

IFP EN and OW2 ProActive Parallel Suite

D. Caromel

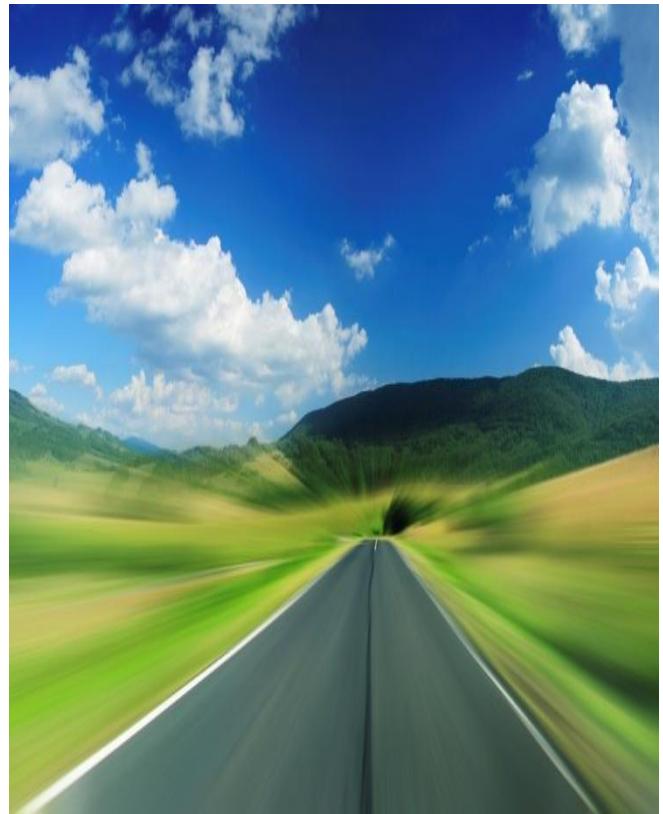


Accelerate and Orchestrate Enterprise Applications

Hybrid Cloud Solutions (Private with Public Burst)

Agenda:

1. Background
2. Solution: ProActive
3. IFP EN Use Case
4. Live Demonstration



1. Background

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

□ + Visitors + Interns



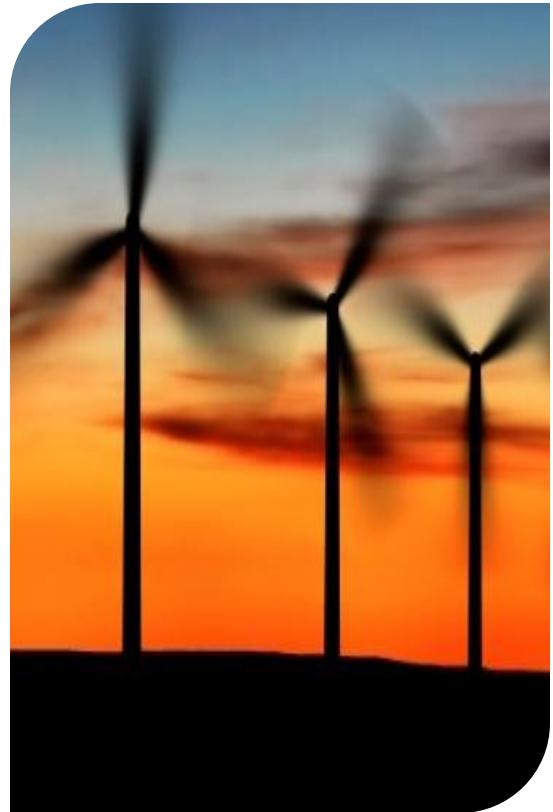
Located in Sophia Antipolis, between
Nice and Cannes,
Visitors Welcome!

ActiveEon Overview



ACTIVEeon
SCALE BEYOND LIMITS

- ActiveEon, a software company **born of INRIA**, founded in 2007, HQ in the French scientific park Sophia Antipolis
- **Co developing** with INRIA **ProActive Parallel Suite®**, a Professional Open Source middleware for parallel, distributed, multi-core computing
- Core **mission**: Scale Beyond Limits
- Providing a full range of services for ProActive Parallel Suite
- Worldwide production customers and users:



amADEUS
Your technology partner



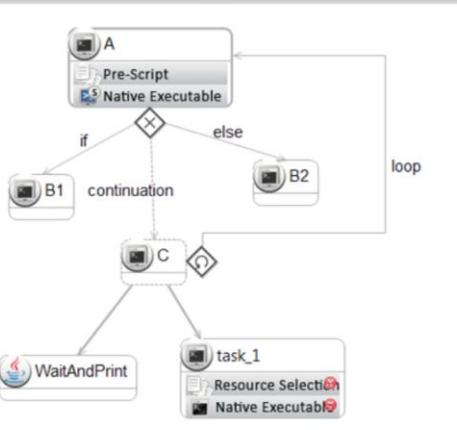
ProActive
Parallel Suite

A Wide Range of Services

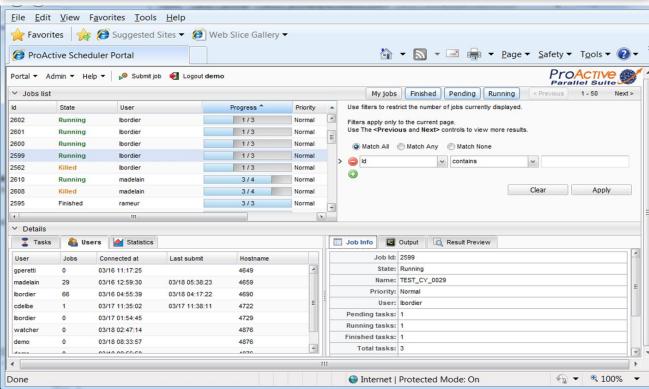
- Training and Certification
 - Accelerate learning process
- Consulting
 - Optimize your infrastructure and maximize ROI
- Technical Support - Subscription
 - The guarantee of a quick and efficient assistance
- Integration-Development
 - Get ActiveEon's products fine tuned to your specific needs
- Partnerships
 - With OEMs and ISVs



