

ObjectWeb & ProActive

Grid@Work Conference, Thursday Oct. 13th 2005.

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ObjectWeb Executive Director
Development Project Director, INRIA Rhône-Alpes



ObjectWeb

Open Source Middleware

WELCOME

Go to ObjectWeb...

?

Advanced - Powered by Google

NewsLetter 

Archive...

Coming Up 

- Fall 2005 Architecture Meeting, October 3,4,5
- Grids at work, 10 - 14 October 2005, ETSI, Sofia (Nice), France
- OSGi Developer Forum, Paris, France, Oct. 11-14, 2005
- LinuxWorld Expo & Conference, Frankfurt, Germany, November 15-17, 2005

[More...](#)

Latest News 

- **Oct 07:** Life Broadcasting of 2nd ProActive User Group
 - **Oct 06:** Sync4j 2.3 beta 2 is out!
 - **Oct 03:** CNRS Joins ObjectWeb Consortium
 - **Sep 27:** ObjectWeb Celtix Project Achieves Key Milestone
- Post a News - More... - RSS**

Top Downloads 

For the last 7 days:

Welcome to ObjectWeb !



ShortCuts

Ambition & Scope
Members
Press Room
Join Us

Downloads
Professional Services
Success Stories
Online Demos

What's Middleware?
Meetings & Events
Working Groups
ObjectWebCon05

Project List
Mailing Lists

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HOT TOPICS

● GRID Computing at ObjectWeb: Life Broadcasting of 2nd ProActive User Group, Monday Oct. 10-11

The **Second ProActive User Group** will be held on Monday Oct. 10: General Presentations from Developers and Users Sessions will be broadcasted in real time (from 9:00 to 19:00, French time). Tuesday Oct. 11: Tutorial and Hands-On Grid Programming Tutorials will be recorded and made available in video streaming later on. The Broadcasting will be accessible from <http://www.etsi.org/webcast/>.

● ObjectWeb Supports the Middleware 2005 Conference

ACM/FIP/USENIX 6th International Middleware Conference - November 28-December 2, 2005 - Grenoble, FRANCE - The Middleware conference is a forum for the discussion of important innovations and recent advances in the design and construction of middleware. Following the success of past conferences in this series, the 6th International Middleware Conference will be the premier event for middleware research and technology in 2005. [\[Read More\]](#)

● ObjectWeb Supports COSGov Vietnam



COSGov Vietnam - September 28-30, 2005 - Hanoi - More than 300 IT-Experts, governmental representatives and entrepreneurs gathered in Hanoi for the international conference "COSGov Vietnam - Building cooperation via open-source for eGovernance". During the three days of exchange and discussions on open-source software, more than 30 international and national experts and policy makers presented global and local solutions to e-government challenges, FOSS-based business models and market opportunities. Presentations are available at www.cosgov.org.

