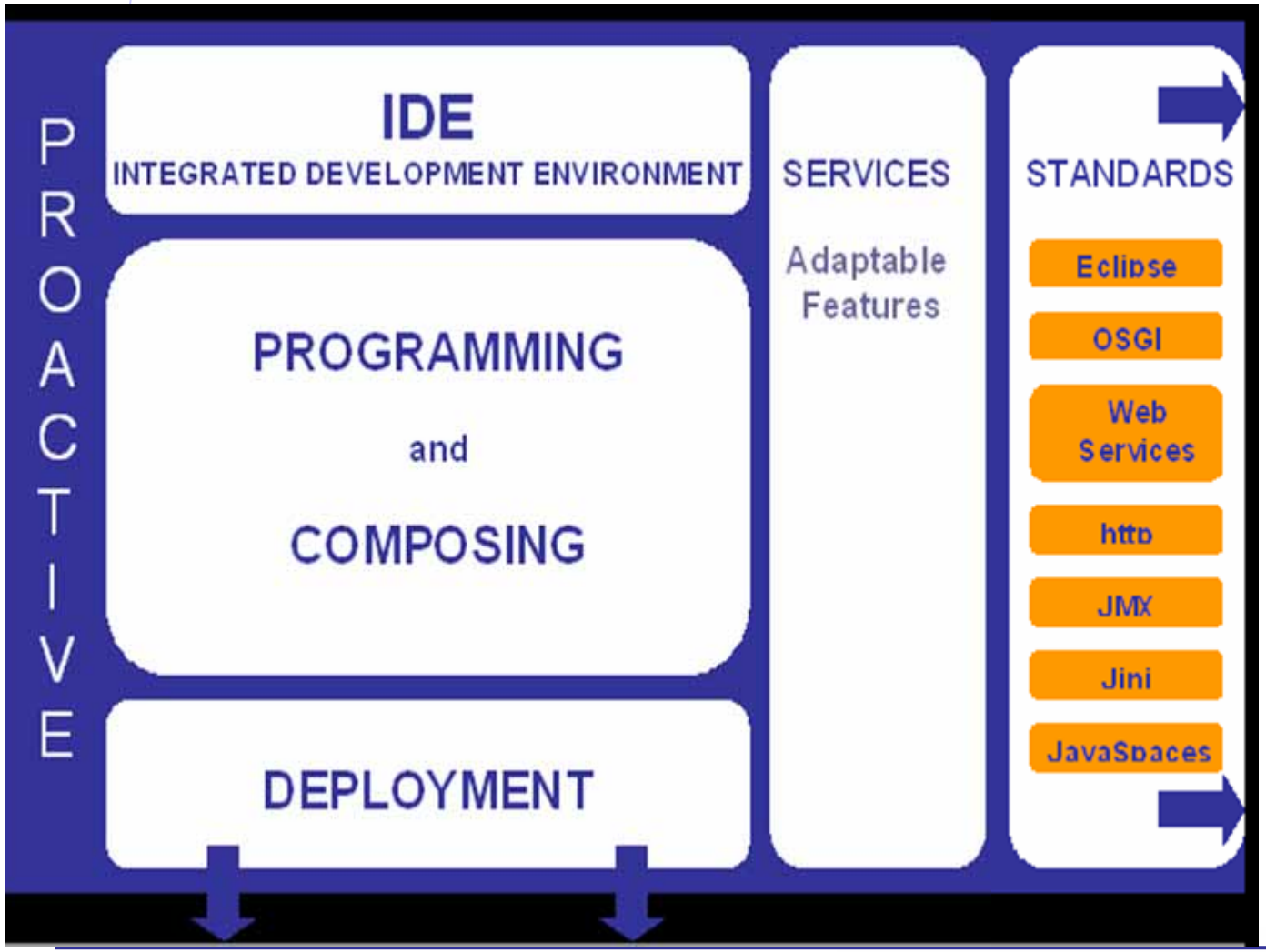
ProActive, GridCOMP, GCM and The 2006 Grid Plugtests: *Towards interoperability and Standardization*

