

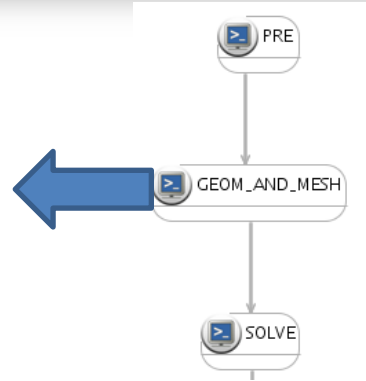
Optimize your Infrastructure & Accelerate Applications

Private – Public – Hybrid Clouds

Denis Caromel

Private, Public & Hybrid Clouds

Enterprise
Private
Hybrid
Cloud



Application
and
Workflow
Acceleration

Static Policy
LSF

Timing Policy
12/24
Desktops

Dynamic Workload
Policy
On Burst



Dedicated resources
On premise

Desktops

External Data Center, Amazon EC2,
Azure

INRIA OASIS Team Composition (35)

□ Researchers (5):

- D. Caromel (UNSA, Det. INRIA)
- E. Madelaine (INRIA)
- F. Baude (UNSA)
- F. Huet (UNSA)
- L. Henrio (CNRS)

□ PhDs (11):

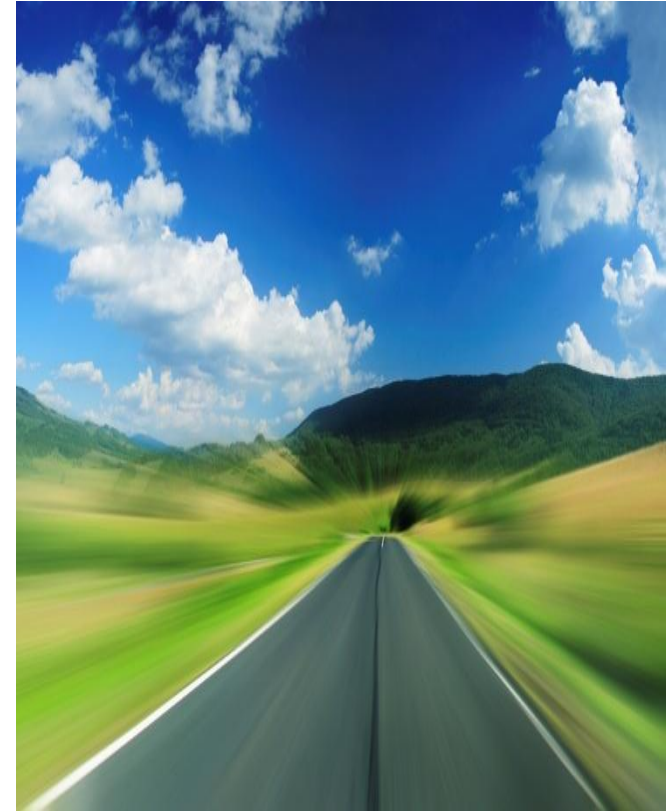
- Antonio Cansado (INRIA, Conic)
- Brian Amedro (SCS-Agos)
- Cristian Ruz (INRIA, Conicyt)
- Elton Mathias (INRIA-Cordi)
- Imen Filali (SCS-Agos / FP7 SO)
- Marcela Rivera (INRIA, Conicyt)
- Muhammad Khan (STIC-Asia)
- Paul Naoumenko (INRIA/Région)
- Viet Dung Doan (FP6 Bionets)
- Virginie Contes (SOA4ALL)
- Guilherme Pezzi (AGOS, CIFR)

□ + Visitors + Interns



Located in Sophia Antipolis, between
Nice and Cannes,
Visitors Welcome!

Startup Company Born of INRIA



- ❑ Co-developing, Support for [ProActive Parallel Suite](#)
- ❑ Worldwide Customers: Fr, UK, Boston USA

Customers, Users and Partners

- Some **Customers**: Industrials, IT Company, SSII, Integrators, ISV, OEM Manufacturers



- Some **Users**:



Your technology partner



a DCS company



- Some **Partners**:



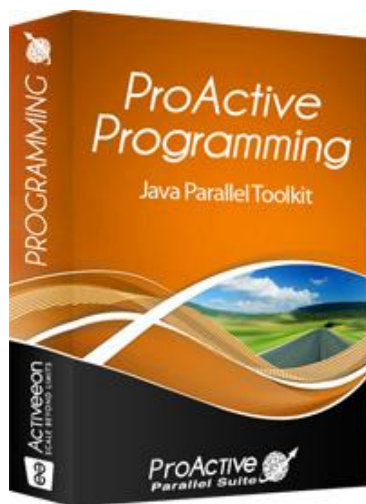
ProActive Parallel Suite

ProActive Parallel Suite

- ❑ Professional Open Source middleware for parallel, distributed, multi-core, Grid and Cloud computing



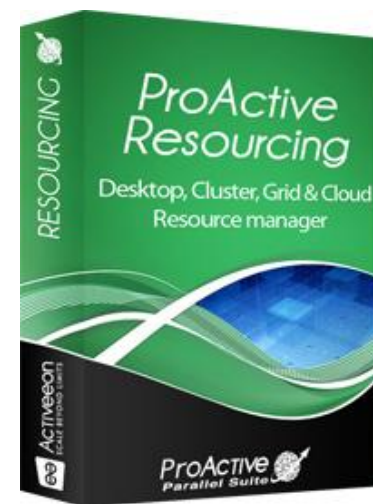
- ❑ Composed of three modules:



Java
Programming Library



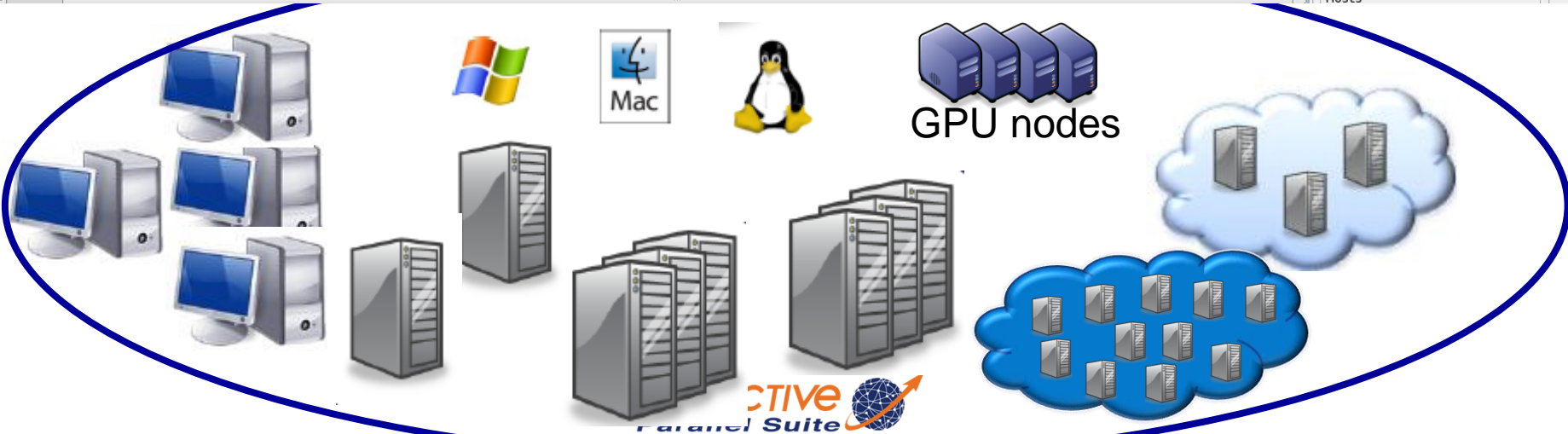
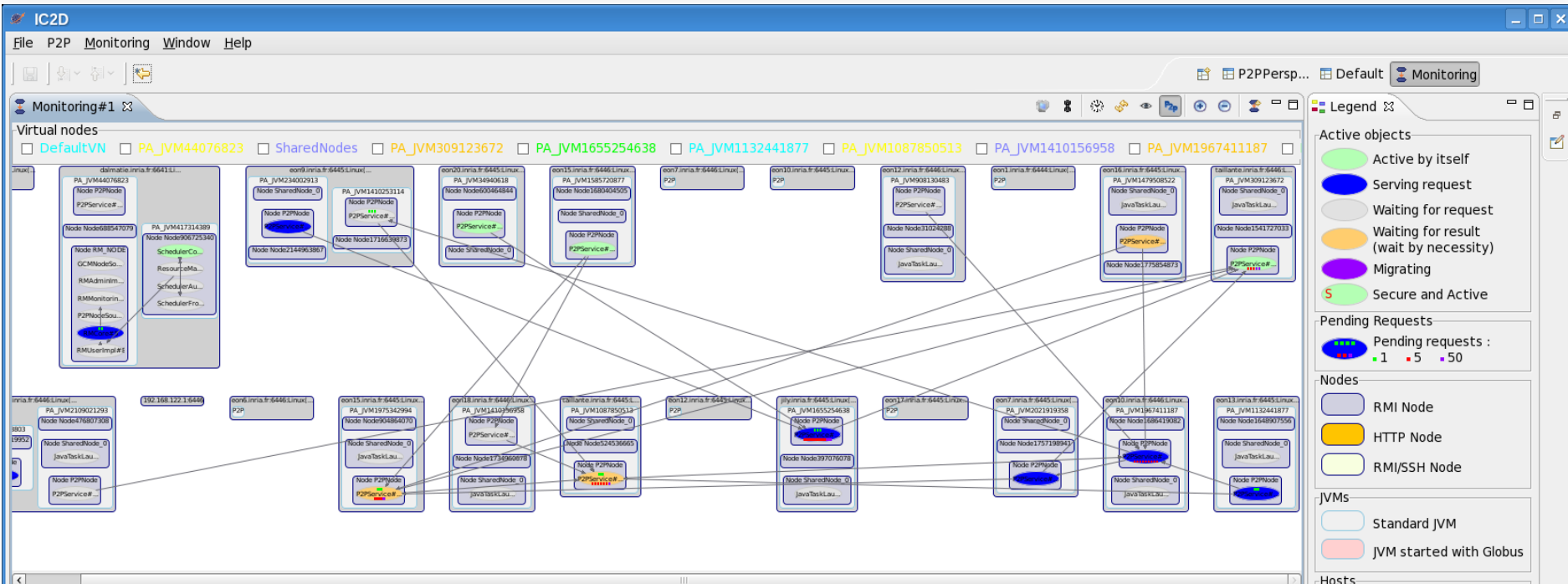
Multiplatform
Job scheduler