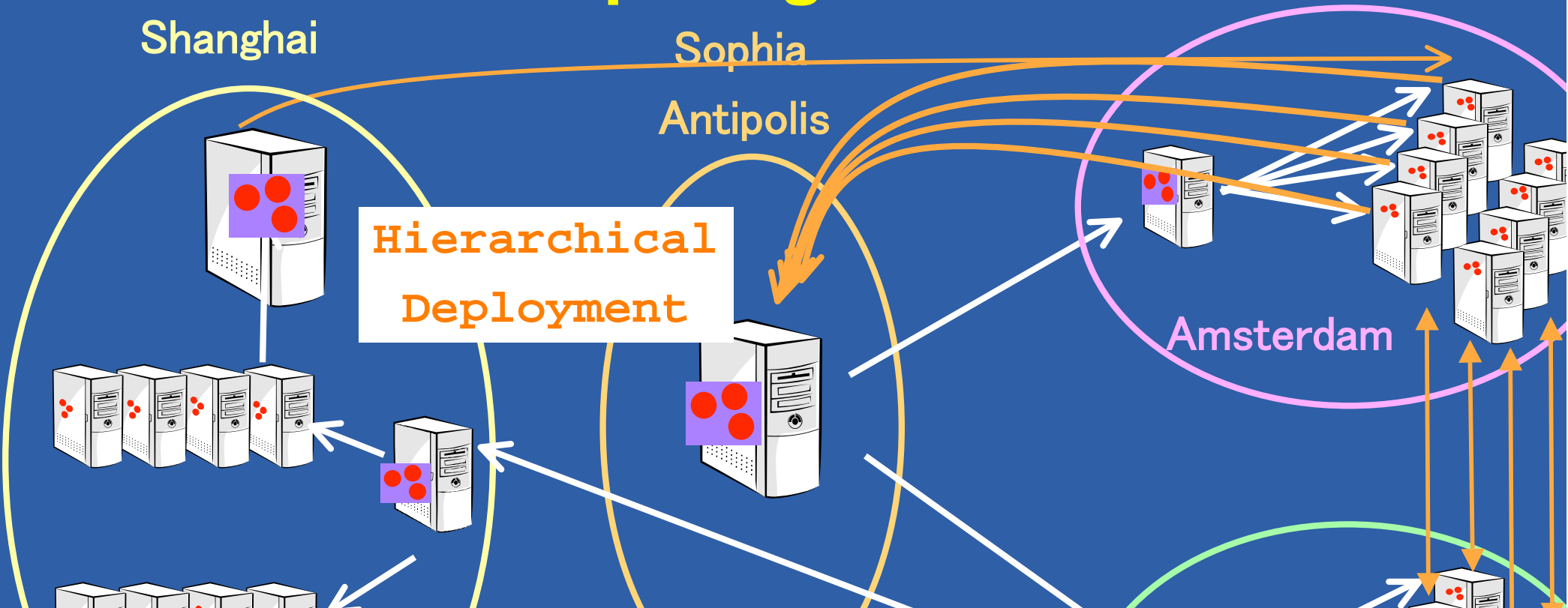


A GLOBAL SOLUTION FOR THE GRID

PROGRAMMING COMPOSING
WRAPPING DEPLOYING



Grid Computing with *ProActive*



**Hierarchical
Deployment**

**Challenges: Programming Model,
Scale, Latency, Heterogeneity,
Versatility (protocols, firewalls,...)**



ProActive:

A Java API + Tools for Parallel, Distributed Computing

Key Facts:

- A uniform framework : The Active Object pattern
- A formal model behind : Determinism (POPL'04)

Programming Model:

- Remote Objects
- Asynchronous Communications, Wait-By-Necessity
- Groups, Mobility, Components, Security, Fault-Tolerance

Environment:

- XML Deployment Descriptors
- Interfaced with: **ssh, LSF, PBS, Globus, gLite, Unicore, ...**
- Graphical Visualization and monitoring: **IC2D**

Open-Source:

- Project of the ObjectWeb Consortium (<http://www.objectweb.org>)
- LGPL License



Application toolkit

Portals - PSEs

Cactus SciRun Triana
NetSolve Ninf

Programming environments

ICENI
XCAT Ccaffeine
Legion
MPICH-G GridLab GAT

GridCCM

Services - Core Middleware

Super-schedulers

Legion
GRAM Nimrod-G Condor

Information

MDS GRACE

Monitoring

P2P JXTA

GSI Security

Globus

Iceni
Unicore
glite

P
R
O
A
C
T
I
V
E

Grid fabric

Schedulers

PBS LSF OAR

Networking

Internet protocols Linux Windows JVMs

OS

Federated hardware resources

ProActive and (De Facto) Standards

ProActive Supports

- RMI, RMI-Ibis, Jini, HTTP
- rsh, ssh, scp
- Globus GTx, sshGSI, Unicore, EGEE gLite
- LSF, PBS, OAR, Sun Grid Engine