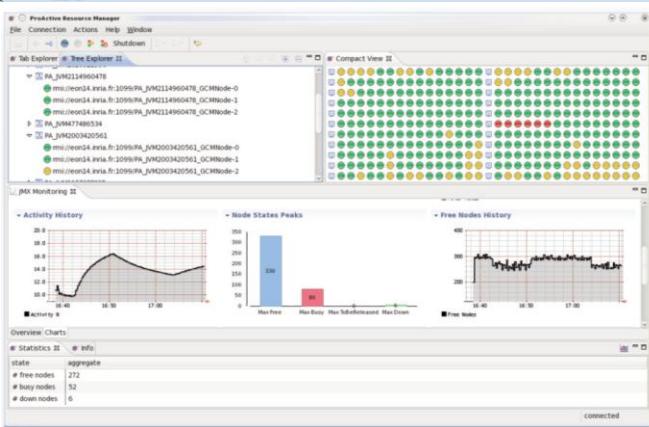
2. ProActive Parallel Suite



HPC Workflow & Parallelization



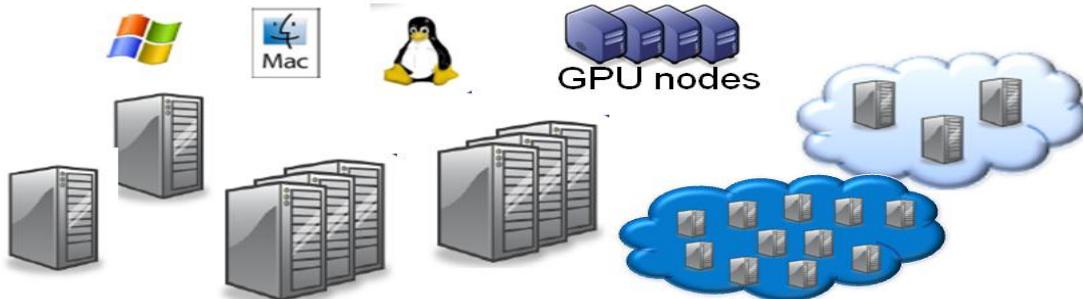
The screenshot shows the ProACTIVE Scheduler Portal interface. At the top, there's a navigation bar with links like File, Edit, View, Favorites, Tools, Help, and a Suggested Sites section. Below the navigation is a toolbar with icons for Portlet, Admin, Help, Submit job, and Logout demo. The main area has tabs for My Jobs, Finished, Pending, and Running. A search bar and filter options are also present. On the left, a 'Jobs list' table shows several jobs with columns for ID, State, User, Progress, and Priority. Some rows are highlighted in orange. On the right, a 'Details' panel provides more information about a selected job (Job ID: 2599, State: Running, User: border, Priority: Normal) along with a 'Job Info' tab. At the bottom, there's a status bar indicating Internet and Protected Mode.



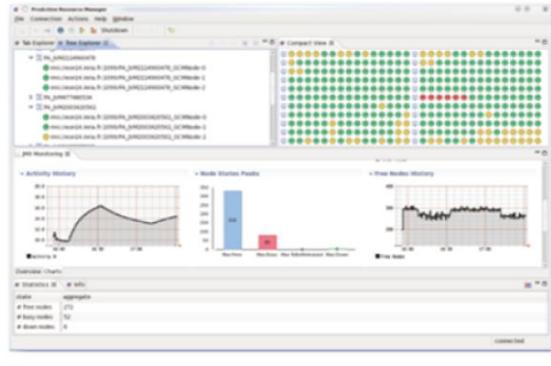
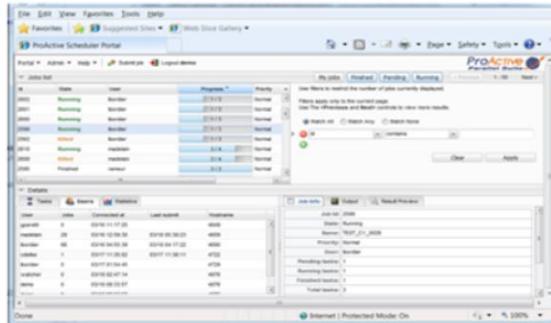
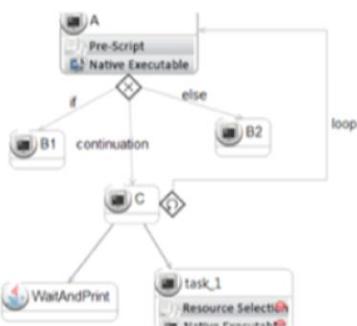
This screenshot shows the Production Resource Manager interface. It includes a 'Tab Explorer' with various tabs like PA_00000000000000000000000000000000, PA_00000000000000000000000000000001, and PA_00000000000000000000000000000002. Below the tabs are three monitoring charts: 'Activity History' (a line graph), 'Node States Peaks' (a bar chart), and 'Free Nodes History' (a line graph). The bottom section contains an 'Overview Charts' section with 'Statistics' and 'Info' tabs, and a summary of node counts: free nodes (272), busy nodes (52), and down nodes (6). To the right, there's a cluster of blue server racks labeled 'GPU nodes'.

Scheduling & Orchestration

Cloud & Grid



Technology & Solutions



HPC Workflow & Parallelization

Studio for HPC, Workflow Visualization
Native Tasks (MPI, OpenMP, Multi-thread, GPU)
Java APIs for Parallelization & Distribution
Matlab & Scilab Distributed Computing

Scheduling & Orchestration

Multi-Application & Multi-Tenant
Portal with Data Management, Remote Visualization
APIs (Java, REST, CLI)
Integration in existing Applications and Web Portals

Cloud & Grid

Physical Machines (Servers, Clusters, Desktops) and
Virtual (*Hyper-V, VMware, KVM, Xen; OpenStack*)
Dynamic Policies, Full accounting of resource usage
Public Cloud Burst (EC2, Azure, Data Centers)

Workflow Studio

ProActive Workflow Studio 1.0 Technical Preview (beta)

File Edit View Help

Project Explorer branchingExample_job.pws JobWithDep_Example.job.pws re_loop.job.pws *ThalesAvionics_job.pws

task_1
Selection-Script
Pre-Script
Input Data
Native Executable
Post-Script
Output Data
Clean-Script

task_2
Java Executable

if else

Palette

- Task
 - Java Task
 - Native Task
 - pre/post/clean
 - DataSpace Input
- Flow Controls
 - if
 - loop
 - replicate
- Flow Connectors
 - flow connection
 - if-then branch
 - if-else branch
 - if-continuation branch