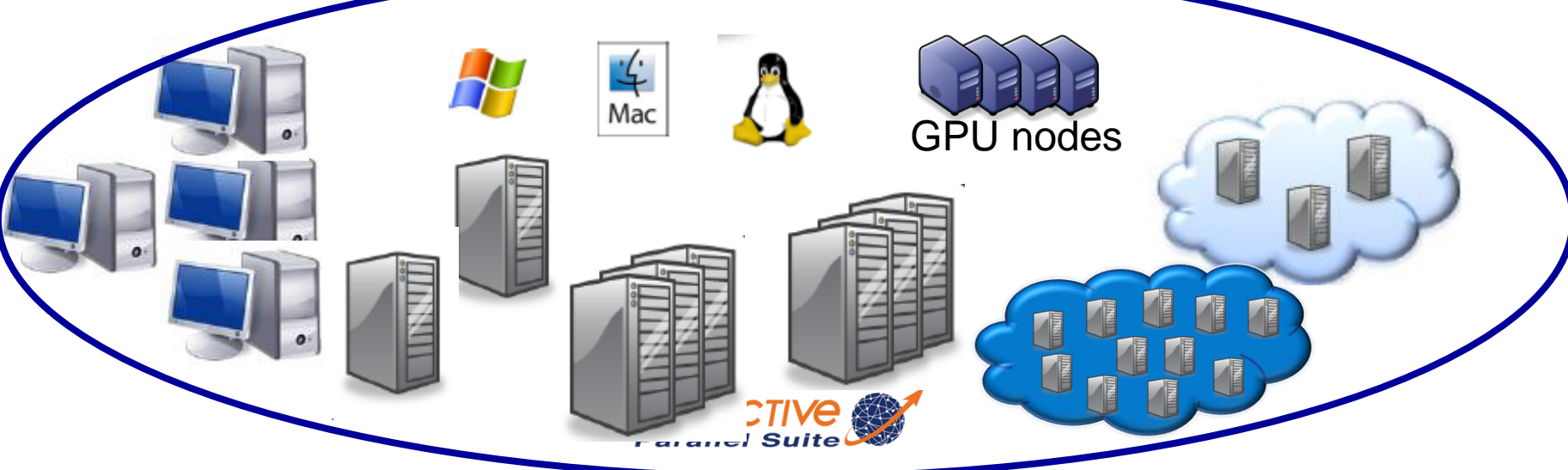
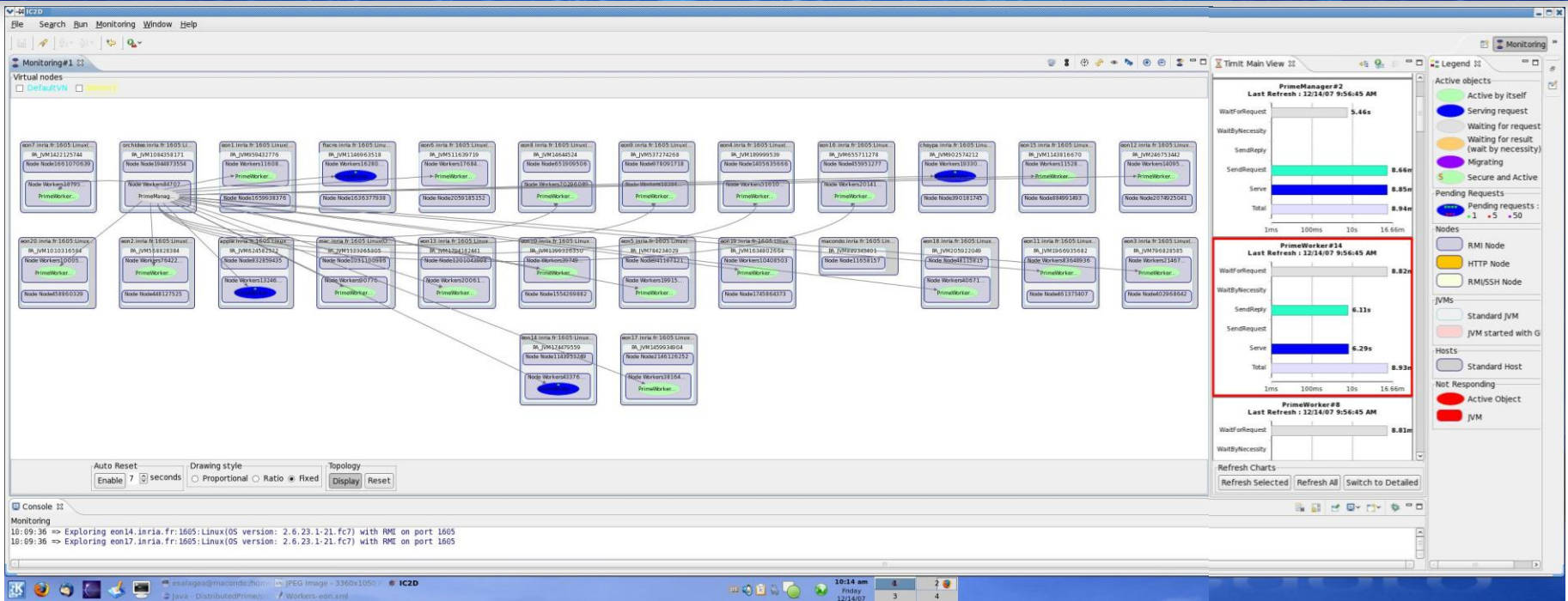
Global
resource manager