ProActive Integrates

- Fractal Components
- Web Services
- OSGi





features

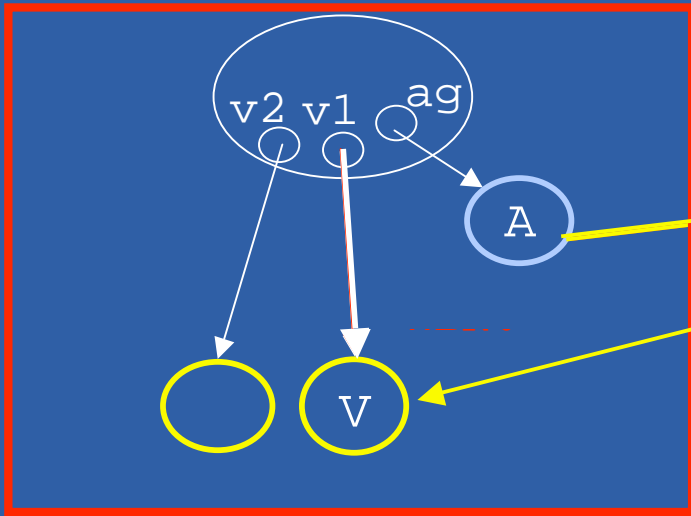
ACTIVE OBJECTS & ASYNCHRONY



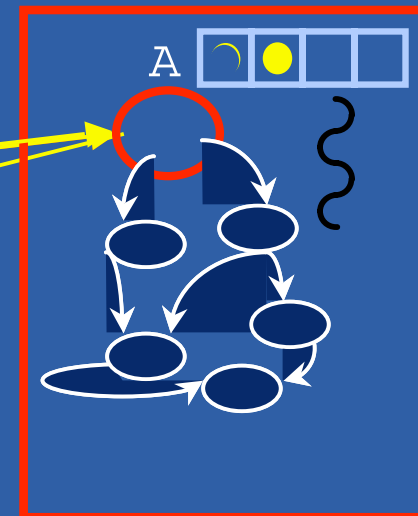
ProActive : Active objects

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

JVM



JVM



Wait-By-Necessity
is a
Dataflow
Synchronization



ProActive
