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

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ProActive: Open Source

- **Open to**
  - Industry Standards

- **Effective:**
  - Used for The Grid Plugtests
  - Over 2000 CPU across the world at once
Grid IDE: Integrated Development Environment

IC2D: View, Manage, Control Distribution and Parallelism

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 slicing of distributed grid applications. It provides a graphical visualization 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 of 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.
• **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.
Scopes and Objectives:
Grid Codes that Compose and Deploy
No programming, No Scripting, No Pain
Innovation:
Composite Components
Multicast and GatherCast
Autonomic
GCM for Code Coupling: Vibro Acoustic (courtesy of EADS)
GCM for Electromagnetism: Jem3D
Jem3D
<table>
<thead>
<tr>
<th>Experiment</th>
<th>Mesh size</th>
<th>Number of Processors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$41 \times 41 \times 41$</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>$81 \times 81 \times 81$</td>
<td>70</td>
</tr>
<tr>
<td>3</td>
<td>$201 \times 201 \times 201$</td>
<td>130</td>
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*Component based vs Object based*

<table>
<thead>
<tr>
<th>Time (min)</th>
<th>Experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
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<td>8</td>
<td>6</td>
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<td>9</td>
<td>7</td>
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</tbody>
</table>

Executed on Grid5000

Several Clusters
Over 4,000 machines all over the world

- Organized together with:

  - CoreGRID
  - ETSI
  - INRIA

- Using for interoperability:

  - ObjectWeb
  - ProActive

European Commission

ProActive

GridCOMP

Information Society
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 (4581s)

• 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 in 1 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
- POZNAŃ PUT@3AM - POLAND
- POZNAŃ OUTPUT - POLAND

European Commission

ProActive

GridCOMP

Information Society
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-aquo 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!