ProActive Programming: Active Objects

ProActive Programming View

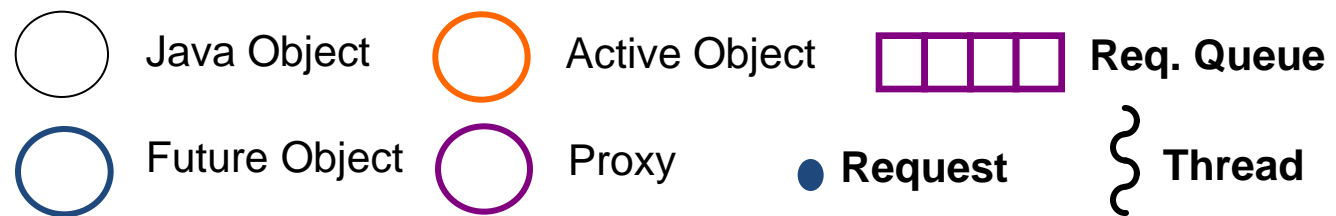
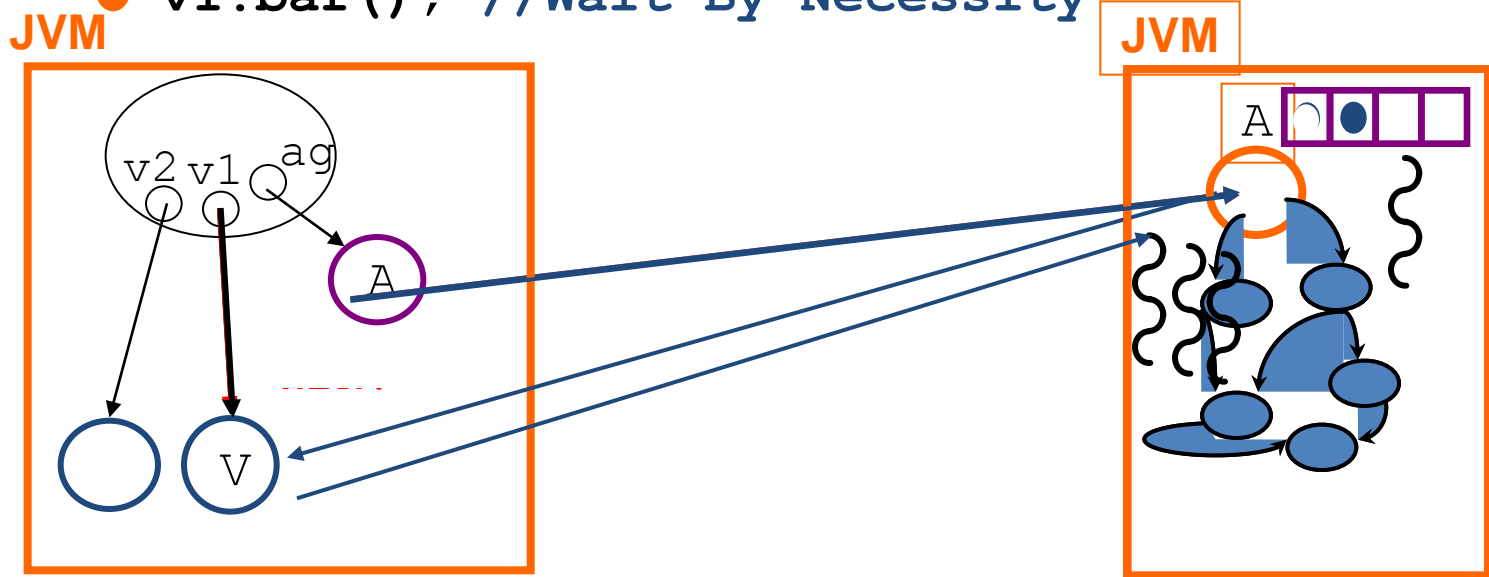


ProActive Programming View



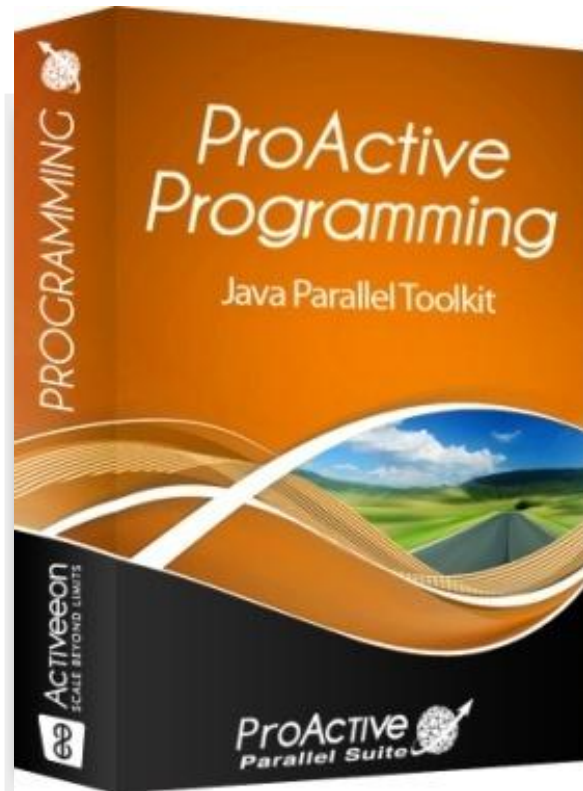
ProActive: Active objects

- A ag = **newActive** ("A", [...], VirtualNode)
- V v1 = ag.foo (param);
- V v2 = ag.bar (param);
- ...
- v1.bar(); //Wait-By-Necessity



Wait-By-Necessity
is a
Dataflow
Synchronization

ProActive Parallel Suite



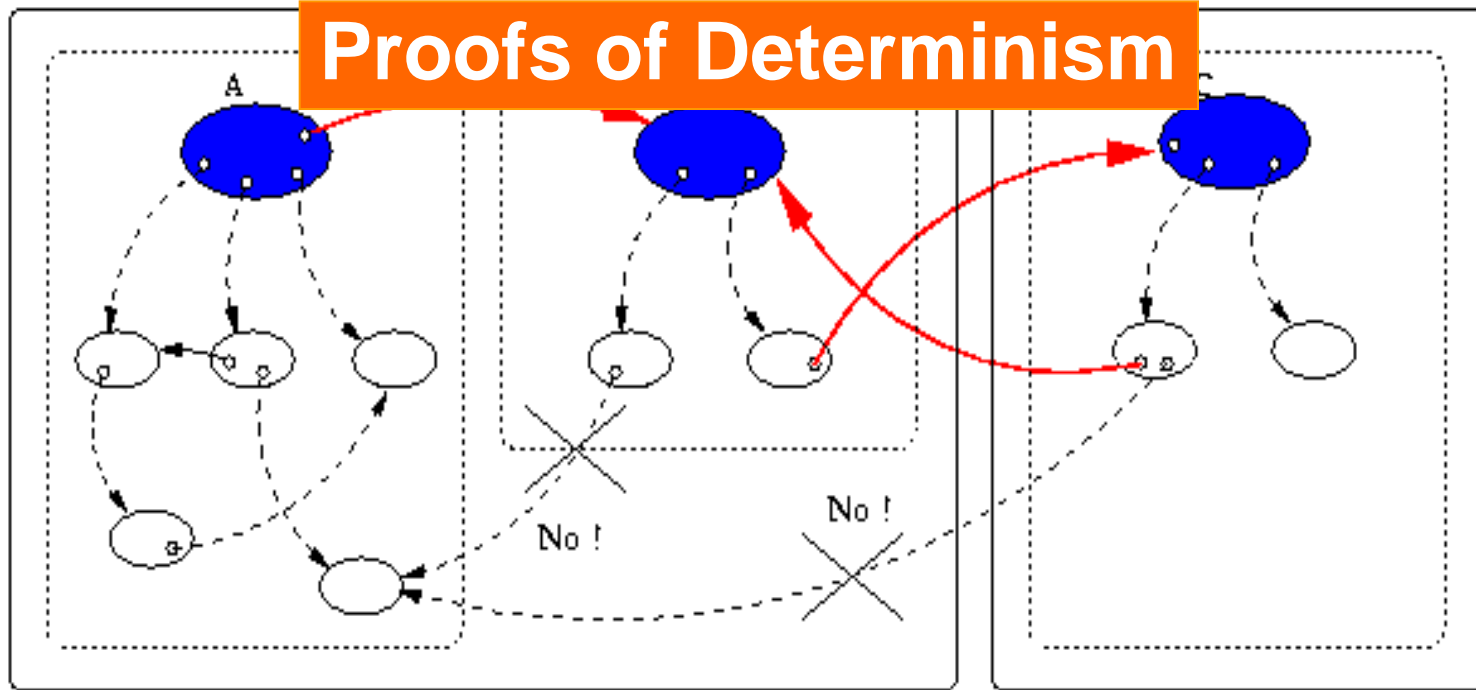
- Workflows in Java
- Master/Workers
- SPMD
- Components
- ...