Programming, Composing, Deploying on the Grid



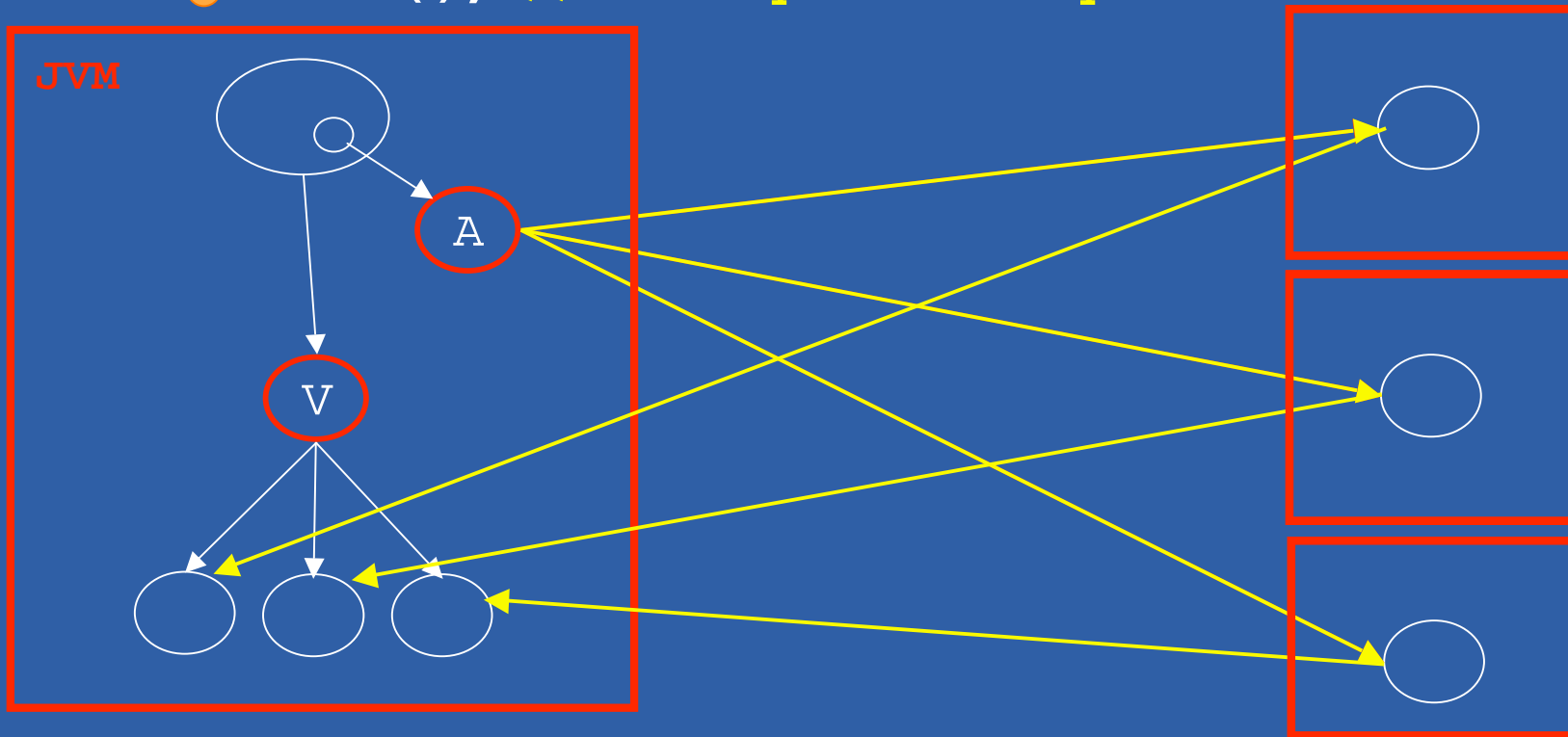
features

TYPED ASYNCHRONOUS GROUPS



Creating AO and Groups

- A ag = `newActiveGroup ("A", [...], VirtualNode)`
- V v = `ag.foo(param);`
- ● ● ●
- v.bar(); //Wait-by-necessity

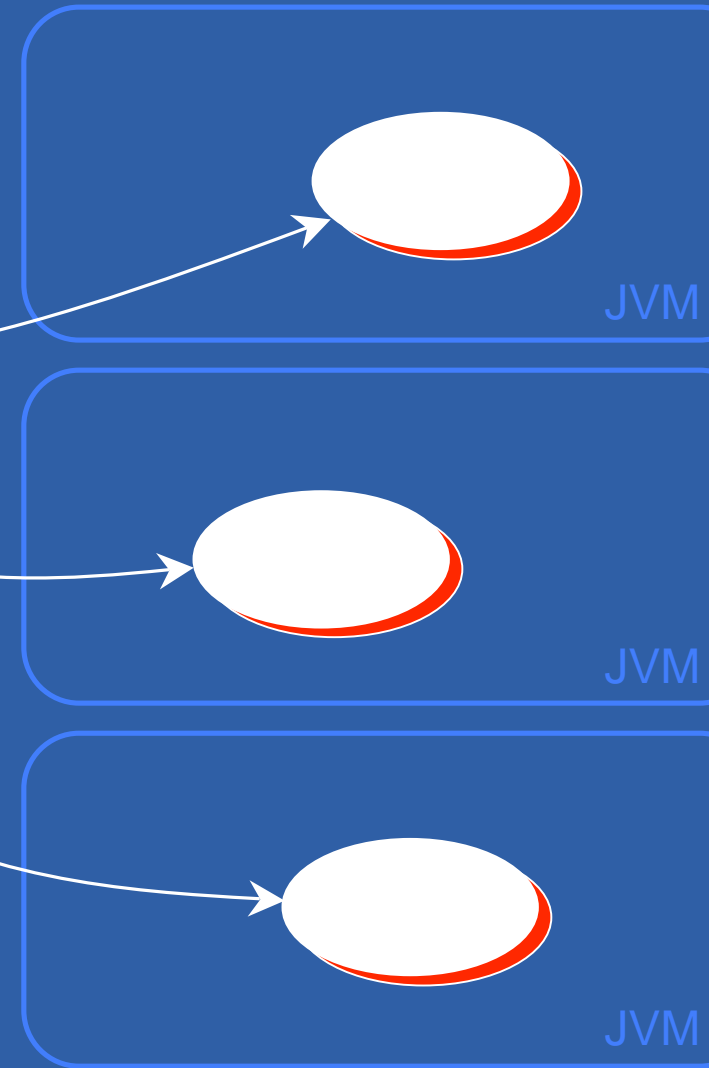
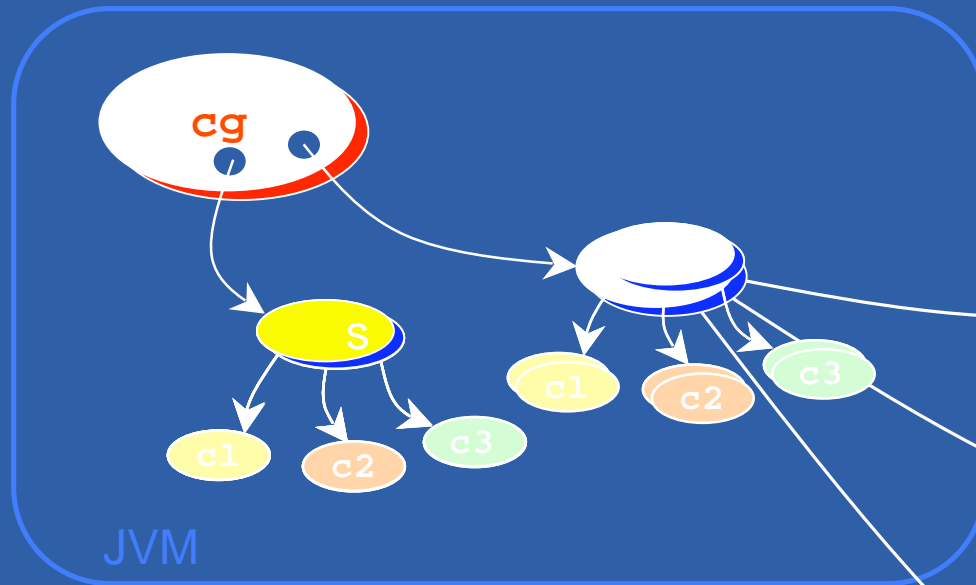