Properties Problems

Job Properties

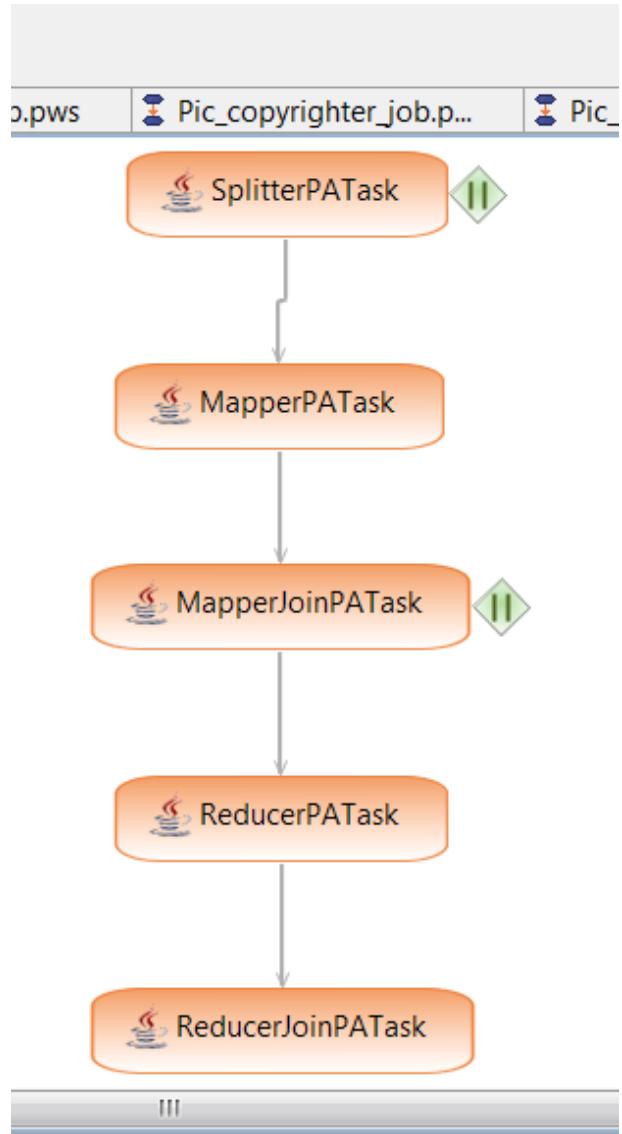
Job	Project Name	Max number of executions for tasks
Generic Info	Job Name ProactiveJob	Cancel Job On Error Policy Continue job execution when a task
Job Classpath	Job Description	If an error occurs restart task anywhere
Variables	Input Space URL:	Job Priority Normal
Rulers & Grid	Output Space URL:	

Parallel Suite

10:26 22/06/2011

ProActive MapReduce

- Same APIs as Hadoop
Easy switch from Hadoop
to ProActive
- Does not requires an HDFS
File System
- Runs on general purpose,
Multi-tenant,
Multi-Application Clouds
- Available as PaaS



3. IFP Energies Nouvelles Use Case

IFP Energies Nouvelles

> Newsletter > RSS feeds 

Quick Links  Research 

ifp Energies nouvelles *Innovating for energy*

IFPEN Research themes Expertise Industrial development Partnerships Publications Training

WELCOME. IFP Energies nouvelles is a public research, innovation and training, whose mission is to develop efficient technologies, economic, clean and sustainable in energy, transport and environment.

HEADLINES

Inventing floating offshore wind turbines



1 2 3 4

Our commitment to research



Renewable energies
Eco-friendly production
Innovative transport
Eco-efficient processes
Sustainable resources

Keywords

Biofuels IEED
Separation platform
Hybridization IQ FUEL
Chairs at IFP School CO2
COCAFE IFPEN Group

Links

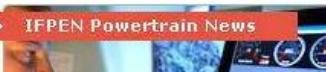
Projects
IFPEN website dedicated to collaborative projects

Oil & Gas Science and Technology - Revue d'IFP Energies nouvelles



Download the articles in full text (free of charge)

IFPEN Powertrain News

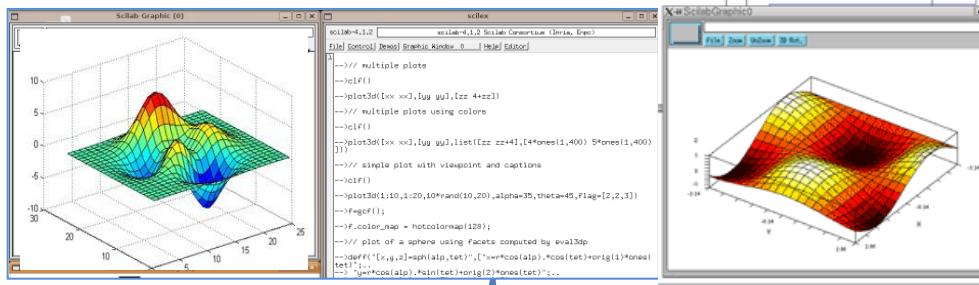


ProACTIVE Parallel Suite

IFP Energies Nouvelles Use Case

- Deployment in production for all sites of IFP EN
- On over 600 computers
- Demanding applications: business workflows, numerical and financial simulations, Matlab ™ and Scilab, data analysis (Map / Reduce)
- Web-based portal as well as
 - RCP and
 - APIs : from within Application

Integration: Scilab and Matlab, Applications



MATLAB®
The Language of Technical Computing



Static Policy

LSF

Timing Policy
12/24

Desktops

Dynamic Workload Policy

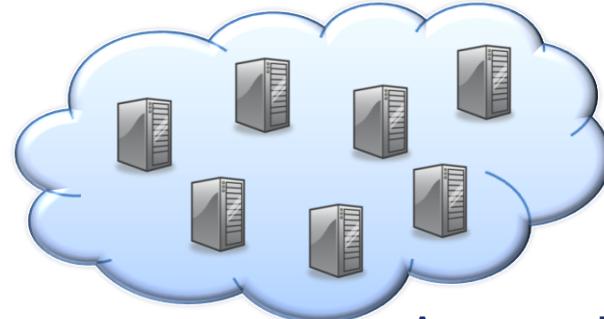
EC2



Dedicated resources



Desktops



Amazon EC2

IFP Energies Nouvelles Use Case

- Deployment in production for all sites of IFP EN
- On over 600 computers
- Demanding applications: business workflows, numerical and financial simulations, Matlab™ and Scilab, data analysis (Map / Reduce)
- Web-based portal as well as RCP and APIs