Core API
Active Objects
Asynchrony
Futures
Groups
Mobile Agents
MOP / AOP

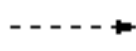
Standard system at Runtime: No Sharing

NoC: Network On Chip

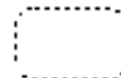
Proofs of Determinism



Active Object



Synchronous Call



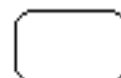
Sub System



Passive Object

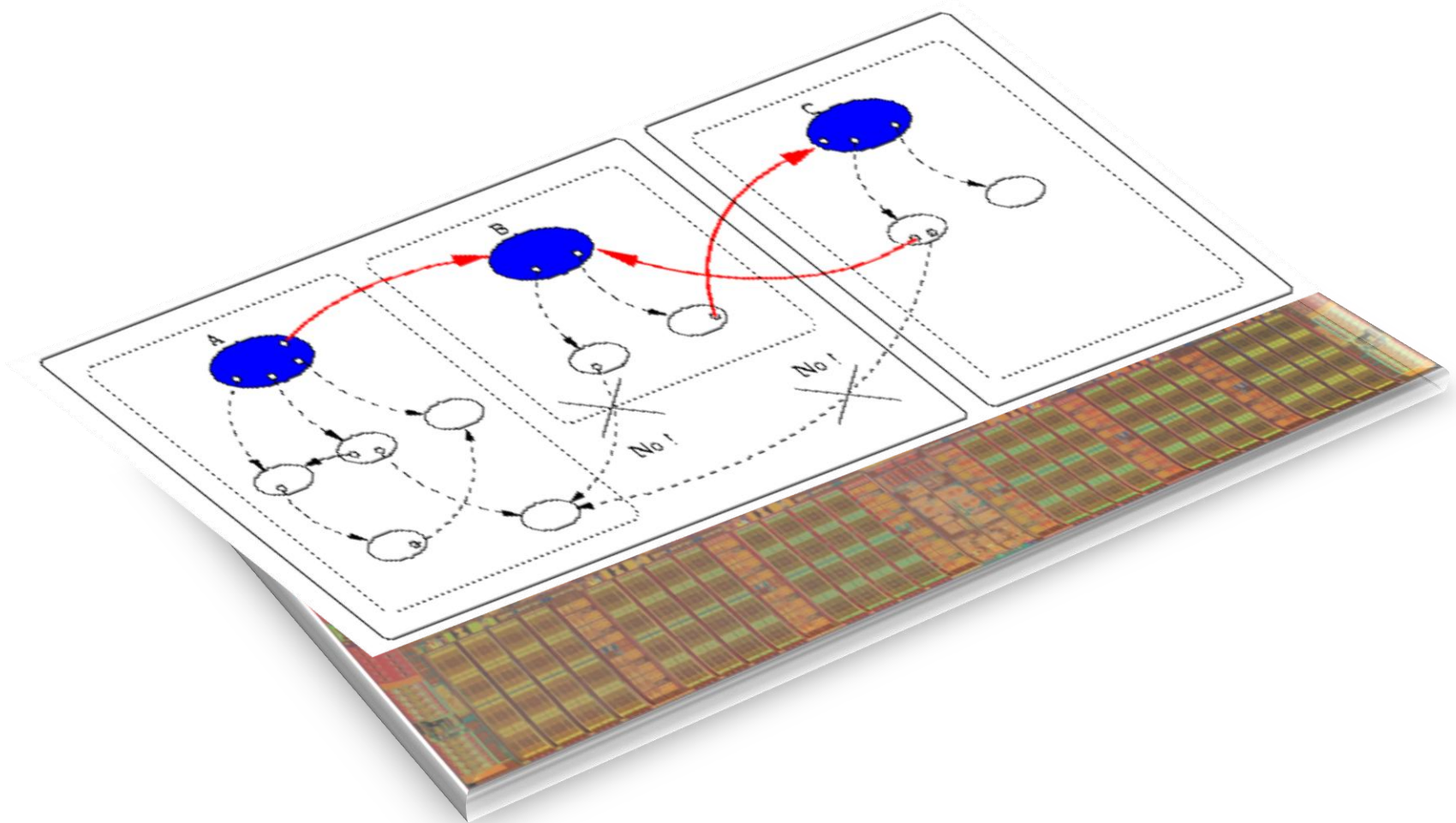


Asynchronous Call



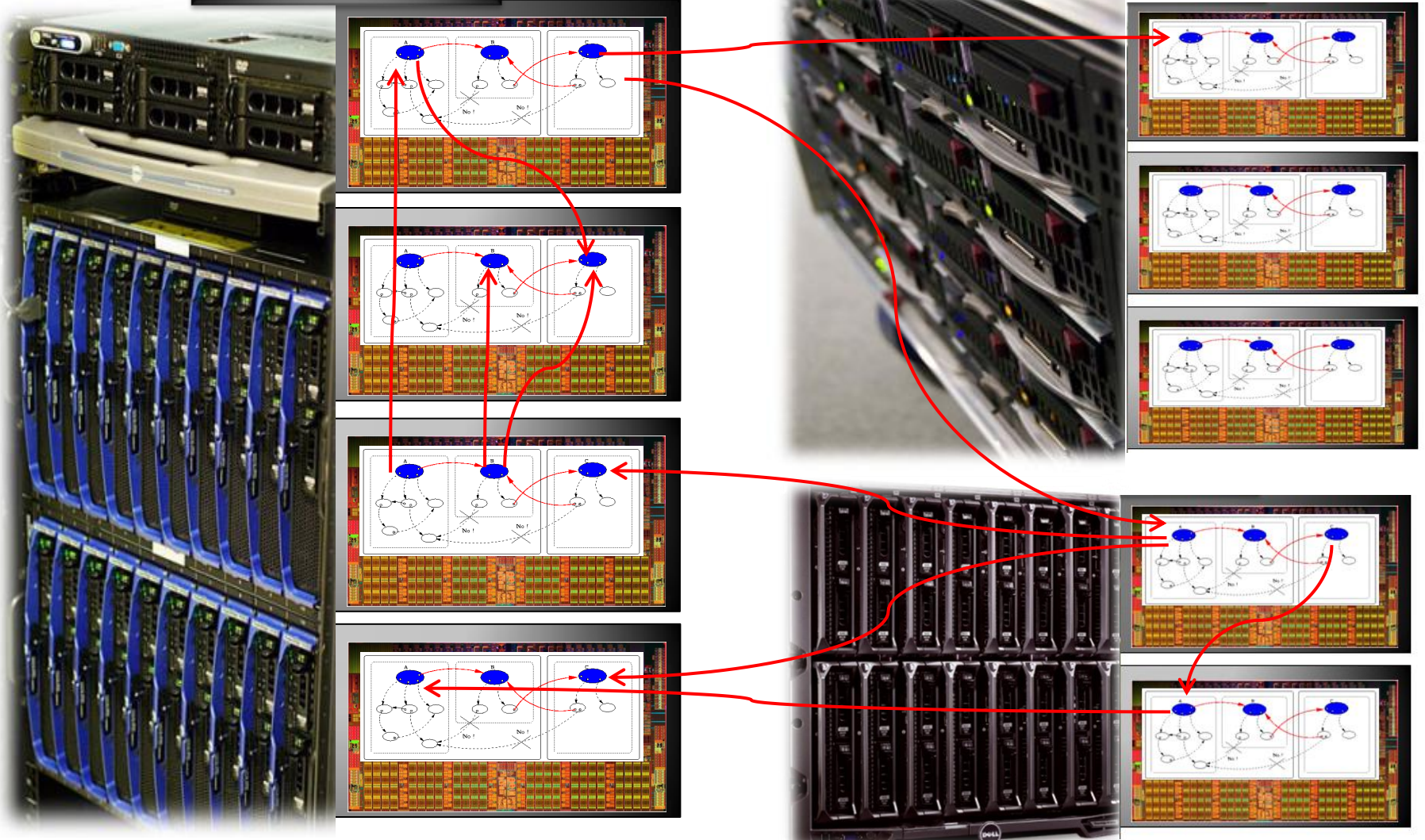
Address Space

Distributed Objects On Chip



Distributed Objects On Chip, Boards, Clouds

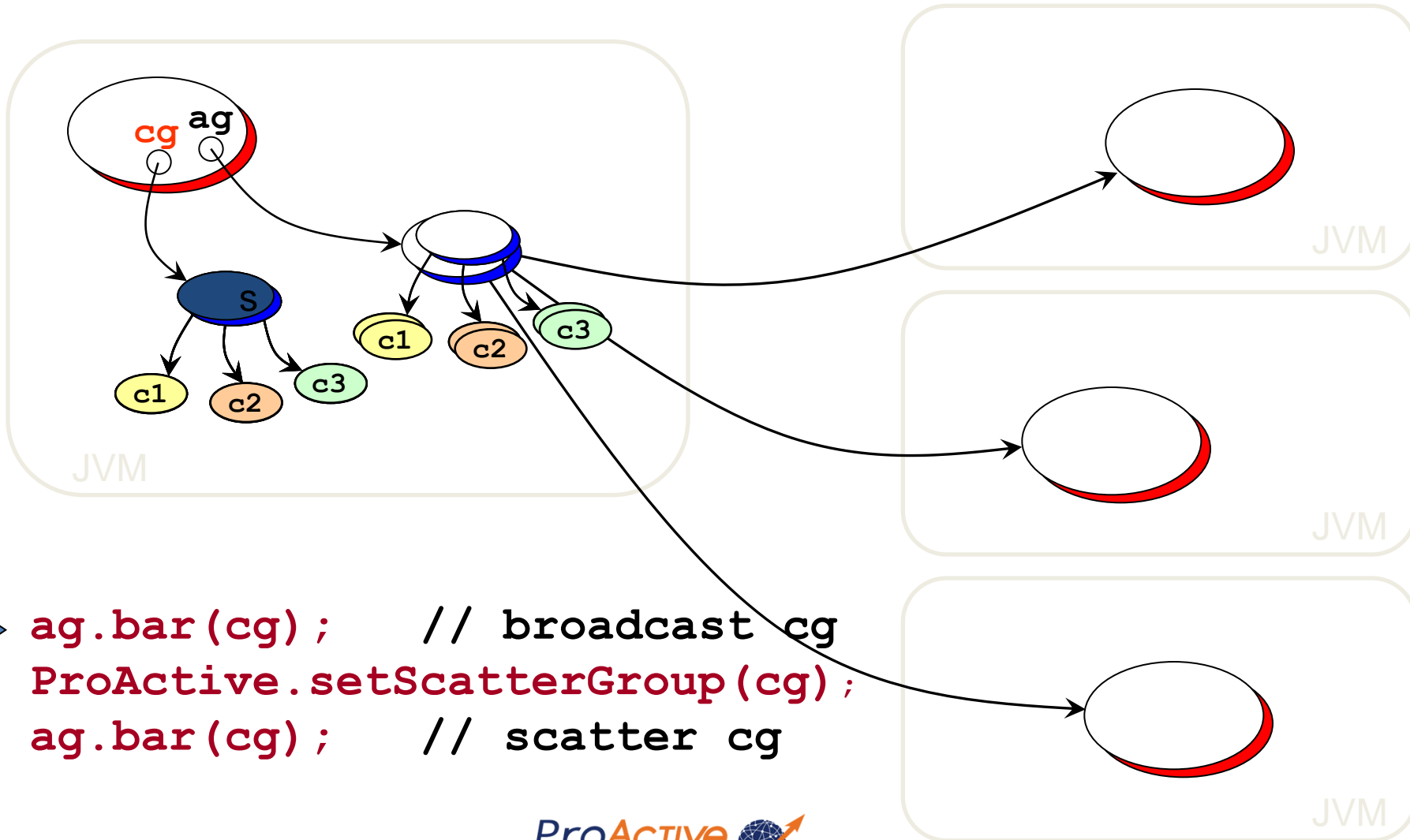
Bi-Socket Board



Broadcast and Scatter

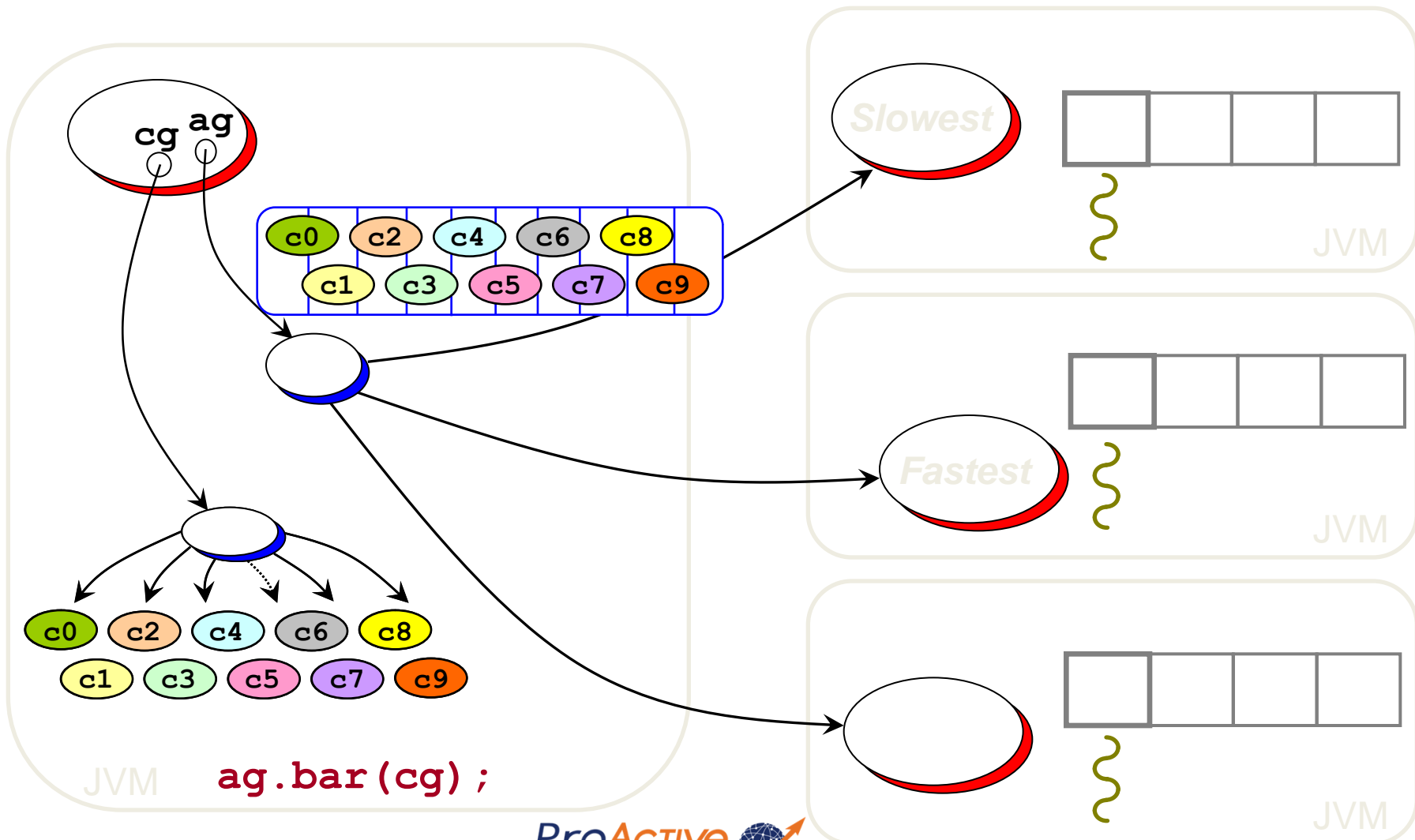
Broadcast is the default behavior

Use a group as parameter, Scattered depends on rankings

