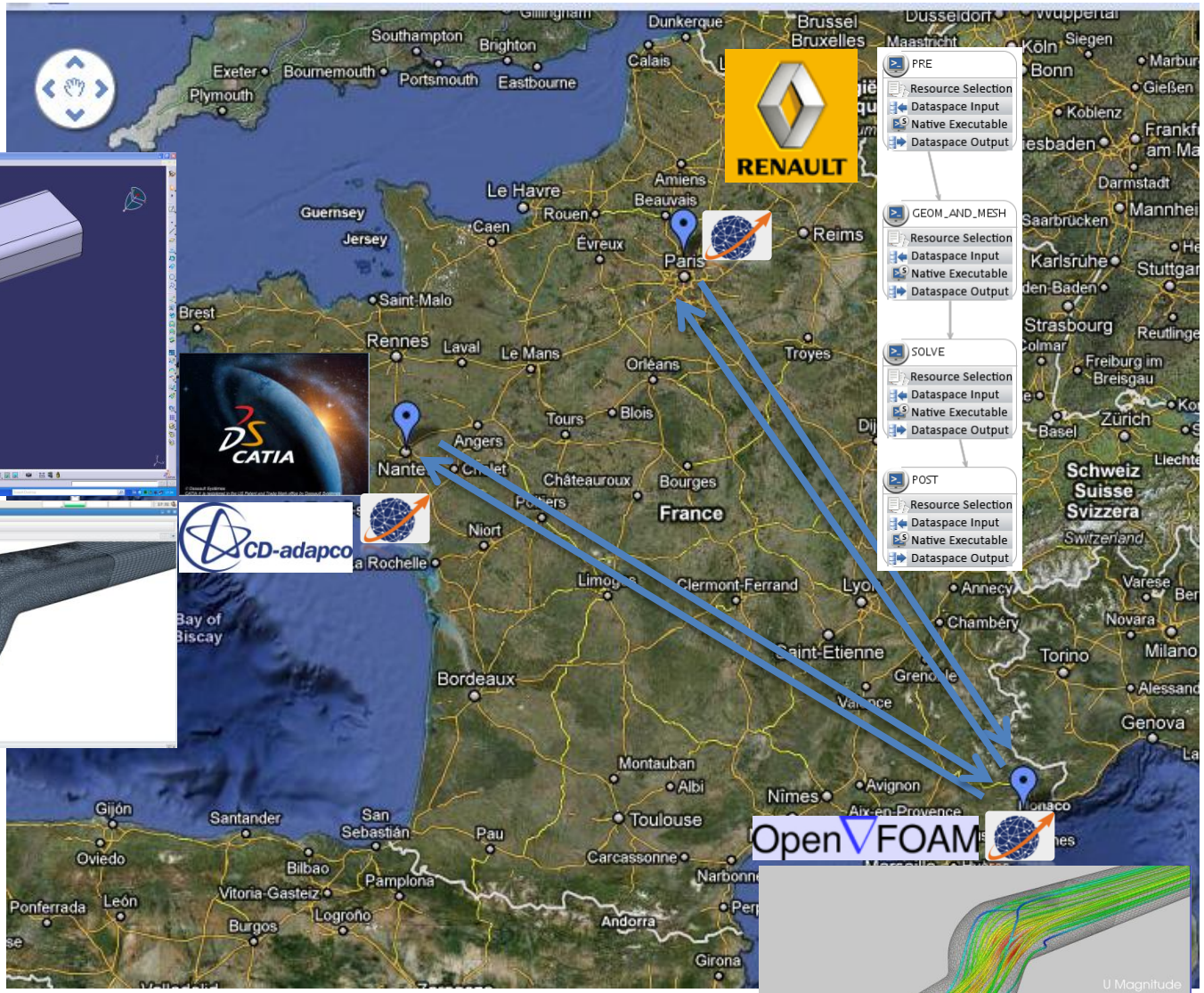
Distributed Multi-Disciplinary Optimizations HPC

ProActive Parallel Suite

ProActive OMD2 Demo







1000 Cores Production Cloud Portal

Use Case 2:

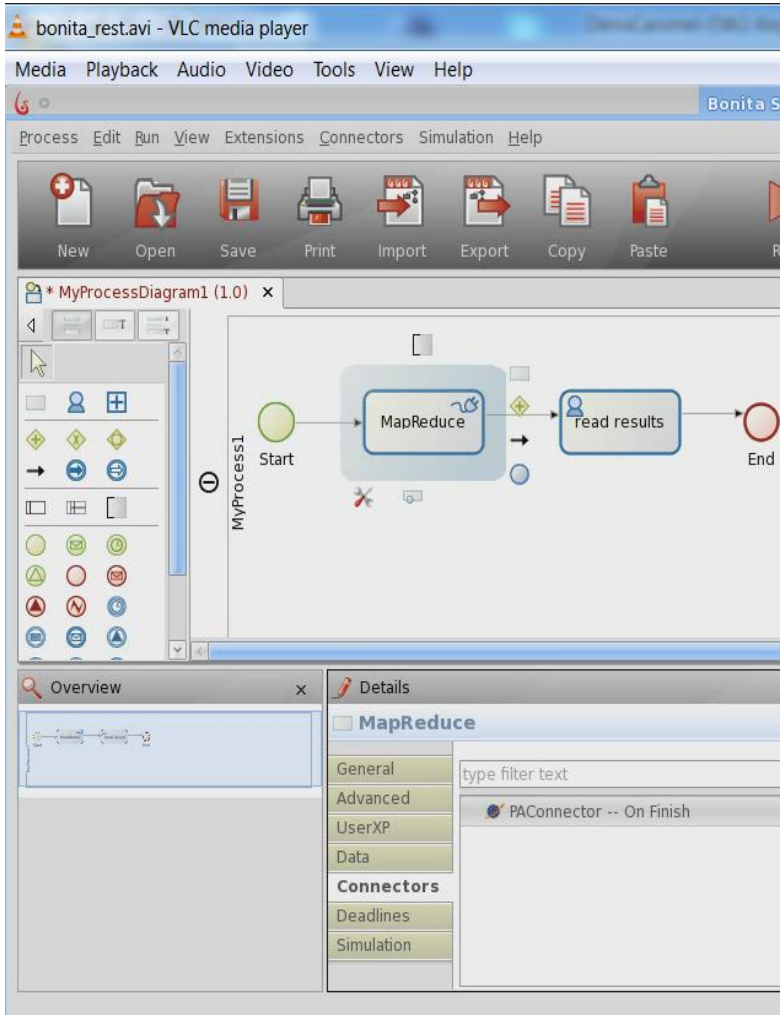
Bonita BPM to Clouds with ProActive Parallel Suite on an IT Map-Reduce Application