“With the adoption of ProActive [...] IFP EN enters in the era of Cloud Computing. We are going to cut on our hardware and software costs, to strengthen our business workflows, to use these globalized resources directly in our business software in order to accelerate them”, Frédéric Gauluet, IFP EN

4. Live Demonstration on a Production Platform

ProActive PACA:
1 368 Cores, 30 TB, 480 Cuda GPUs

The ProActive PACA Grid Platform

Production Platform operated by:



Total:

- 1 368 Cores
- 480 GPU CUDA Cores
- 30TB Storage

Publically Available Today



ProActive Scheduler Portal - Mozilla Firefox

File Edit View History Bookmarks Tools Help

ProActive Scheduler ... x ProActive Scheduler ... x ProActive - Profession... x +

inria.fr https://node0.cloud.sophia.inria.fr/pc Google

Most Visited Getting Started Latest Headlines XE - Universal Currency ...

Portal Admin Help Submit job Logout dcaromel

ProACTIVE Parallel Suite

Jobs list

ID	Status	User	Progress	Priority	Duration
3829	Running	dcaromel	0 / 8	Normal	
3828	Running	dcaromel	0 / 8	Normal	
3827	Running	dcaromel	0 / 1	Normal	
3826	Running	dcaromel	0 / 9	Normal	
3825	Running	dcaromel	0 / 2	Normal	
3824	Running	dcaromel	0 / 2	Normal	
3823	Running	dcaromel	0 / 2	Normal	
3822	Running	dcaromel	0 / 8	Normal	
3820	Running	dcaromel	0 / 8	Normal	
3819	Running	dcaromel	0 / 8	Normal	
3818	Running	dcaromel	0 / 1	Normal	
3817	Running	dcaromel	0 / 9	Normal	

Details

Tasks **Users** **Statistics**

ID	Status	Nr.	Duration	Node
37840008	Running	ta:		1
37840001	Running	ta:		1
37840002	Running	ta:		1
37840003	Running	ta:		1
37840004	Running	ta:		1
37840005	Running	ta:		1
37840006	Running	ta:		1
37840007	Running	ta:		1

Job Info **Output** **Preview**

Job Id:	3784
State:	Running
Name:	Job_with_verif
Priority:	Normal
User:	dcaromel
Pending tasks:	0
Running tasks:	8
Finished tasks:	0
Total tasks:	8
Submitted time:	vendredi 24 juin 2011 23:02:52
Finished time:	
Pending duration:	3m 11s 940ms
Execution duration:	

ProActive Resource Manager Client

ResourceManager Admin Window Help

Tree Explorer x Compact View x

CNSlice2 [Infra] CNSlice1 [Infra] CNSliceGpu [Infra] CNSlice3 [Infra] CNSliceVisu [Infra]

node2

pamr://45 pamr/ pamr://45

Statistics x

Node State	Count
Deploying	0
Lost	16
Configuring	0
Free	2
Busy	1070
Down	0
Total	1072

Runtime Monitoring x

Busy Nodes History

Overview Charts connected



23:08
24/06/2011

ProActive Scheduler Portal - Mozilla Firefox

File Edit View History Bookmarks Tools Help

ProActive Scheduler ... x ProActive Scheduler ... x ProActive - Profession... x +

inria.fr https://node0.cloud.sophia.inria.fr/pc Google

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Portal Admin Help Submit job Logout dcaromel

ProACTIVE Parallel Suite

Jobs list

ID	State	User	Progress	Priority	Duration
3564	Running	dcaromel	1 / 2	Normal	
3563	Running	dcaromel	1 / 2	Normal	
3558	Running	dcaromel	2 / 8	Normal	
3556	Running	dcaromel	6 / 9	Normal	
3555	Running	dcaromel	1 / 2	Normal	
3554	Running	dcaromel	1 / 2	Normal	
3549	Running	dcaromel	2 / 8	Normal	
3547	Running	dcaromel	6 / 9	Normal	
3546	Running	dcaromel	1 / 2	Normal	
3545	Running	dcaromel	1 / 2	Normal	
3540	Running	dcaromel	2 / 8	Normal	
3538	Running	dcaromel	6 / 9	Normal	

Details

Tasks Users Statistics

Job Info Output Preview

No items to show.

No job selected

ProActive Resource Manager Client

ResourceManager Admin Window Help

Tree Expl... x Compact View x

CNSlice2 [Infra] CNSlice1 [Infra] CNSliceGpu [Infra] CNSlice3 [Infra] CNSliceVisu [Infra]

node2

pamr://45 pamr// pamr://45

Statistics x

Node St...	Count
Deploying	0
Lost	16
Configuring	0
Free	2
Busy	1070
Down	0
Total	1072

Runtime Monitoring x

Busy Nodes History

Overview Charts connected



23:10
24/06/2011

ProActive Orchestration Portal

File Edit View Favorites Tools Help

Favorites Suggested Sites Web Slice Gallery

ProActive Scheduler Portal

Portal Admin Help Submit job Logout demo

Jobs list

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

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

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
cdefbe	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