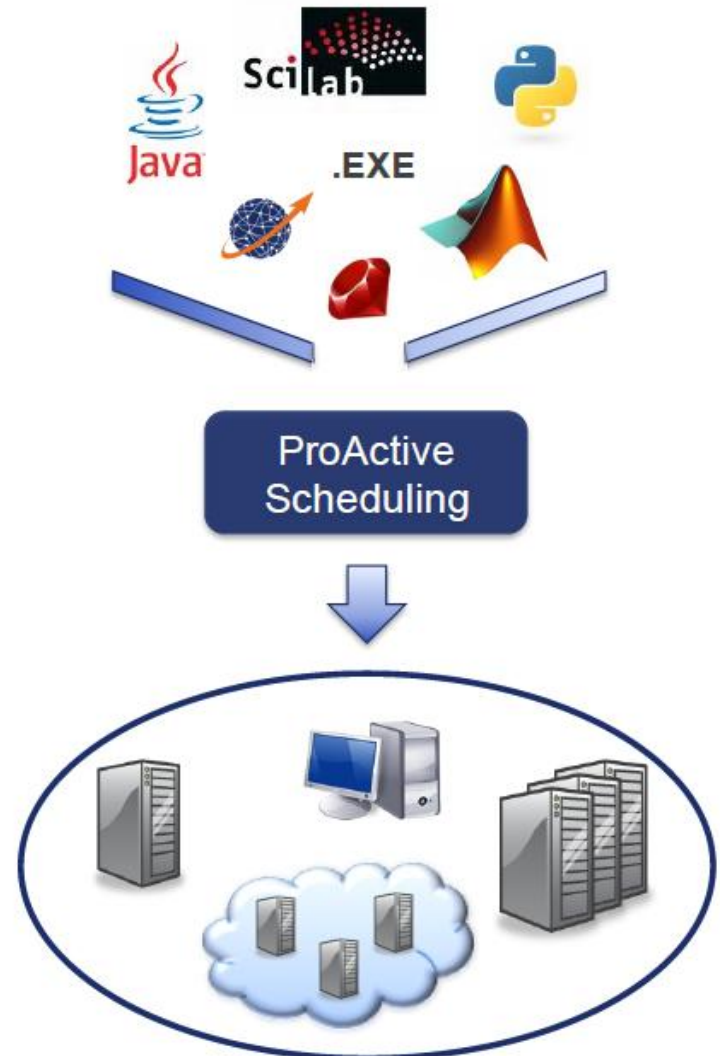


```
ag.bar (cg) ; // broadcast cg  
ProActive.setScatterGroup (cg) ;  
ag.bar (cg) ; // scatter cg
```


Dynamic Dispatch Group

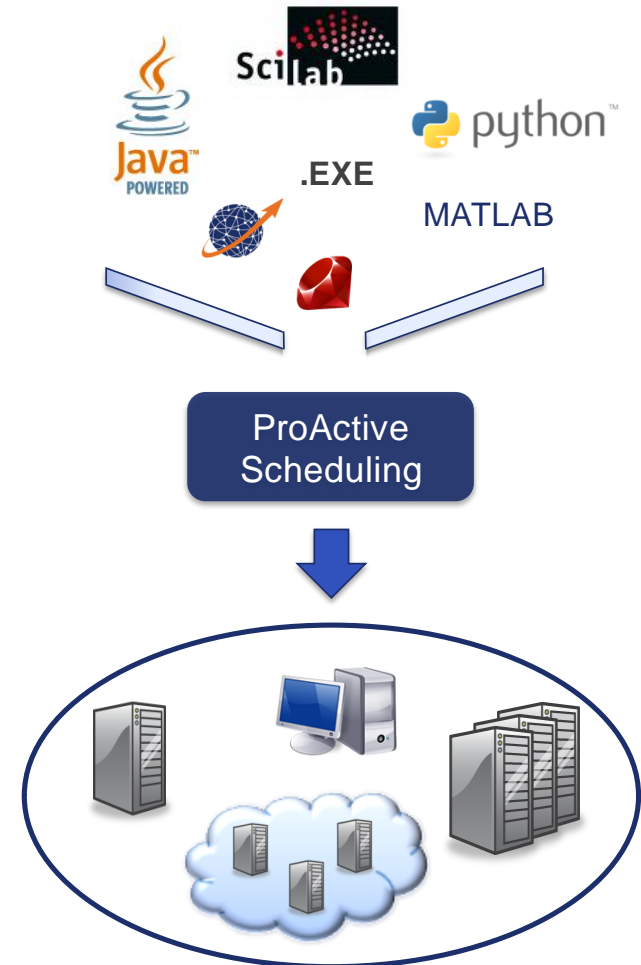


ProActive Scheduling



ProActive Scheduling

- ❑ Job Scheduling
- ❑ Optimize:
 - workload distribution
 - computing resources usage
 - software licences
- ❑ Straightforward **batch, jobs and workflow** construction
- ❑ Any kind of jobs supported:
 - Java, Applications and Scripts
- ❑ Data management with automatic transfer



ProActive Scheduling Big Picture

The screenshot displays the ProActive Scheduler interface with three main panels: Pending (674), Running (60), and Finished (31). The 'Job Info' panel is expanded for job 2008, showing its tasks and their status.

