Optimize your Infrastructure & Accelerate Applications

Private – Public – Hybrid Clouds

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Private, Public & Hybrid Clouds

Enterprise Private Hybrid Cloud

Dedicated resources
On premise

Application and Workflow Acceleration

Static Policy
LSF

Timing Policy
12/24
Desktops

Dynamic Workload Policy
On Burst

External Data Center, Amazon EC2, Azure

ProActive Parallel Suite
Allinclusive Enterprise Edition Programming,Scheduling Resourcing

ProActive Parallel Suite

Dedicated resources
On premise
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 SOA4All)
  - 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 SCP)

- + Visitors + Interns
  - PostDoc (1):
    - Regis Gascon (INRIA)
  - Engineers (10):
    - Elaine Isnard (AGOS)
    - Fabien Viale (ANR OMD2, Renault)
    - Franca Perrina (AGOS)
    - Germain Sigety (INRIA)
    - Yu Feng (ETSI, FP6 EchoGrid)
    - Bastien Sauvan (ADT Galaxy)
    - Florin-Alexandru Bratu (INRIA CPER)
    - Igor Smirnov (Microsoft)
    - Fabrice Fontenoy (AGOS)
    - Open position (Thales)
  - Trainee (2):
    - Etienne Vallette d’Osia (Master 2 ISI)
    - Laurent Vanni (Master 2 ISI)
  - Assistants (2):
    - Patricia Maleyran (INRIA)
    - Sandra Devauchelle (I3S)

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

  ![Thales](image1.jpg)
  ![Dexia](image2.jpg)
  ![IFP Energies Nouvelles](image3.jpg)
  ![GMO](image4.jpg)
  ![EMBL-EBI](image5.jpg)
  ![EDF](image6.jpg)
  ![CEA](image7.jpg)
  ![Orange](image8.jpg)

- **Some Users:**

  ![AmaDEUS](image9.jpg)
  ![Sirehna](image10.jpg)
  ![K-Epsilon](image11.jpg)
  ![Renault](image12.jpg)

- **Some Partners:**

  ![hp](image13.jpg)
  ![Oracle](image14.jpg)
  ![Microsoft](image15.jpg)
  ![Dell](image16.jpg)
  ![Bull](image17.jpg)
  ![Intel](image18.jpg)
  ![NVIDIA](image19.jpg)
  ![CARRI Systems](image20.jpg)
  ![Atos Origin](image21.jpg)
  ![ProActive](image22.jpg)
  ![Activeeon](image23.jpg)
  ![Tsinghua University](image24.jpg)
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 View
ProActive Programming View

GPU nodes
ProActive: Active objects

- `ag = newActive ("A", [...], VirtualNode)`
- `v1 = ag.foo (param);`
- `v2 = ag.bar (param);`
- `v1.bar(); // Wait-By-Necessity`
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
- Passive Object
- Asynchronous Call
- Sub System
- 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

```java
ag.bar(cg); // broadcast cg
ProActive.setScatterGroup(cg);
ag.bar(cg); // scatter cg
```
Dynamic Dispatch Group

\[ \text{ag.bar(cg)}; \]
ProActive Scheduling

ProActive Scheduling
Multi-Platform Job Scheduler

ProActive Scheduling

ProActive
Parallel Suite

Scilab
Java
.EXE
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**

### RESOURCES

- Multi-platform Graphical Client (RCP)
- File-based or LDAP authentication
- Static Workflow Job Scheduling, Native and Java tasks, Retry on Error, Priority Policy, Configuration Scripts,…
- Dynamic and Static node sources, Resource Selection by script, Monitoring and Control GUI,…
- ProActive Deployment capabilities: Desktops, Clusters, Clouds,…

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**ProActive Scheduler**

**ProActive Resource Manager**

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**Activeeon**

**SCALE BEYOND LIMITS**
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
ProActive Resourcing

ProActive Resource Manager

Desktop, Cluster, Grid & Cloud Resource Manager
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
Topology with the ProActive Resourcing
Demonstration on a Production Platform
Integration with Scilab and Matlab

Static Policy
- LSF

Timing Policy 12/24
- Desktops

Dynamic Workload Policy
- EC2

Dedicated resources

Desktops

Amazon EC2
Integration with Applications

Using your ProActive Cloud

Smooth integration of your codes!
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

- Static Policy
  - LSF

- Timing Policy
  - 12/24
  - Desktops

- Dynamic Workload Policy
  - On Burst

Dedicated resources
On premise

External Data Center, Amazon EC2, Azure
Conclusion: ProActive

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?