○ Typed Group ○ Java or Active Object

Group, Type, and Asynchrony are crucial for Cpt. and GRID



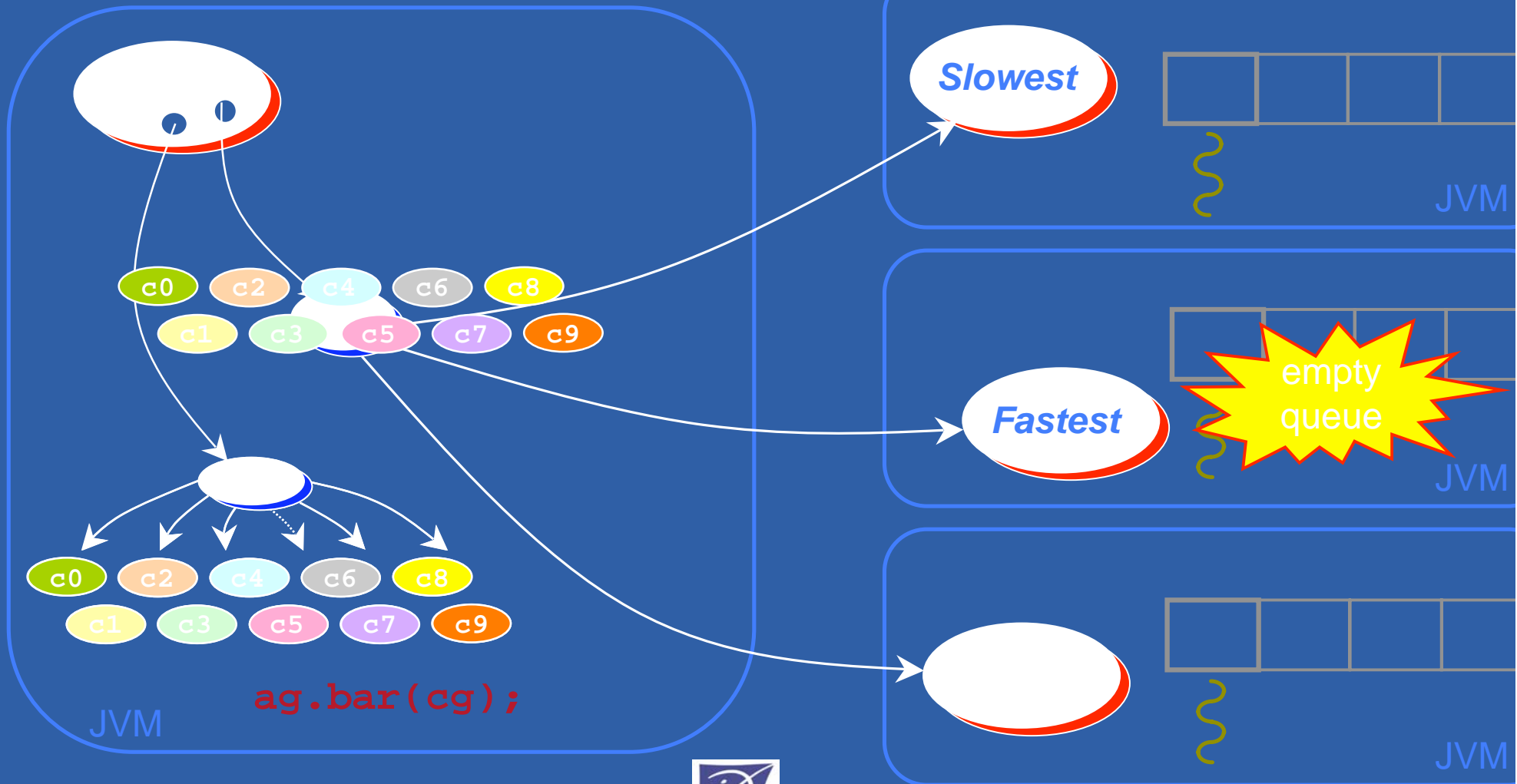
Broadcast and Scatter