Pending (674)

Id	State	User	Priority	Name
1996	Pending	jl	Normal	job_with_dep
1997	Pending	jl	Normal	job_with_dep
1998	Pending	jl	Normal	job_with_dep
1999	Pending	jl	Normal	job_with_dep
2000	Pending	jl	Normal	job_with_dep
2001	Pending	jl	Normal	job_with_dep
2002	Pending	jl	Normal	job_with_dep
2003	Pending	jl	Normal	job_with_dep
2004	Pending	jl	Normal	job_with_dep
2005	Pending	jl	Normal	job_with_dep
2006	Pending	jl	Normal	job_with_dep
2007	Pending	jl	Normal	job_with_dep
2008	Pending	jl	Normal	job_with_dep
2009	Pending	jl	Normal	job_with_dep
2010	Pending	jl	Normal	job_with_dep

Running (60)

Id	State	Progress	# Finished	User	Priority
1313	Running	[Progress Bar]	4/8	user1	Normal
1314	Running	[Progress Bar]	4/8	user1	Normal
1315	Running	[Progress Bar]	7/8	admin	Normal
1316	Running	[Progress Bar]	4/8	user1	Normal
1317	Running	[Progress Bar]	7/8	admin	Normal
1318	Running	[Progress Bar]	4/8	user1	Normal
1319	Running	[Progress Bar]	7/8	admin	Normal
1320	Running	[Progress Bar]	3/8	user1	Normal
1321	Running	[Progress Bar]	7/8	admin	Normal
1322	Running	[Progress Bar]	3/8	user1	Normal
1323	Running	[Progress Bar]	7/8	admin	Normal
1324	Running	[Progress Bar]	2/8	user1	Normal
1325	Running	[Progress Bar]	2/8	user1	Normal
1326	Running	[Progress Bar]	2/8	user1	Normal
1327	Running	[Progress Bar]	2/8	user1	Normal

Finished (31)

Id	State	User	Priority	Name
010	Finished	jl	Low	job_proActive
008	Finished	jl	Low	job_proActive
005	Finished	jl	Low	job_proActive
001	Finished	jl	Low	job_proActive
006	Finished	jl	Low	job_proActive
004	Finished	jl	Low	job_proActive
003	Finished	jl	Low	job_proActive
009	Finished	jl	Low	job_proActive
007	Finished	jl	Low	job_proActive
002	Finished	jl	Low	job_proActive
245	Finished	user1	Normal	job_with_dep
246	Finished	user1	Normal	job_with_dep
247	Finished	user1	Normal	job_with_dep
252	Finished	admin	Normal	job_with_dep
253	Finished	admin	Normal	job_with_dep

Job Info (Job 2008)

Job 2008 has 8 tasks

Id	State	Name	Host name	Start time	Finished time	Re-run	Description
200800	Submitted	task4	n/a	Not yet	Not yet	0/2	This task will sleep 5s
200800	Submitted	task2	n/a	Not yet	Not yet	0/1	This task will sleep 10s
200800	Submitted	task6	n/a	Not yet	Not yet	0/1	This task will sleep 8s
200800	Submitted	task1	n/a	Not yet	Not yet	0/2	This task will sleep 6s
200800	Submitted	task5	n/a	Not yet	Not yet	0/1	This task will sleep 2s
200800	Submitted	task7	n/a	Not yet	Not yet	0/2	This task will sleep 6s
200800	Submitted	task3	n/a	Not yet	Not yet	0/1	This task will sleep 4s
200800	Submitted	task8	n/a	Not yet	Not yet	0/1	This task will sleep 6s

Result Preview

Property	Value
Id	2008
State	Pending
Name	job_with_dep
Priority	Normal
Pending tasks number	0
Running tasks number	0
Finished tasks number	0
Total tasks number	8
Submitted time	09:40:06 03/12/08
Started time	Not yet
Finished time	Not yet



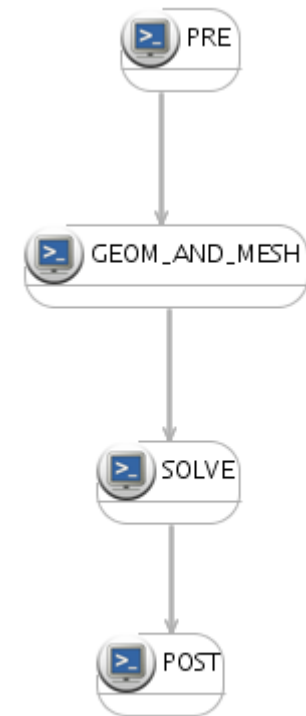
a
ion



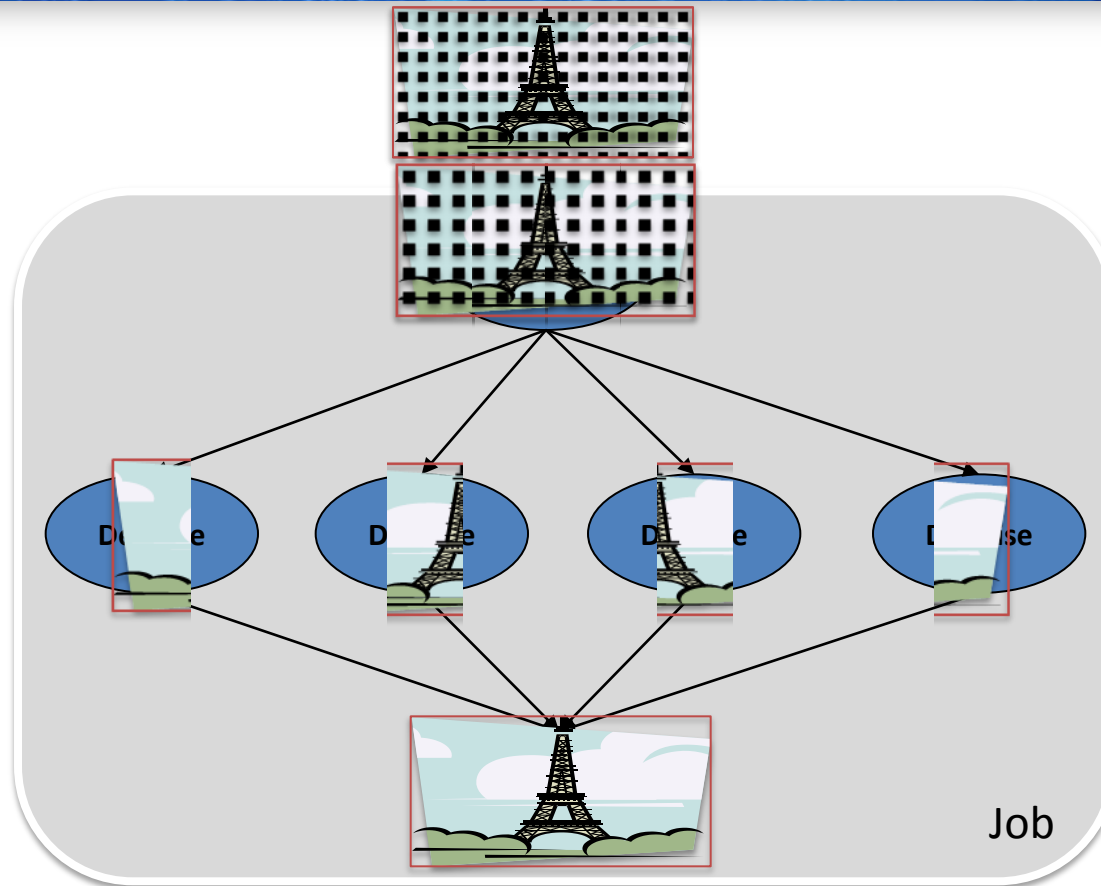
RESO

ProActive Scheduling & Orchestration

- ❑ Provides highly configurable scheduling policies
- ❑ Self-healing with automatic restart from latest valid point
- ❑ Hardware and software fault tolerant mechanism for task execution
- ❑ Graphical interface and command line client
- ❑ Seamless integration with third-party application
 - Java, Web Service and C/C++
- ❑ Accounting per user



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

Workflow Studio

The screenshot displays the Eclipse Workflow Studio interface. The main window shows a workflow diagram with the following tasks and connections:

- Pre_computation** connects to **Computation_setup**.
- Computation_setup** branches into **Test_case_speed_1** and **Test_case_speed_2**.
- Test_case_speed_1** connects to **Post_processing_speed_1**, **Post_processing_speed_2**, and **Post_processing_speed_3**.
- Test_case_speed_2** connects to **Test_case_speed_3** and **Test_case_speed_4**.
- Test_case_speed_4** connects to **Post_processing_speed_4**.