Denis Caromel,Yu Feng

INRIA Sophia, UNSA-I3S-CNRS

France

ProActive
Programming, Composing, Deploying on the Grid

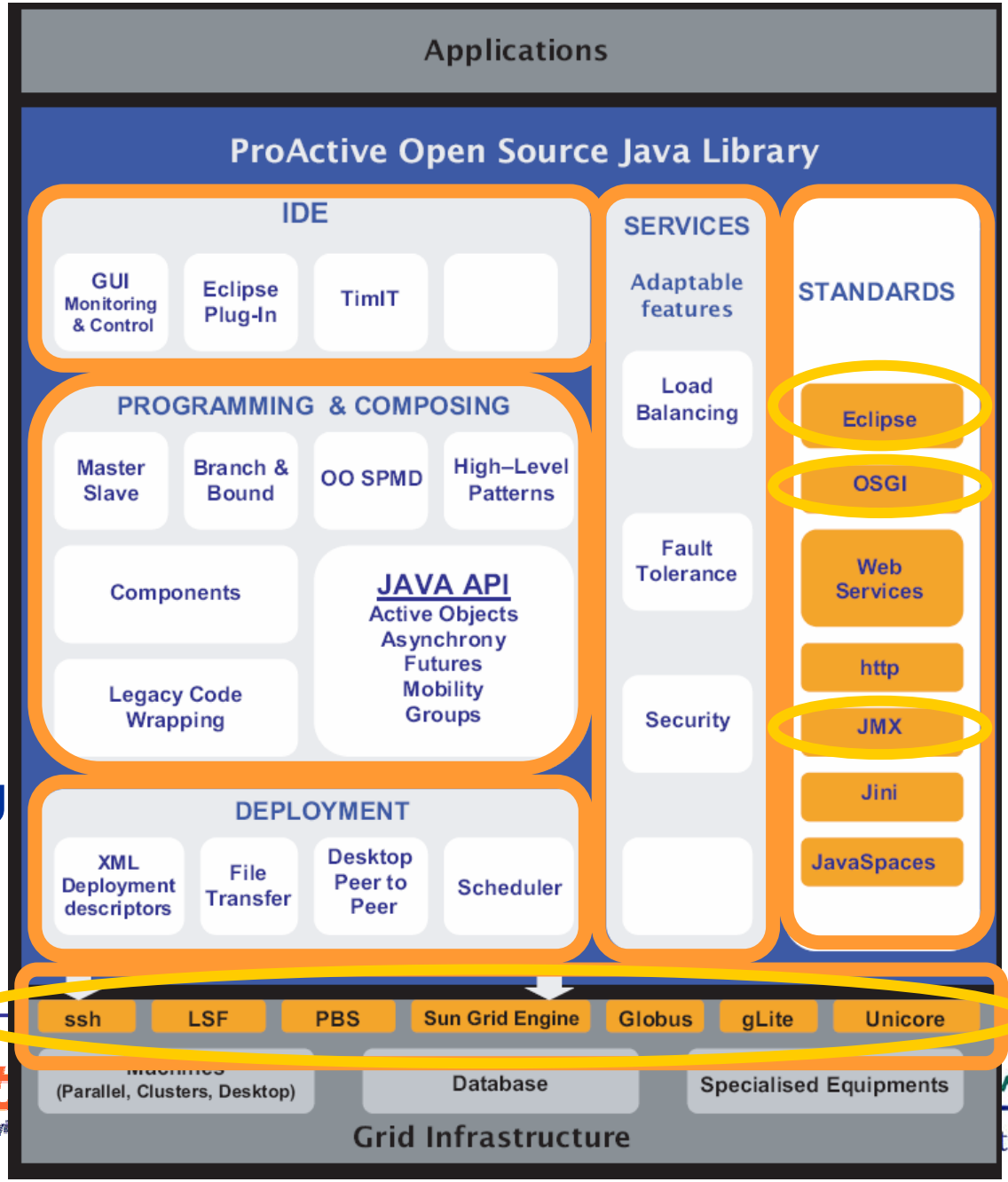


Open Source

ObjectWeb
Open Source Middleware

ProActive: Open Source

- **Open to**
  - ⇨ Industry Standards
- **Effective:**
  - ⇨ Used for The Grid Plugtests
  - ⇨ Over 2000 CPU across the world at once



European Commission

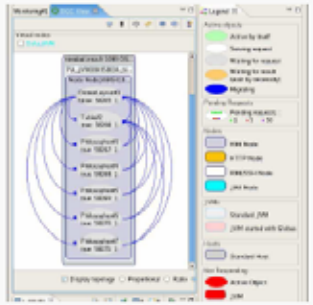
ProAct
Programming, Composing, Deploy

tion Society

ProActive GUIs

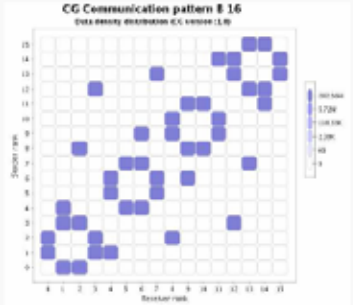
Graph of Distributed References

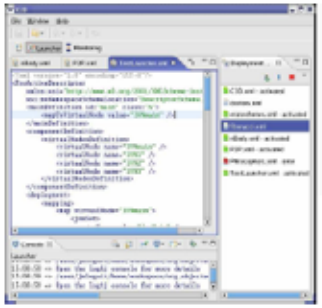
Display the references between active objects; in short it can easily spot cyclic dependencies.



TimIT Pattern

Visualize both number and size of communications between distributed entities.





Launcher and Scheduler

Launching applications directly from the GUI.