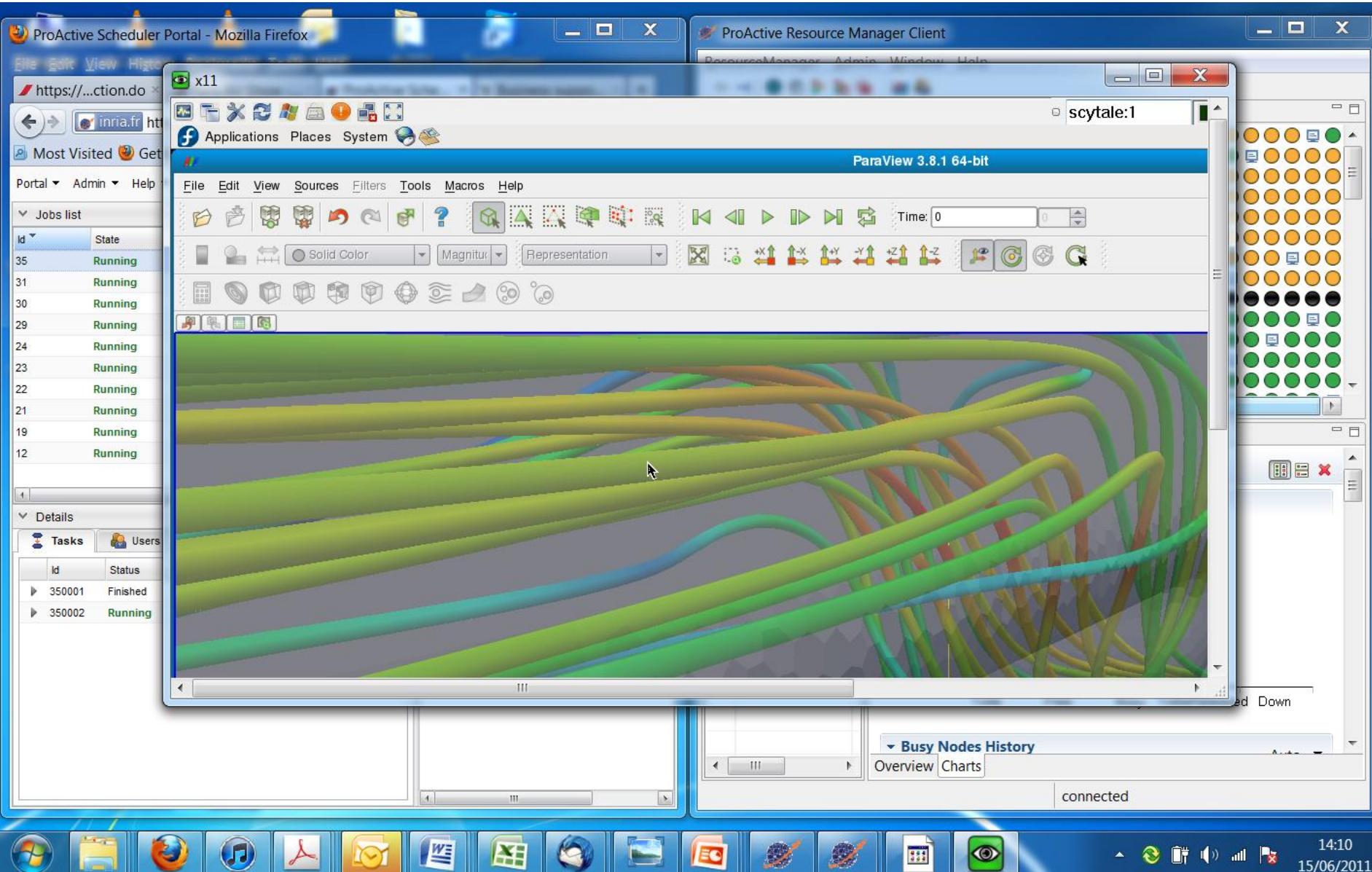
Job Id: 2599
State: Running
Name: TEST_CY_0029
Priority: Normal
User: lbordier
Pending tasks: 1
Running tasks: 1
Finished tasks: 1
Total tasks: 3