The **Job Properties** panel is visible at the bottom, showing the following configuration:

Job	Value
Project Name	
Job Name	job_Finemarine_1Host
Job Description	
Input Space URL:	
Output Space URL:	
Log File	\${LOGS}/job_finemarine107Core2Host.log

Additional settings in the Job Properties panel include:

- Max number of executions for tasks: []
- Cancel Job On Error Policy: Cancel job as soon as one task fails
- If an error occurs restart task: anywhere
- Job Priority: Normal

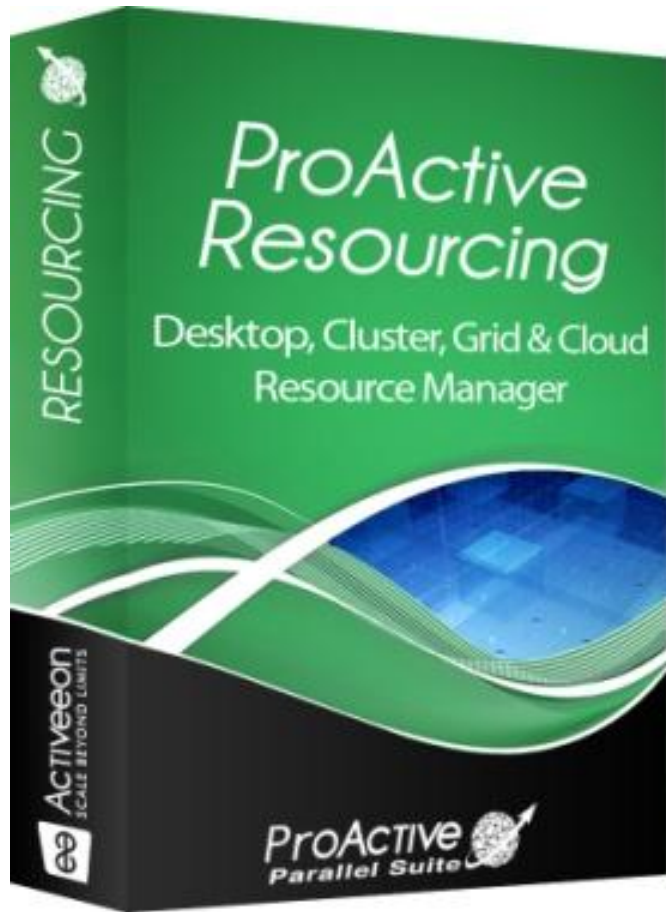
Buttons at the bottom of the Job Properties panel include: generic information, job classpath, and job variables.



Studio Demonstration

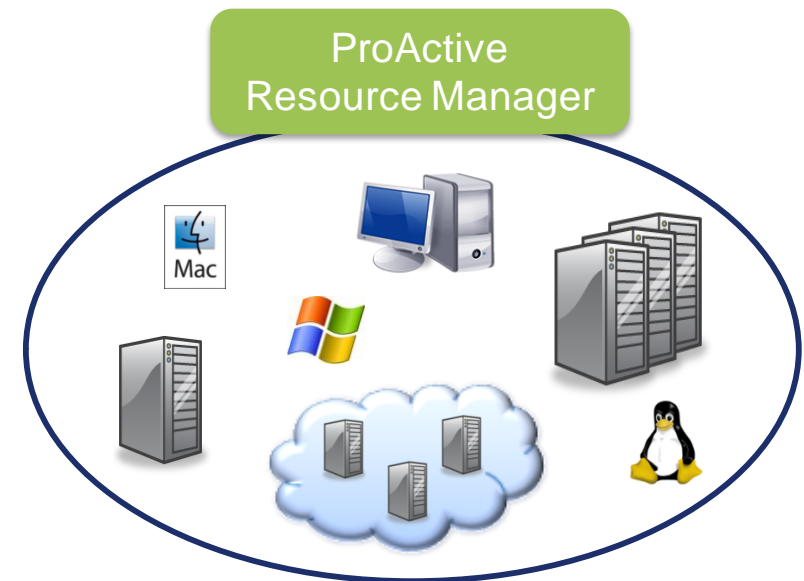


ProActive Resourcing



ProActive Resourcing

- ❑ **Virtualizes** organizations' existing infrastructure for a heightened computing power
- ❑ Enables **business driven** computing resources acquisitions
 - Elastic computing platform
- ❑ Reaps the benefits from **Clouds**, e.g. Amazon EC2, and latest hardware architecture
- ❑ **Aggregates** and leverages any type of resources
- ❑ Manage your **virtual machines**
 - VMWare, Xen, KVM, Hyper-V, ...
- ❑ Accounting per resource provider



Resource Manager GUI

The screenshot displays the ProActive Resource Manager interface. At the top, there is a menu bar (File, Connection, Actions, Help, Window) and a toolbar with icons for file operations and a 'Shutdown' button. Below the menu is a 'Tab Explorer' and 'Tree Explorer' showing a hierarchical view of resources. The 'Tree Explorer' shows a tree structure with nodes like 'PA_JVM406472916' and 'eon14.inria.fr'. The 'Compact View' shows a grid of colored circles representing node states. The 'JMX Monitoring' section contains three charts: 'Activity/Inactivity' (a pie chart showing 15.53% activity and 84.47% inactivity), 'Node States' (a bar chart showing 330 Total, 266 Free, 40 Busy, 0 ToBeReleased, and 24 Down nodes), and 'Total Nodes History' (a line chart showing a total of 330 nodes). At the bottom, there is a 'Statistics' table and an 'Info' tab. The status 'connected' is shown in the bottom right corner.

Tree Explorer

- PA_JVM406472916
 - rmi://eon11.inria.fr:1099/PA_JVM406472916_GCMNode-0
 - rmi://eon11.inria.fr:1099/PA_JVM406472916_GCMNode-1
 - rmi://eon11.inria.fr:1099/PA_JVM406472916_GCMNode-2
- eon14.inria.fr
 - PA_JVM1252018564
 - PA_JVM1861646533
 - rmi://eon14.inria.fr:1099/PA_JVM1861646533_GCMNode-0
 - rmi://eon14.inria.fr:1099/PA_JVM1861646533_GCMNode-1
 - rmi://eon14.inria.fr:1099/PA_JVM1861646533_GCMNode-2

Compact View

JMX Monitoring

Charts

- Activity/Inactivity**
 - Activity(15.53%)
 - Inactivity(84.47%)
- Node States**
 - Total: 330
 - Free: 266
 - Busy: 40
 - ToBeReleased: 0
 - Down: 24
- Total Nodes History**
 - Total Nodes: 330

Statistics

state	aggregate
# free nodes	266
# busy nodes	40
# down nodes	24

connected

Topology with the ProActive Resourcing

The screenshot displays the ProActive Resource Manager GUI. The main window shows a network topology with nodes and edges. The nodes are labeled with names like 'styx.inria.fr', 'tranquilly.inria.fr', 'pendule.inria.fr', etc. The edges are labeled with numbers representing weights or costs. A 'Visibility filter' panel on the right allows adjusting 'Density' (38), 'Threshold' (100), and 'Show edges' (unchecked). Below the topology is a 'Compact View' showing a grid of colored circles representing node status. At the bottom, a 'Statistics' table provides a summary of node statuses.

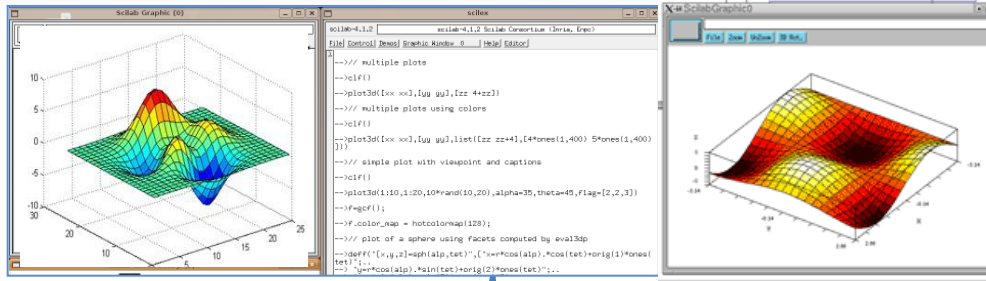
Node Status	Count
Deploying	0
Lost	24
Configuring	0
Free	84
Busy	100
Down	3
Total	187

connected



Demonstration on a Production Platform

Integration with Scilab and Matlab



Copyright 1993-2005 The MathWorks, Inc.