Allow seamless deployment on local machines (rsh, ssh…), as well as on third-party schedulers (such as Platform™ LSF, PBS, Globus, Sun GE, gLite, Unicore…). The toolbox also provides a simple generic scheduler interface that lets you deploy your own scheduler, or integrate directly within your application.

GRID Scilab

ProActive interfaces with the Scilab Scientific Free Software Package

It allows the deployment of Scilab instances on distributed nodes, and manages scripts to be executed in parallel.

For more information on ProActive and Professional Services, please visit http://ProActive.ObjectWeb.org/

Contact Denis Caromel, Head of OASIS Team.
Phone: +33 492 387 631; Facsimile: +33 492 387 971
Denis.Caromel@inria.fr
Joint Project University of Nice Sophia Antipolis – INRIA – CNRS – I3S
ProActive is a member of the ObjectWeb Open Source Consortium

INRIA - INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET EN AUTOMATIQUE
2004, Route des Lucioles, BP 93
06902 Sophia Antipolis Cedex, France

ProActive
Programming, Composing, Deploying on the Grid

GRID IDE: Integrated Development Environment

ProActive
Programming, Composing, Deploying on the Grid

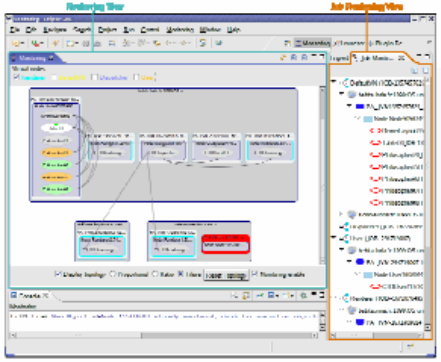
IC2D: View, Manage, Control Distribution and Parallelism

Grid IDE Overview

ProActive features an **integrated full-fledged Grid IDE** (Integrated Development Environment) named **IC2D**. It features graphical monitoring and control, programming wizards, debugging and optimizing tools which all contribute to **high-productivity grid development**. Moreover, enterprise developers can work in a familiar setting within **Eclipse plugins**; increasing both productivity and reducing the need for new training.

IDE HIGHLIGHTS

Health of your applications including Graphical Monitoring and Control, Programming Wizards, Debugging and Optimizing Tools



Graphical Monitoring View

A graphical environment for remote monitoring and steering of distributed and grid applications.

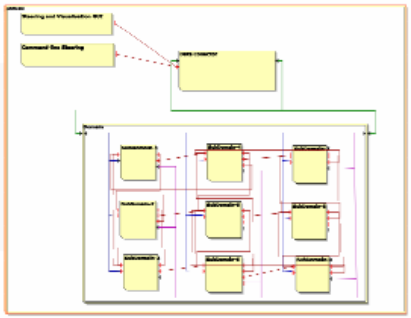
It provides a graphical visualisation for hosts, Java Virtual Machines, and active objects, including the topology and the volume of communications.

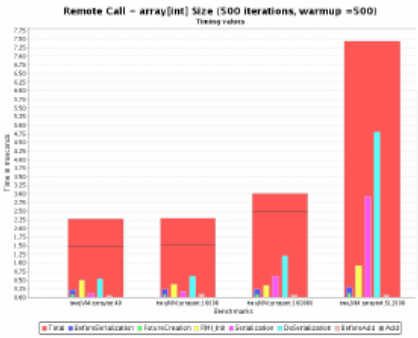
Job monitoring (right side) provides a tree representation of all these entities.

Fractal GUI

A graphical tool to edit Fractal and Grid Component configurations.

The GUI allows for Client/Server interface connections, and renaming of Virtual Nodes for controlling mapping and co-allocation at deployment.