Internet | Protected Mode: On 100%

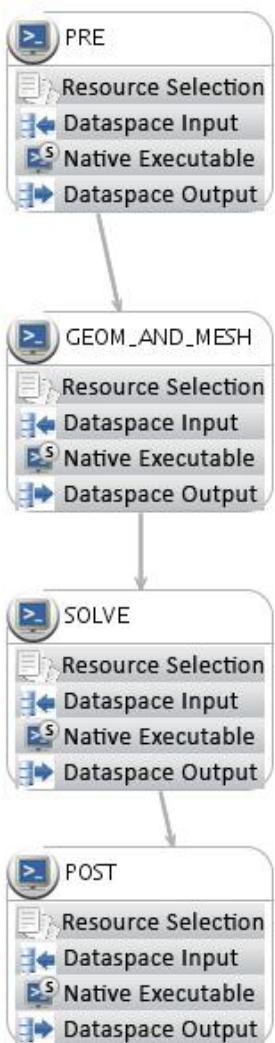
ProActive Renault Use Case



Remote Visualization Directly from Portal

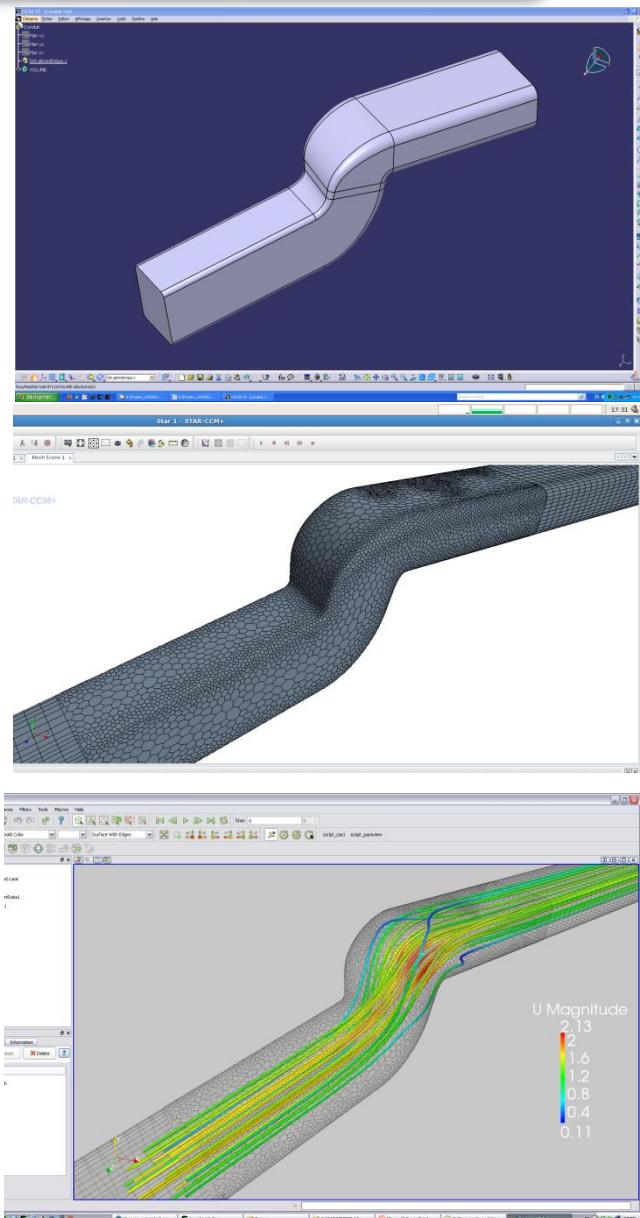


Engineering Optimizations: Renault UC

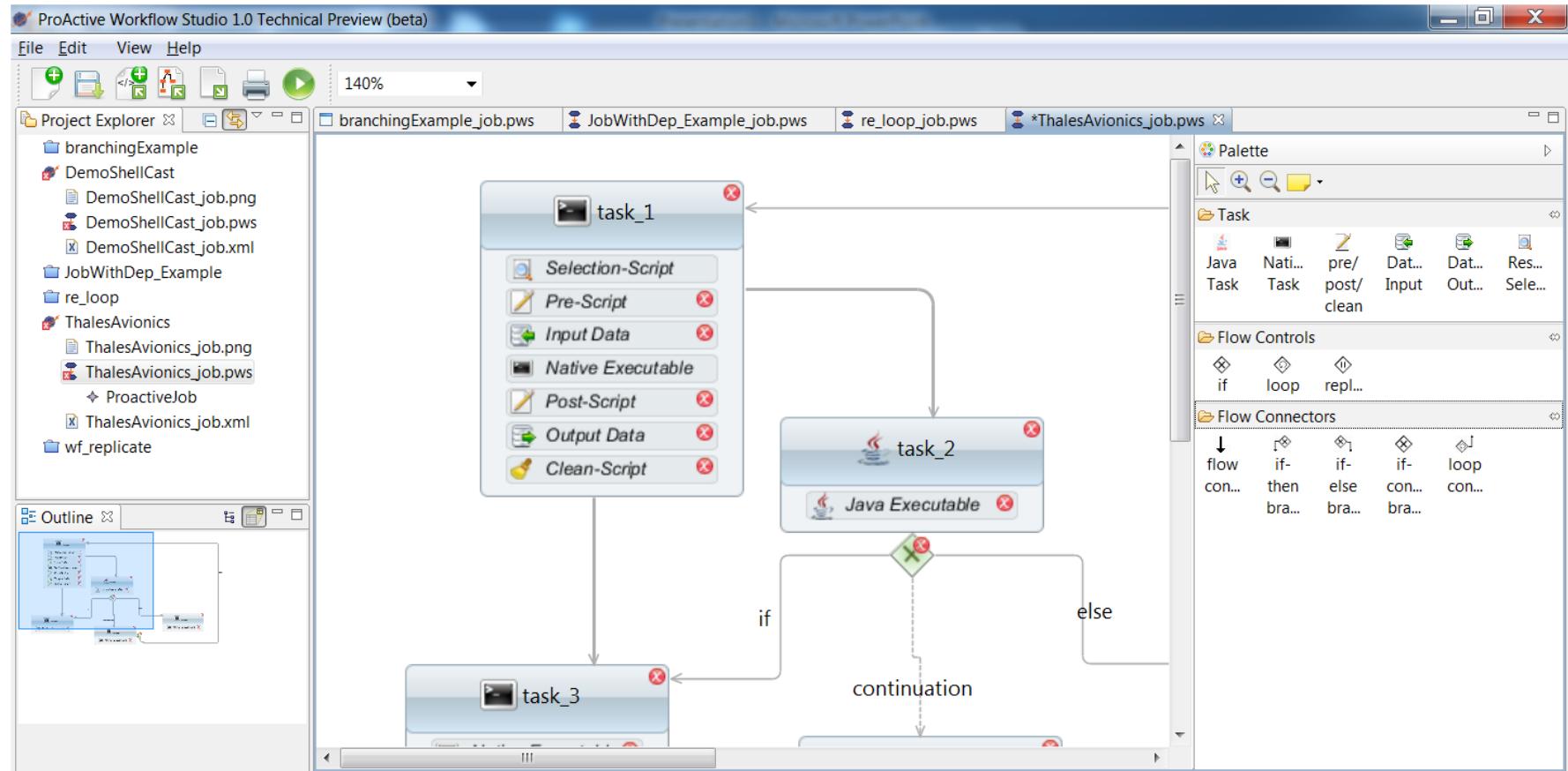


Open ∇ FOAM

Open ∇ CFD



Workflow Studio



Orchestration Portal with Graphical Workflow Visu

https://node0.cloud.sophia.inria.fr:8888/portal/

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Portal Admin Help Submit job Logout dcaromel

ProActive Parallel Suite

Jobs list

ID	State	User	Progress	Priority	Duration	Name
101	Stalled	dcaromel	40 / 45	Normal		PA_Workflow_Job
100	Finished	dcaromel	45 / 45	Normal	1m 38s 949ms	PA_Workflow_Job
99	Finished	dcaromel	45 / 45	Normal	1m 48s 209ms	PA_Workflow_Job

Details

Tasks Visualization Users Statistics

Job Info Output Preview

Streaming

```
[end#1@node7;18:08:51] Task 0 : Test STDERR
[end#2@node7;18:08:51] Task 0 : Test STDOUT
[end#2@node7;18:08:51] Terminate task number 0
[split#3@node16;18:08:53] Task 0 : Test STDERR
[split#3@node16;18:08:53] Task 0 : Test STDOUT
[split#3@node16;18:08:53] Terminate task number 0
[else_split#3@node28;18:08:54] Task 0 : Test STDERR
[else_split#3@node28;18:08:54] Task 0 : Test STDOUT
[else_split#3@node28;18:08:54] Terminate task number 0
[else_rep#3@node8;18:08:58] ok
[else_rep#3@node14;18:09:00] java.io.IOException: Cannot run program "/var/sbin/fail": java.io.IOException: error=2, No such file or directory
[else_merge#3@node17;18:09:01] Task 0 : Test STDERR
[else_merge#3@node17;18:09:01] Task 0 : Test STDOUT
[else_merge#3@node17;18:09:01] Terminate task number 0
[merge#3@node32;18:09:05] ok
[endif#3@node33;18:09:09] Task 0 : Test STDERR
[endif#3@node33;18:09:09] Task 0 : Test STDOUT
[endif#3@node33;18:09:09] Terminate task number 0
[split#4@node10;18:09:11] Task 0 : Test STDERR
[split#4@node10;18:09:11] Task 0 : Test STDOUT
[split#4@node10;18:09:11] Terminate task number 0
[worker#4@node13;18:09:15] Task 0 : Test STDERR
[worker#4@node13;18:09:15] Task 0 : Test STDOUT
[worker#4@node13;18:09:15] Terminate task number 0
[merge#4@node26;18:09:19] java.io.IOException: Cannot run program "/var/sbin/sv_fail": java.io.IOException: error=2, No such file or directory
[endif#4@node36;18:09:21] Task 0 : Test STDERR
[endif#4@node36;18:09:21] Task 0 : Test STDOUT
[endif#4@node36;18:09:21] Terminate task number 0
```