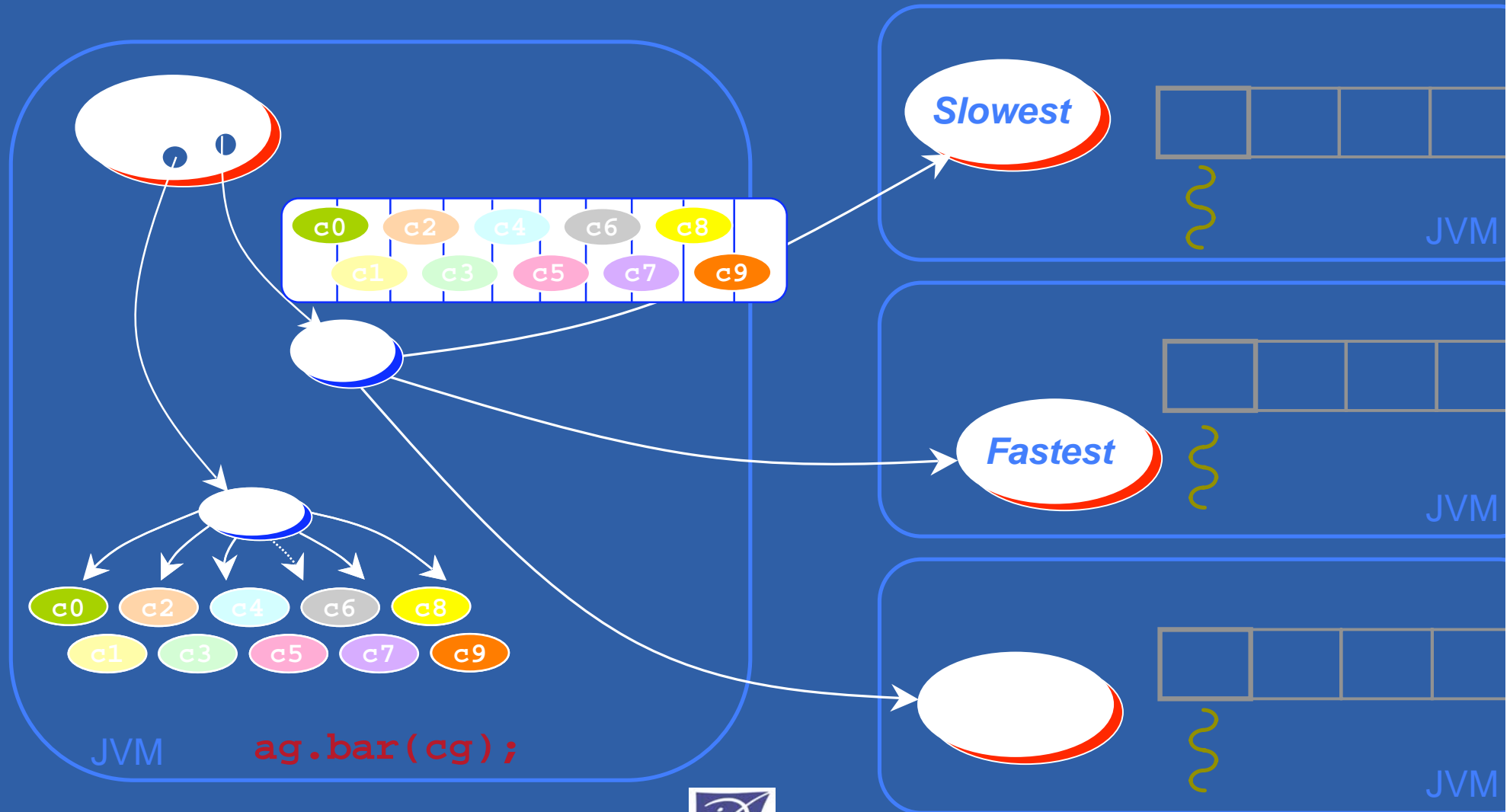
```
➔ ag.bar(cg); // broadcast cg  
ProActive.setScatterGroup(cg);  
ag.bar(cg); // scatter cg
```