TimIT Bench

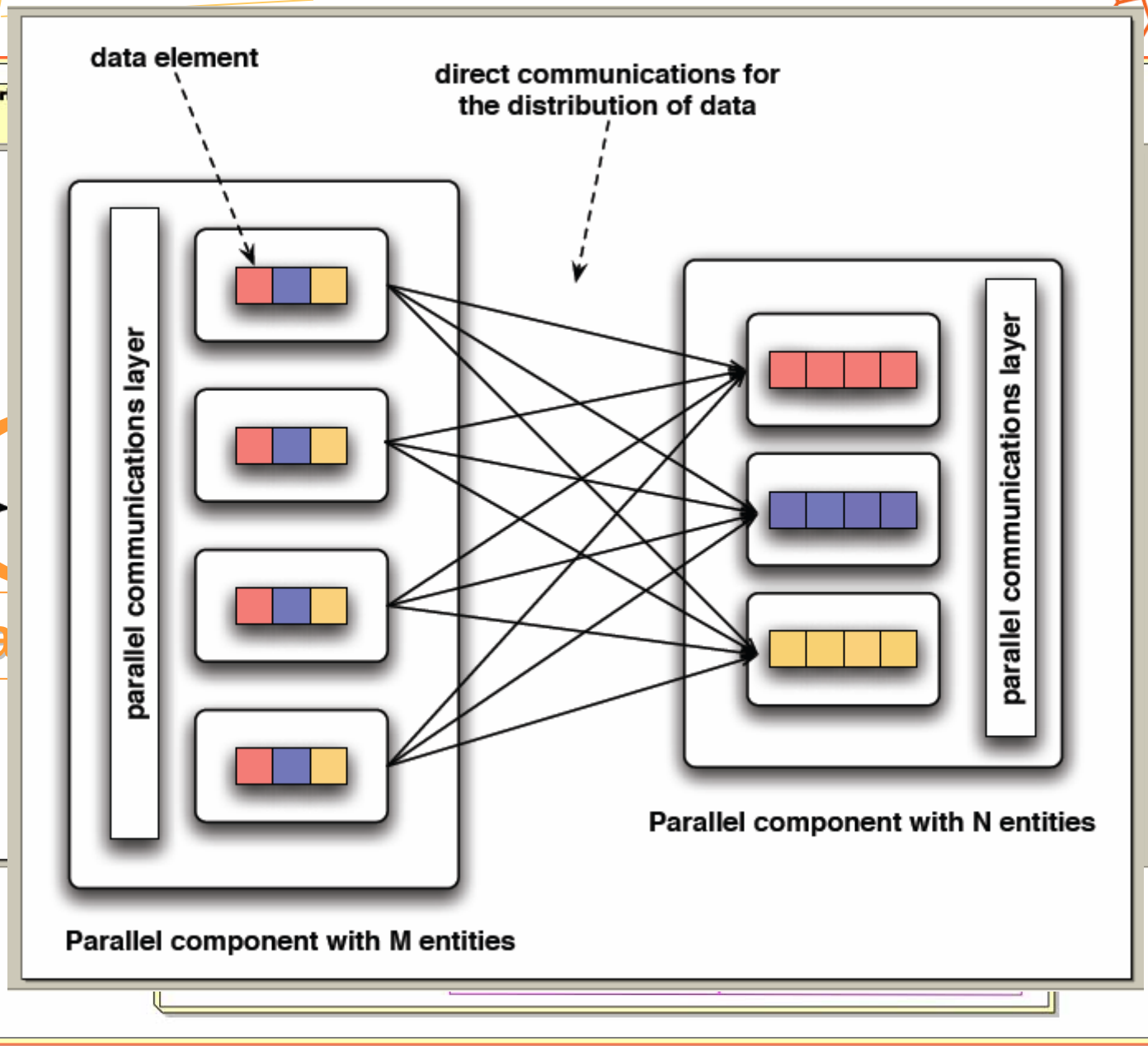
A complete solution to benchmark and optimize applications' performance.

TimIT is able to produce a large variety of statistics, advanced timers with hierarchical capabilities.
TimIT automatically generates statistical charts.

ObjectWeb INRIA

- **GCM: Grid Component Model**
  - ⇨ GCM Being defined in the NoE CoreGRID (42 institutions)
  - ⇨ Open Source ObjectWeb *ProActive* implements a preliminary version of GCM
  - ⇨ Autonomic Features
  - ⇨ Service Oriented: NESSI relation exp. (Services come to life from Cp)

- **GridCOMP takes:**
  - ⇨ GCM as a first specification,
  - ⇨ *ProActive* as a starting point, and Open Source reference implementation.


data element
direct communications for
the distribution of data
parallel communications layer
parallel communications layer
Parallel component with N entities
Parallel component with M entities