Diagram:

```
graph TD
    split((split)) -- if --> worker[worker]
    worker -- continuation --> else_if(( ))
    else_if -- else --> else_split((else_split))
    else_split --> else_rep[else_rep]
    else_rep -- loop --> else_merge[else_merge]
    else_merge --> end((end))
    end -- continuation --> split
```

ProActive Workflow Studio

OpenStack Workflow

ProActive Workflow Studio 0.9.1 (beta)

File Edit Diagram Search Help

Tahoma

Project Explorer branchingExample... branchingExample... *OpenStackWorkflow... 31

Inspur JobWithDep_Example K-Epsilon m1 OpenStackWorkflow OpenStackWorkflow.job OpenStackWorkflow.job Orange-Lab OrangesSOPHIA

VMDeployOpenStack Compute VMTreatment VMUndeployOpenStack

Resource Selection Native Executable

Properties Problems

Job Properties

Job	Project Name	OpenStack
Generic Info	Job Name	Compute-Deployer
Job Classpath	Job Description	Compute then deploy with OpenStack from the
Variables	Input Space IRI	

Palette

Task Java Task Native Task

Flow Controls if loop replicate

if-then branch if-else branch

flow connection

Max number of parallel tasks

Cancel Job

If an error occurs

The screenshot shows the ProActive Workflow Studio interface with a blue header and a white workspace. In the top left, there's a toolbar with icons for file operations like New, Open, Save, and Print. Below the toolbar is a menu bar with File, Edit, Diagram, Search, and Help. The main workspace contains a Project Explorer on the left listing various projects and examples. The central area displays a workflow diagram titled 'branchingExample...' with three main nodes: 'VMDeployOpenStack', 'Compute', and 'VMTreatment'. Arrows connect 'VMDeployOpenStack' and 'Compute' to 'VMTreatment'. Below each node is a 'Resource Selection' and a 'Native Executable' section. To the right of the diagram is a 'Palette' window containing categories for Task (Java Task, Native Task) and Flow Controls (if, loop, replicate, if-then branch, if-else branch, flow connection). At the bottom, there are tabs for Properties and Problems, and a detailed 'Job Properties' table with columns for Job, Generic Info, Job Classpath, Variables, Project Name, Job Name, Job Description, Input Space IRI, Max number of parallel tasks, Cancel Job, and If an error occurs.

Deploying VMs with ProActive Cloud

The image shows two windows side-by-side. On the left is the 'ProActive Scheduler Portal - Mozilla Firefox' window, which displays a list of jobs with one entry: '3708 Pending dcaromel'. On the right is the 'ProActive Resource Manager Client' window, which shows a 'Compact View' of nodes (represented by green circles) and a 'Statistics' table. The statistics table provides a breakdown of node states:

Node Status	Count
Deploying	4
Lost	16
Configuring	0
Free	484
Busy	16
Down	0
Total	500

The 'Runtime Monitoring' chart shows the distribution of nodes across different states:

State	Count
Total	520
Free	484
Busy	16
ToBeReleased	0
Down	0

The system status bar at the bottom indicates 'connected'.

Deploying VMs with ProActive Cloud

The image shows two windows side-by-side. On the left is the 'ProActive Scheduler Portal - Mozilla Firefox' window, which displays a list of jobs with columns for Id, State, User, and Progress. One job is listed as 'Stalled'. On the right is the 'ProActive Resource Manager Client' window, which includes a 'Tree Explorer' showing infrastructure slices and a 'Compact View' grid of nodes. Below these are 'Statistics' and 'Runtime Monitoring' tabs. The 'Runtime Monitoring' tab features a 'Charts' section with a bar chart titled 'Node States' showing 'Total' and 'Free' counts.

ProActive Scheduler Portal - Mozilla Firefox

File Edit View History Bookmarks Tools Help

ProActive Scheduler Portal x ProActive - Java Parallel ... +

inria.fr https://node0.cloud.psu.inria.fr Google

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Portal Admin Help Submit job Logout dcaromei

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

Id	State	User	Progress
3708	Stalled	dcaromei	2 / 4

ProActive Resource Manager Client

ResourceManager Admin Window Help

Tree Explorer x Compact View x

Default [Infrastructure] CNSlice2 [Infrastructure] CNSlice1 [Infrastructure] CNOpenStack [Infrastructure] CNSliceVisu [Infrastructure] CNSliceESXi [Infrastructure] CNOpenStackDynamic [Infrastructure]

i-00000069.novalocal pamr://4809/Port 1 pamr://4809/Port 2 i-0000006a.novalocal pamr://4810/Port 1 pamr://4810/Port 2 i-0000006b.novalocal