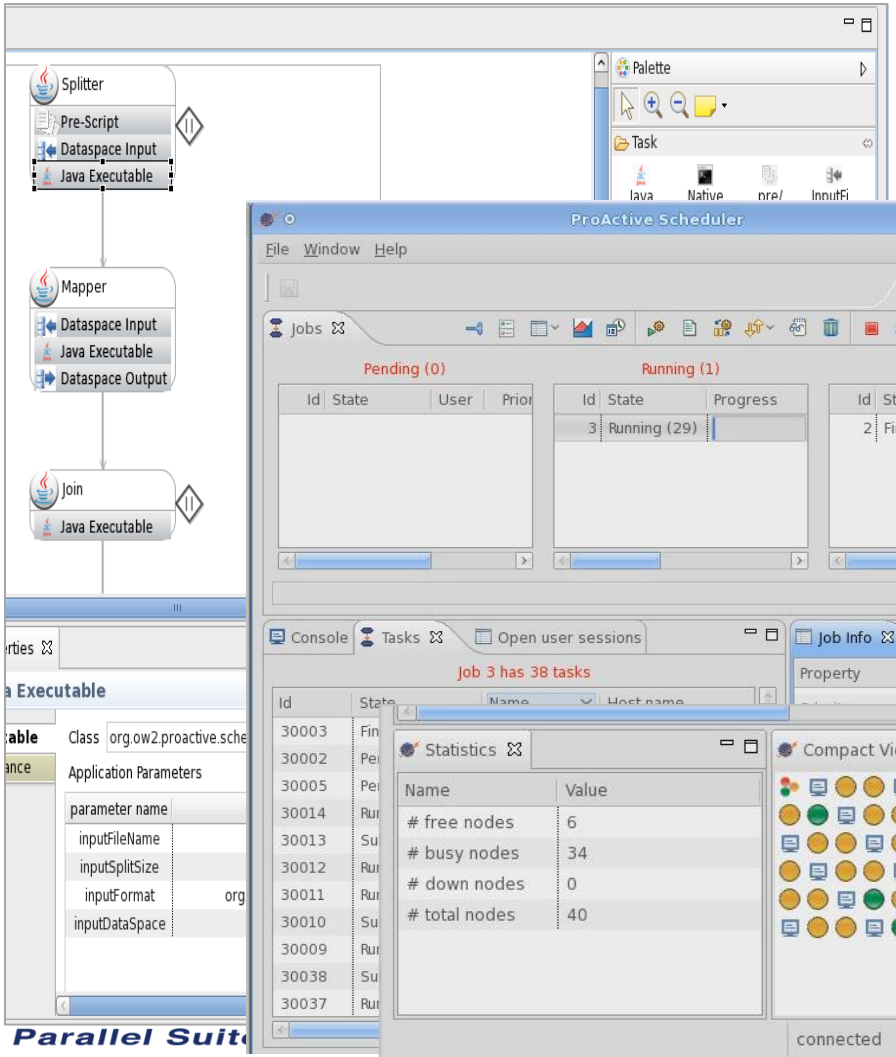
ProActive Parallel Suite

BonitaSoft + ProActive: BPM Map/Reduce in the Cloud

bonitasoft
open your processes

ProActive Parallel Suite





Video:
BonitaSoft + ProActive:
BPM Map/Reduce in the Cloud

ProActive Parallel Suite

Real Live Demo: ProActive Scheduler & Resource Manager

ProActive Parallel Suite

Industrial (1750) & Cloud Revolution Compared

	Industrial Revolution	Cloud Revolution
Concept	Mechanization and centralization of manufacturing activities	Computing as a Utility Centralization of Data Center
Technology	Supporting new technos (Mechanic, Tool Machines, etc.)	Distributed Computing Virtualization Multi-Cores Network
Socio Economical Factors	Large new demand was ready to use the new offer. (A change in business attitude & organization)	IT Cost Reduction Pressure CIO Nightmare CEO Out-of-DataCenter CapEx

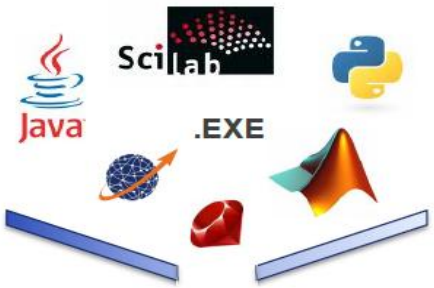
➔All elements converge for a strong Cloud Revolution

Sources & Inspiration: Simon Wardley (CSC) Scott Stewart

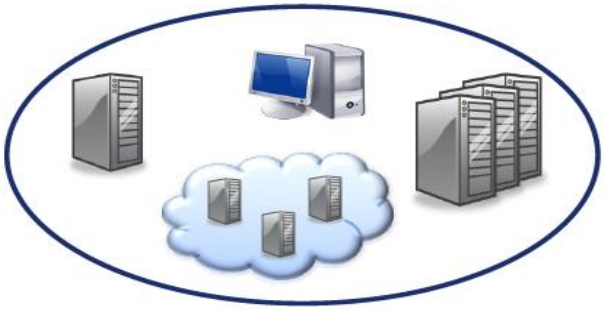
ProActive Parallel Suite

Conclusion: OW2 OSCi initiative

ProActive Parallel Suite



ProActive Scheduling



OW2 Consortium

OPEN SOURCE CLOUDWARE initiative

4 Strategic Domains

- Self-sizing and green PaaS
- Massively Distributed Services
- BI 4 Cloud
- Massively Distributed clouds

➔ Fine Grain CLOUD management:
➔ Pricing at the second (like GSM)
Elastic Clouds

➔ Full-Fledged Cloud Solution in OS

ProActive Parallel Suite

http://proactive.inria.fr

ProActive Parallel Suite


Thank you for your attention!