GridCOMP Partners

European Research Consortium for Informatics and Mathematics
ERCIM

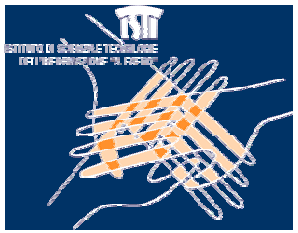
INRIA

Université Nice Sophia Antipolis

CNRS CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

IN SUPREMÆ DIGNITATIS 1343

University of Westminster



GRIDSYSTEMS
Simplify Complexity

IBM

Atos Origin
WORLDWIDE IT PARTNER

清華大學 Tsinghua University

POSTERA CRESCAM LAUDE
THE UNIVERSITY OF MELBOURNE

Universidad de Chile

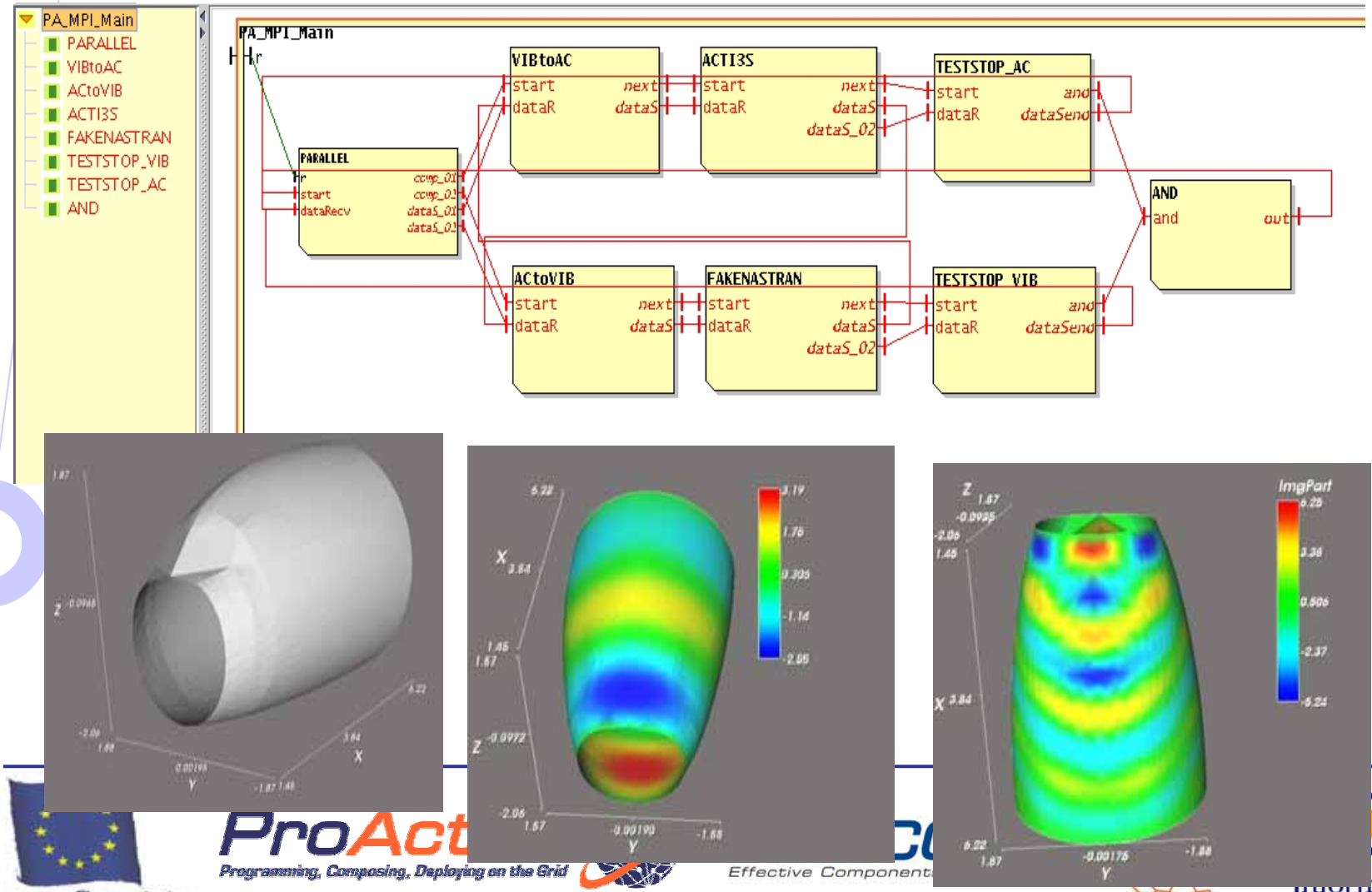
European Commission

ProActive
Programming, Composing, Deploying on the Grid

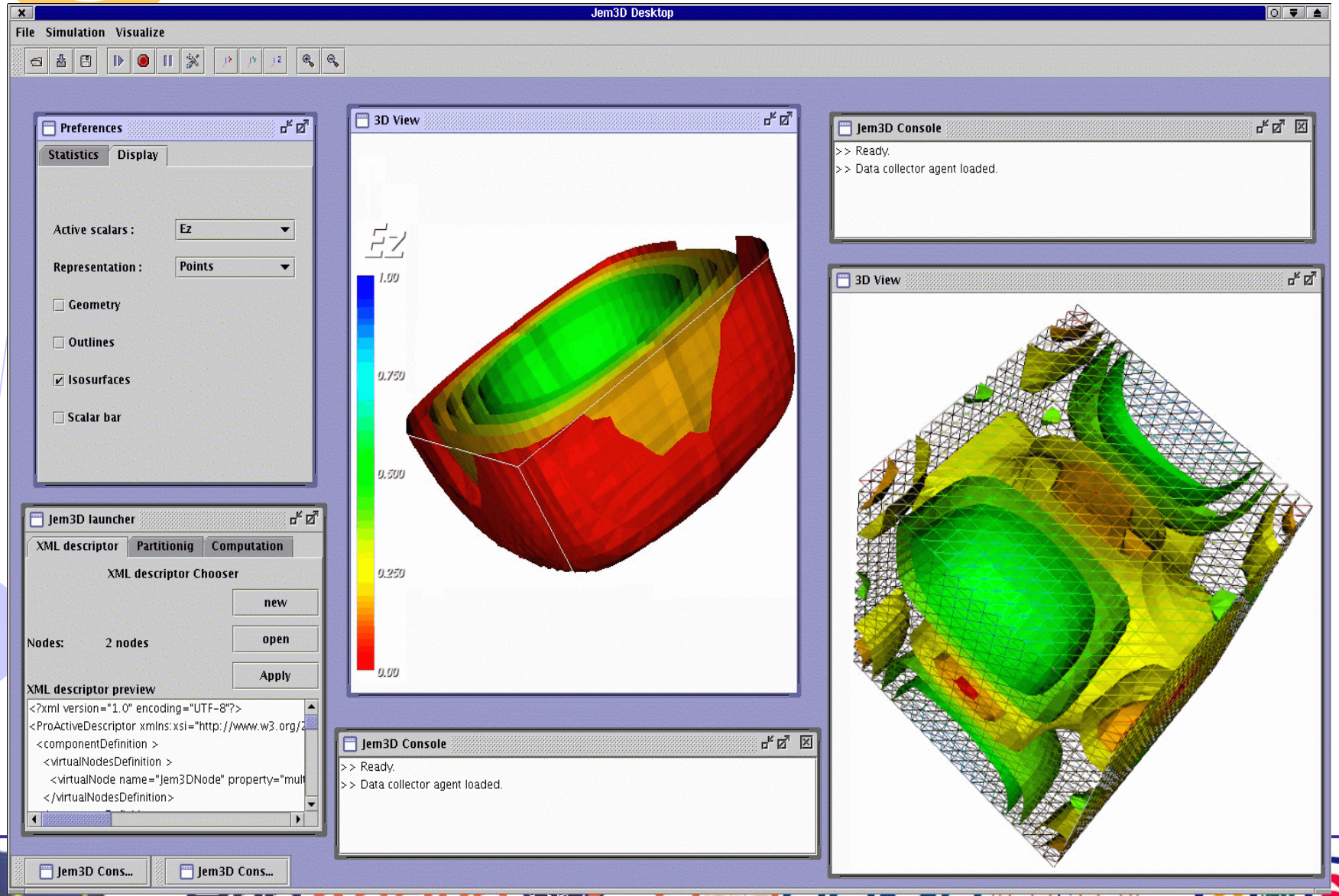
GridCOMP
Effective Components for the Grids

Information Society

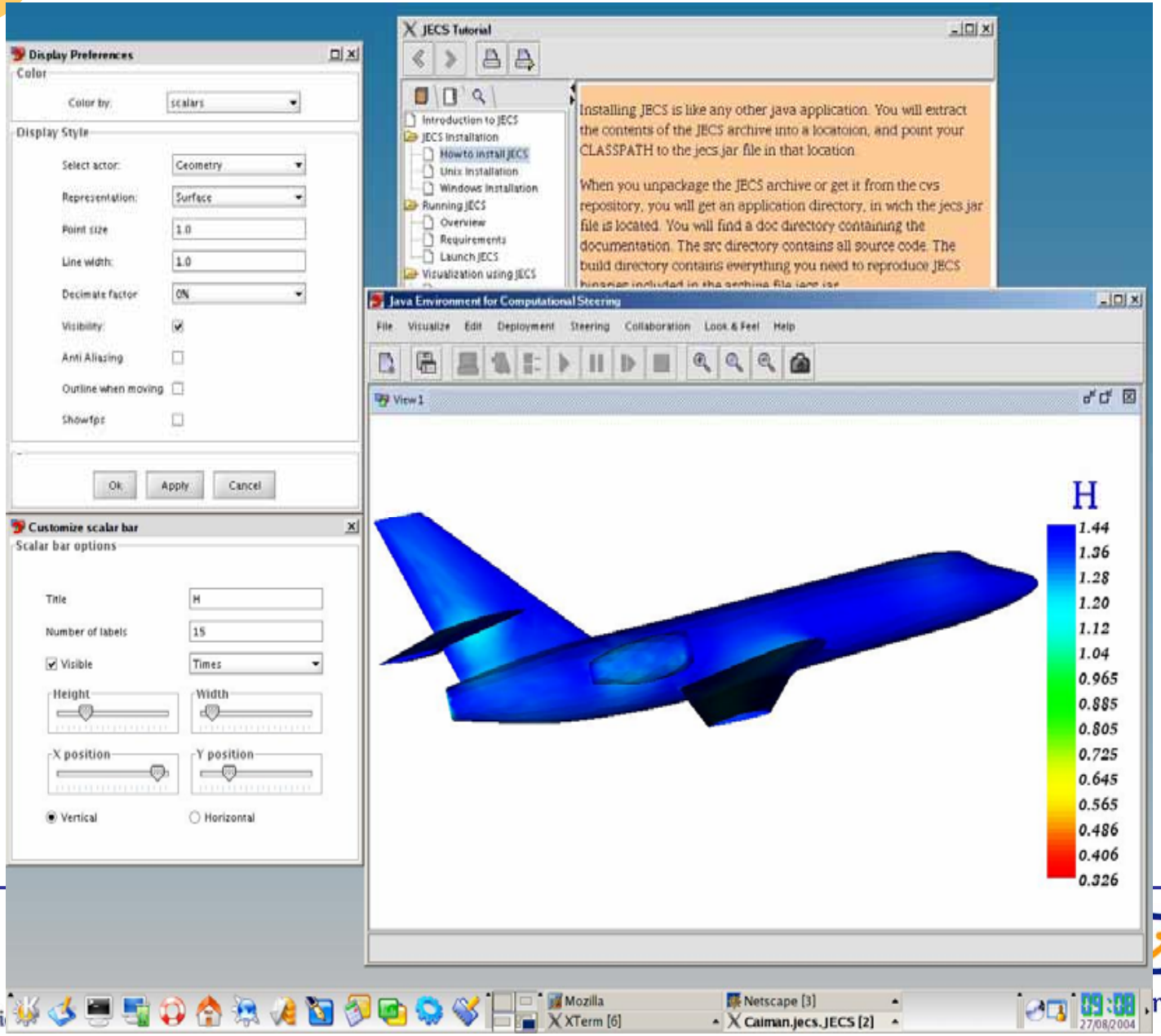
GCM for Code Coupling : Vibro Acoustic (courtesy of EADS)