Static Dispatch Group



Dynamic Dispatch Group





features

MOBILITY



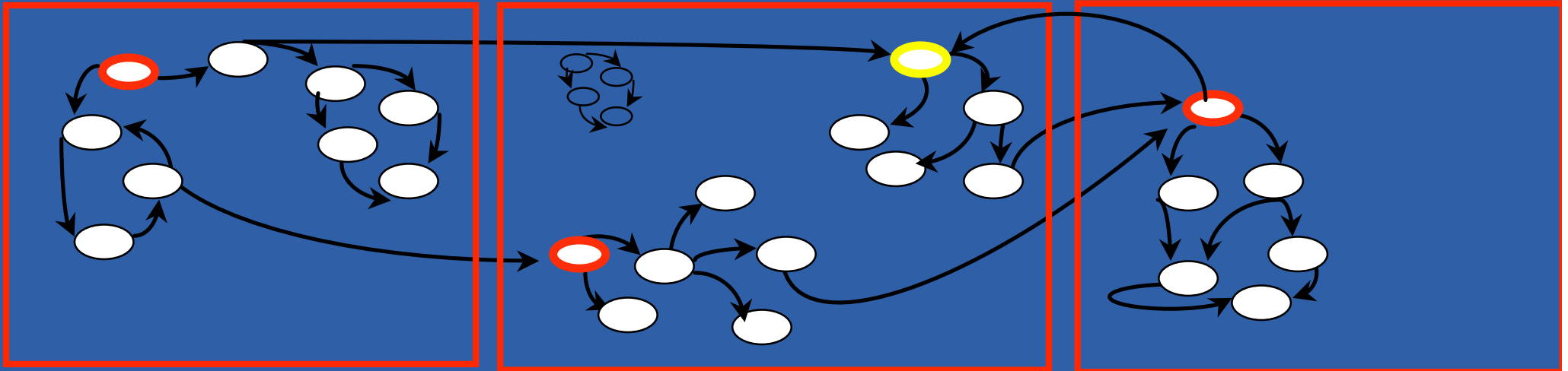
Principles and optimizations

Same semantics guaranteed (RDV, FIFO order point to point, asynchronous)

Safe migration (no agent in the air!)