Statistics x Runtime Monitoring x

Node Status Count

Deploying	0
Lost	16
Configuring	0
Free	500
Busy	4
Down	0
Total	504

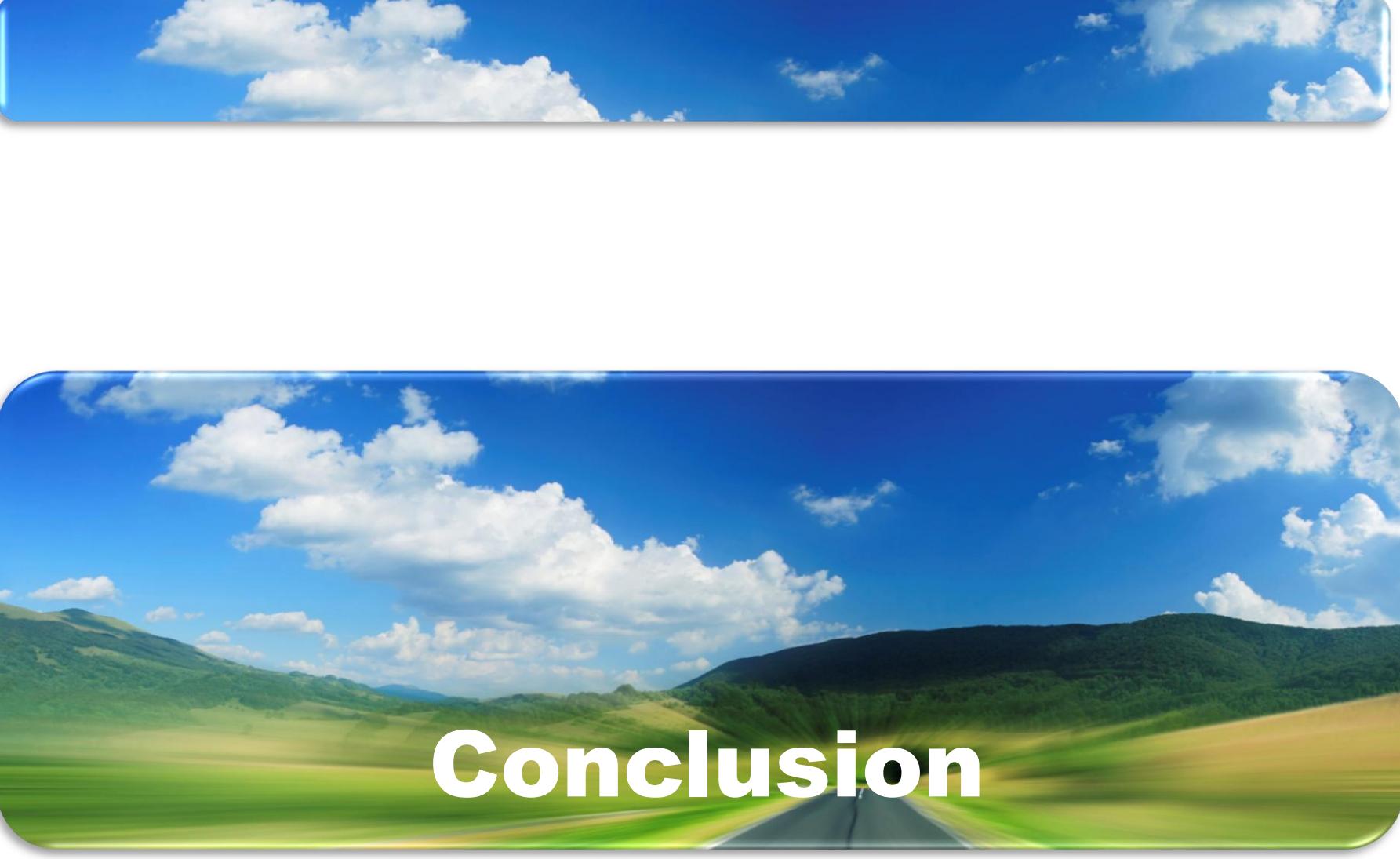
Charts

Node States

State	Count
Total	520
Free	504

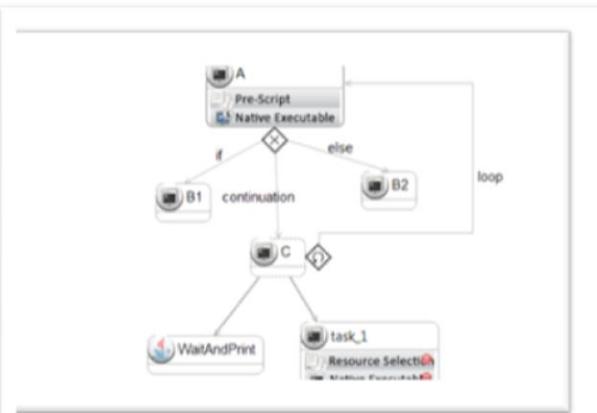
Overview Charts connected

01:43 27/04/2011



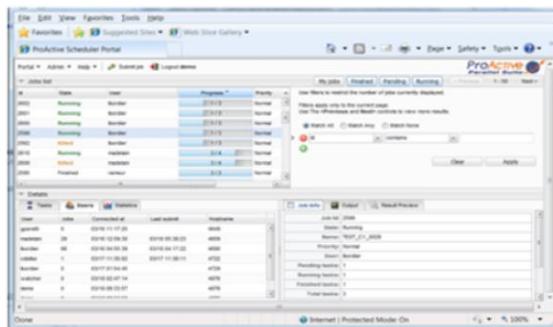
Conclusion

Technology & Solutions



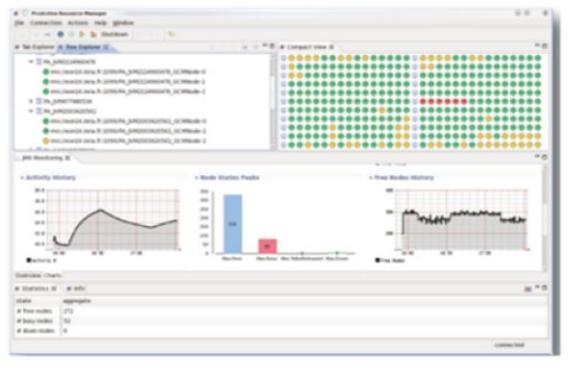
HPC Workflow & Parallelization

Studio for HPC, Workflow Visualization
Native Tasks (MPI, OpenMP, Multi-thread, GPU)
Java APIs for Parallelization & Distribution
Matlab & Scilab Distributed Computing



Scheduling & Orchestration

Multi-Application & Multi-Tenant
Portal with Data Management, Remote Visualization
APIs (Java, REST, CLI)
Integration in existing Applications and Web Portals

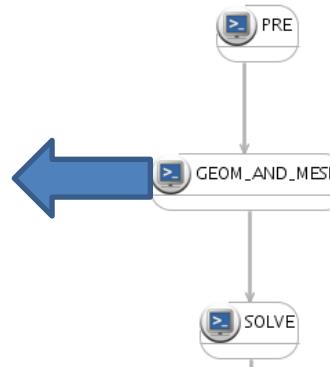
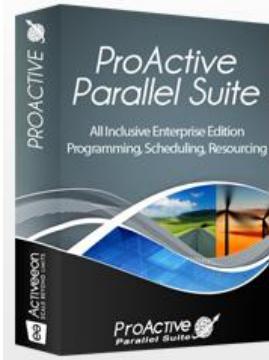


Cloud & Grid

Physical Machines (Servers, Clusters, Desktops) and
Virtual (*Hyper-V, VMware, KVM, Xen; OpenStack*)
Dynamic Policies, Full accounting of resource usage
Public Cloud Burst (EC2, Azure, Data Centers)

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