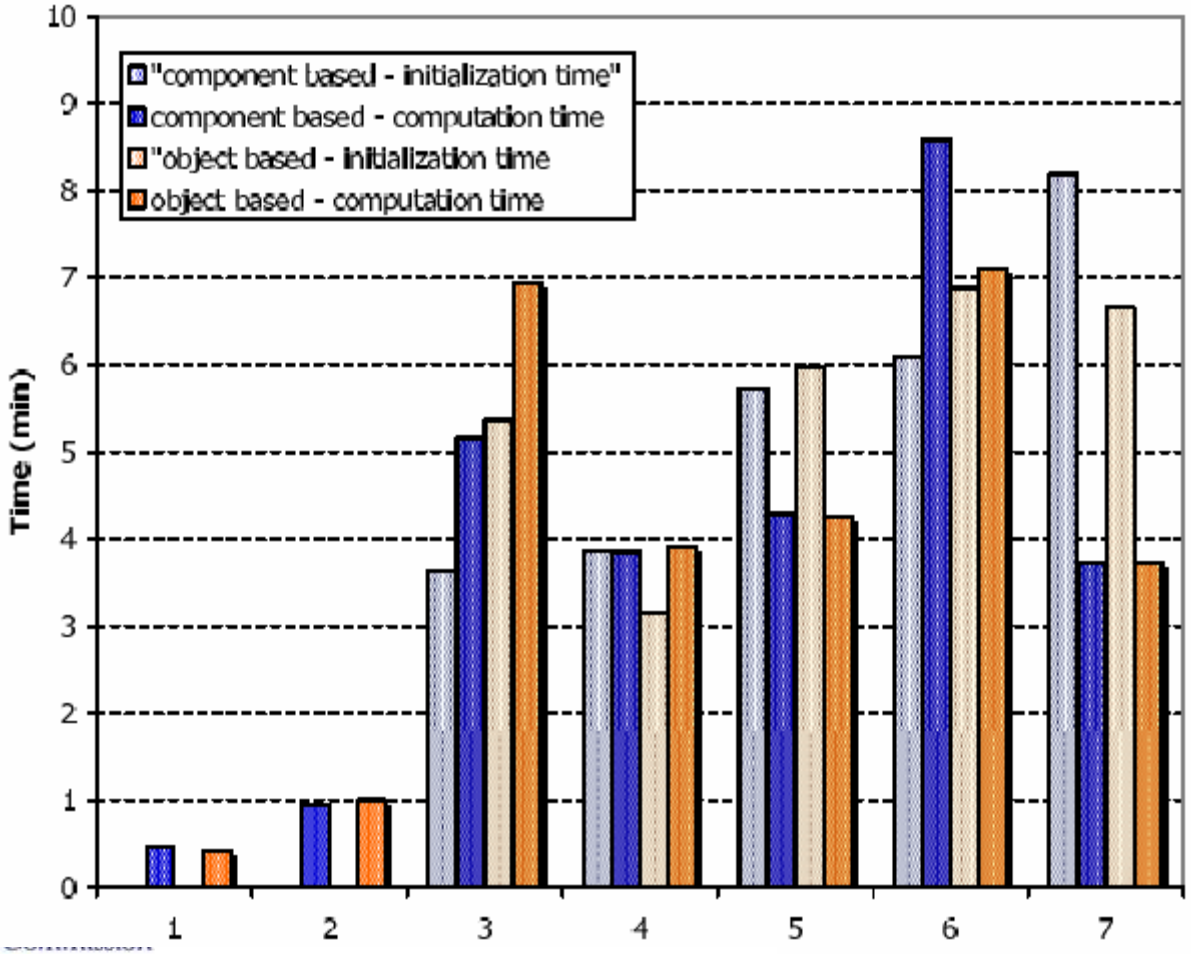
GCM for Electromagnetism: Jem3D



Jem3D


Display Preferences
Color
Color by:
scalars
Display Style
Select actor:
Geometry
Representation:
Surface
Point size
1.0
Line width:
1.0
Decimate factor
0%
Visibility:
Anti Aliasing
Outline when moving
Showfps
Ok
Apply
Cancel
Customize scalar bar
Scalar bar options
Title
H
Number of labels
15
Visible
Times
Height
Width
X position
Y position
Vertical
Horizontal
JECS Tutorial
Introduction to JECS
JECS Installation
Howto install JECS
Unix Installation
Windows Installation
Running JECS
Overview
Requirements
Launch JECS
Visualization using JECS
Installing JECS is like any other java application. You will extract the contents of the JECS archive into a locatoion, and point your CLASSPATH to the jecs.jar file in that location
When you unpackage the JECS archive or get it from the cvs repository, you will get an application directory, in wich the jecs.jar file is located. You will find a doc directory containing the documentation. The src directory contains all source code. The build directory contains everything you need to reproduce JECS
Java Environment for Computational Steering
File
Visualize
Edit
Deployment
Steering
Collaboration
Look & Feel
Help
View 1
H
1.44
1.36
1.28
1.20
1.12
1.04
0.965
0.885
0.805
0.725
0.645
0.565
0.486
0.406
0.326
Mozilla
Netscape [3]
XTerm [6]
Caiman.jecs.JECS [2]
09:08
27/08/2004

Experiment	Mesh size	Number of Processors
1	41×41×41	20
2	81×81×81	70
3	201×201×201	130
4		138
5		258
6		258
7		308



Executed on Grid5000

Several Clusters

GRID PLUGTESTS
THE INTEROPERABILITY SERVICE

Over 4 000 machines all over the world

- **Organized together with:**

CoreGRID ETSI INRIA

- **Using for interoperability:**

ObjectWeb ProActive