Static Policy

LSF

Timing Policy
12/24

Desktops

Dynamic Workload
Policy

EC2



Dedicated resources

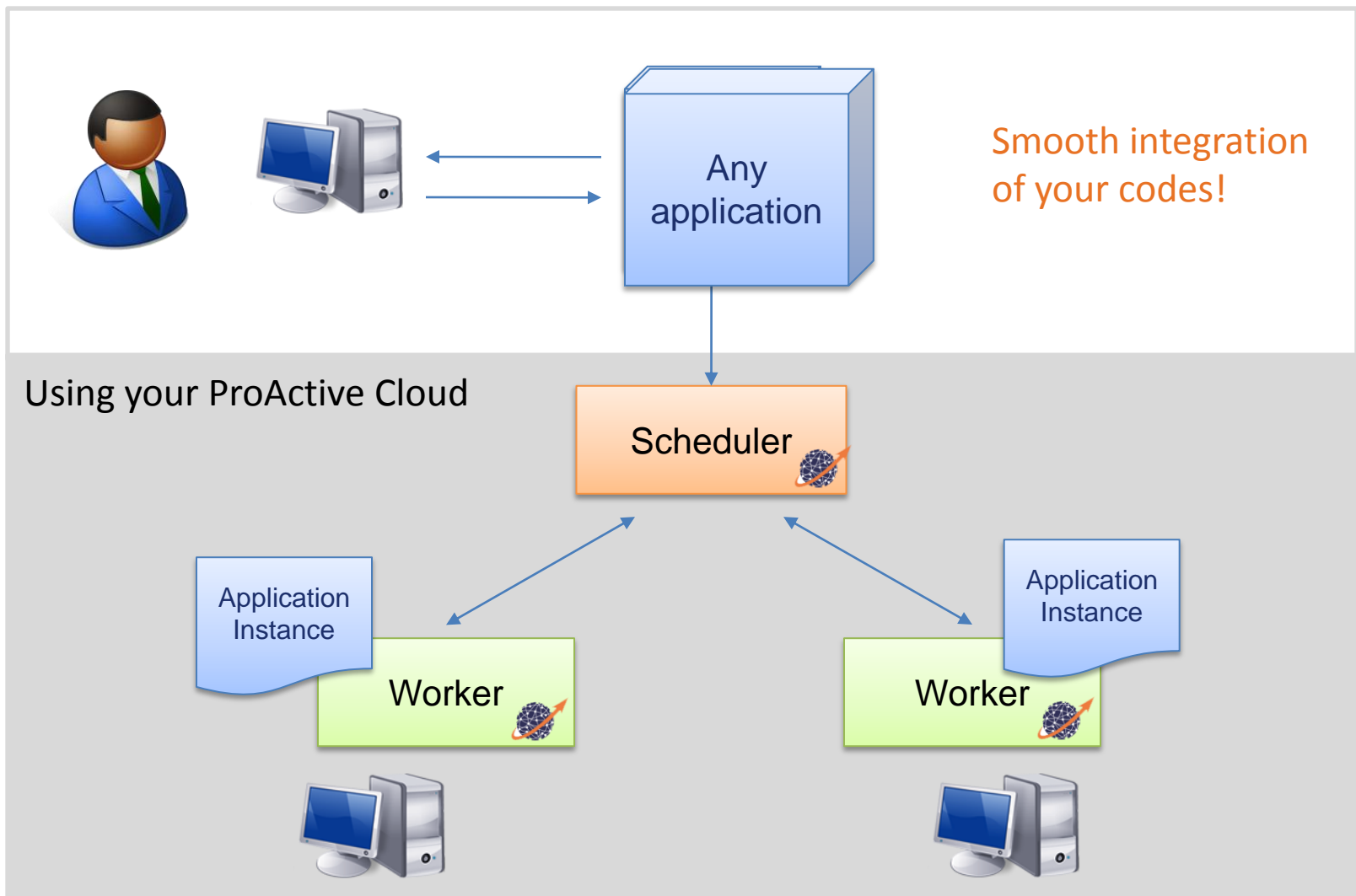


Desktops



Amazon EC2

Integration with Applications



ProActive Orchestration Portal

File Edit View Favorites Tools Help

★ Favorites | ★ Suggested Sites | Web Slice Gallery

ProActive Scheduler Portal

Home RSS Mail Print Page Safety Tools ?

Portal Admin Help Submit job Logout demo



Jobs list

My jobs Finished Pending Running < Previous 1 - 50 Next >

Id	State	User	Progress	Priority
2602	Running	lbordier	1 / 3	Normal
2601	Running	lbordier	1 / 3	Normal
2600	Running	lbordier	1 / 3	Normal
2599	Running	lbordier	1 / 3	Normal
2562	Killed	lbordier	1 / 3	Normal
2610	Running	madelain	3 / 4	Normal
2608	Killed	madelain	3 / 4	Normal
2595	Finished	rameur	3 / 3	Normal

Use filters to restrict the number of jobs currently displayed.

Filters apply only to the current page.

Use The <Previous and Next> controls to view more results.

Match All Match Any Match None

> - Id contains

Clear

Apply

Details

Tasks Users Statistics

User	Jobs	Connected at	Last submit	Hostname
gperetti	0	03/16 11:17:25		4649
madelain	29	03/16 12:59:30	03/18 05:38:23	4659
lbordier	66	03/16 04:55:39	03/18 04:17:22	4690
cdelbe	1	03/17 11:35:02	03/17 11:38:11	4722
lbordier	0	03/17 01:54:45		4729
watcher	0	03/18 02:47:14		4876
demo	0	03/18 08:33:57		4876

Job Info Output Result Preview

Job Id:	2599
State:	Running
Name:	TEST_CY_0029
Priority:	Normal
User:	lbordier
Pending tasks:	1
Running tasks:	1
Finished tasks:	1
Total tasks:	3

Done

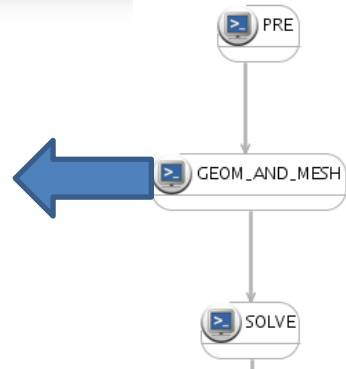
Internet | Protected Mode: On

100%

ProActive: Security for your Enterprise Cloud platform

- ❑ User Authentication (LDAP or Files)
- ❑ Authentication and encryptions of network communications using SSH, SSL and PKI
- ❑ Secure communication routing through Firewall and NAT configuration of LAN network

Consolidate IT with non-intrusive Cloud & Accelerate Applications



Dedicated resources

On premise

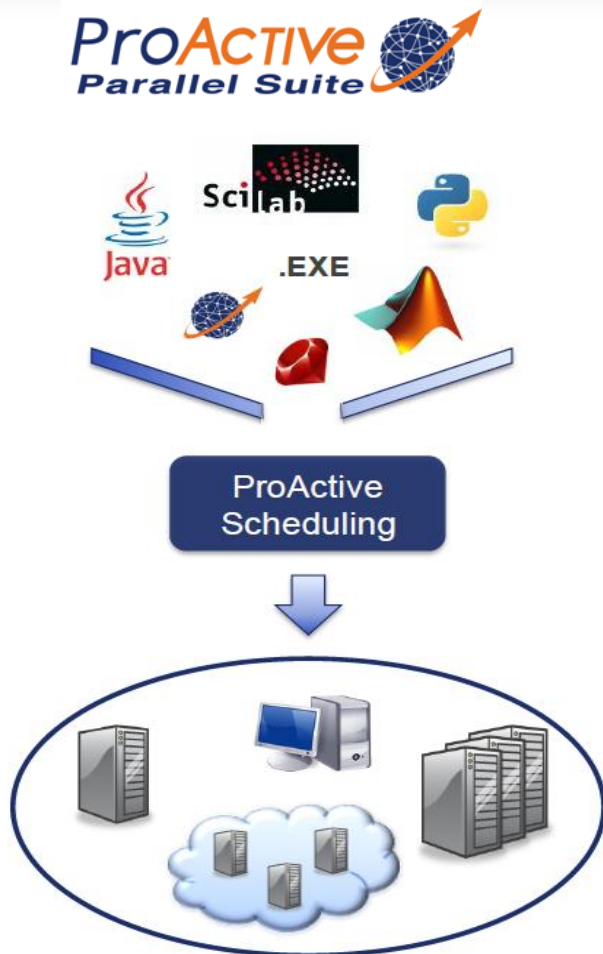


Desktops



External Data Center, Amazon EC2, Azure

Conclusion: ProActive



OW2
Consortium



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



Thanks for your attention!

Questions?