GRID Plugtests -- 2006 FlowShop contest

- Goal of the FlowShop contest
  - ⇨ Solve the 10 Taillard instances with 20 jobs and 20 machines
- 2005 FlowShop contest
  - ⇨ The winner was POZNAN PUTat3AM - POLAND (**4 581s**)
- 2006 FlowShop contest (4 teams)
  - ⇨ BUPT – Beijing University - China
  - ⇨ Kanban System - University of Tokyo - Japan
- **The winner is Kanban System: 553 s, 207 workers**
  - ⇨ ***Beating 2005 FlowShop contest record***
  - ⇨ BUPT: 13 760 s, 86 workers

GRID Plugtests – 2006 NQueens contest

- Goal of the N-Queens contest
  - ⇨ Solve the maximum number of N-Queens solutions in1 hour
  - ⇨ On a maximum number of machines
  - ⇨ With the most efficient algorithm
- 2006 N-Queens contest (10 teams)
  - ⇨ Eight Samurai - University of Tokyo – JAPAN
  - ⇨ FIT – Tsinghua University - CHINA
  - ⇨ BUPT – Beijing University - CHINA
  - ⇨ VU – Vrije University - NETHERLANDS
  - ⇨ ChinaGrid – CHINA
  - ⇨ MOAIS/Kaapi – FRANCE using direct login
  - ⇨ *UDP - Diego Portales University - CHILE*
  - ⇨ *LSC/UFSM – BRAZIL*
  - ⇨ *POZNAN PUT@3AM - POLAND*
  - ⇨ *POZNAN OUTPUT - POLAND*

2006 N-Queens contest

- The 3rd ProActive Prize winner is VU – Vrije University
  - ⇨ Calculated N=22 Queens in 27mn
- The 2nd ProActive Prize winner is ex-aequo BUPT and FIT with ~5 000 Billions solutions found on ~680 workers
- The 1st ProActive Prize winner is Eight Samourai with ~6 467 Billions solutions found deployed on 2193 workers
- The « Prix special du Jury » is MOAIS/Kaapi
  - ⇨ Calculated 8 times N=22 Queens ~21 528 Billions solutions in 4600s (1h16mn) on 1348 Workers
  - ⇨ Computed N=22 Queens in 488s (8mn8s)
  - ⇨ And N=23 Queens ~24 233 Billions solutions in 4 415s (1h13mn)

Conclusion

Compete Next Year for the 2007 Grid Plugtest !