Local references if possible when arriving within a VM

Tensioning (removal of forwarder)



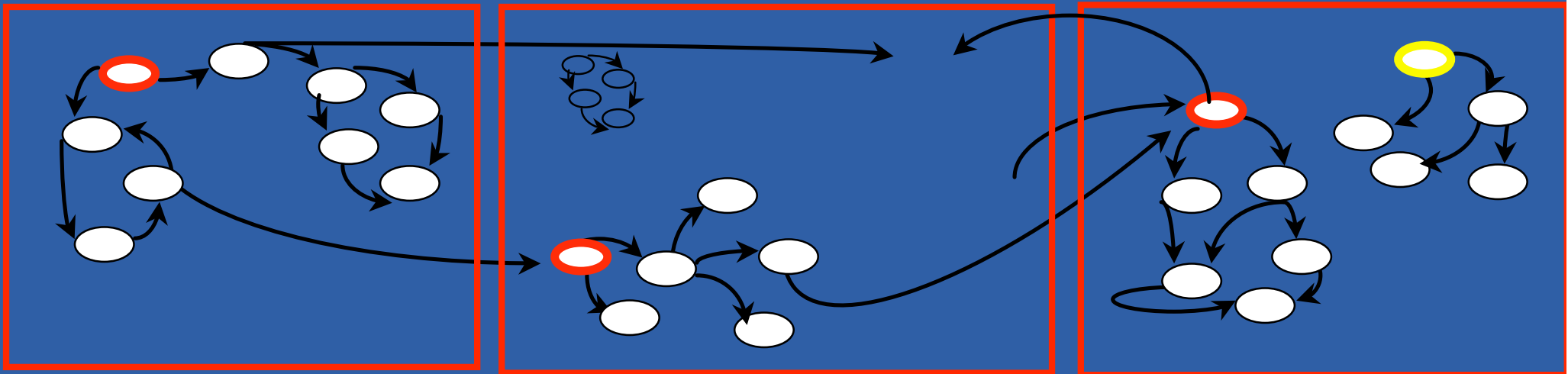
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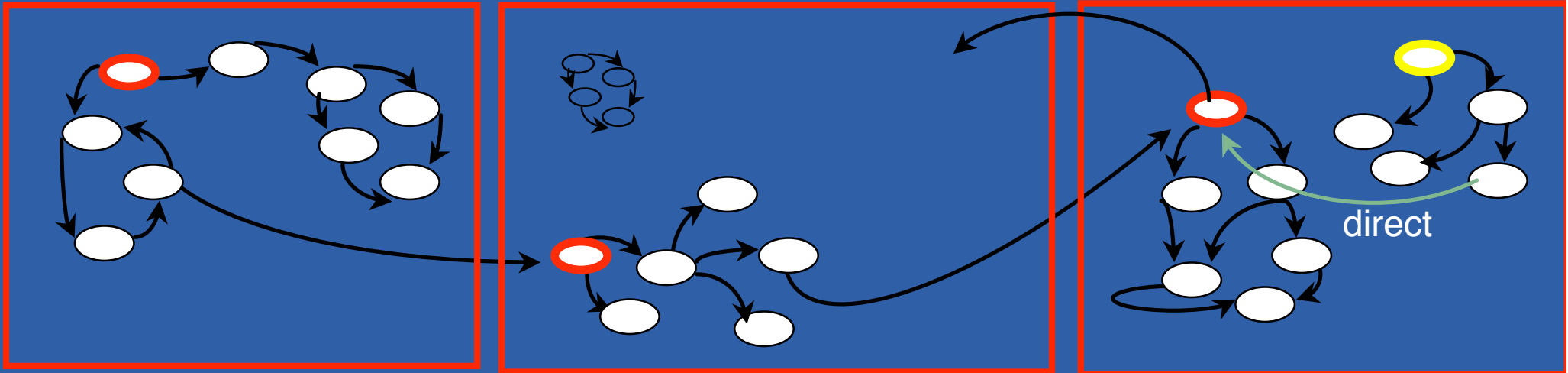
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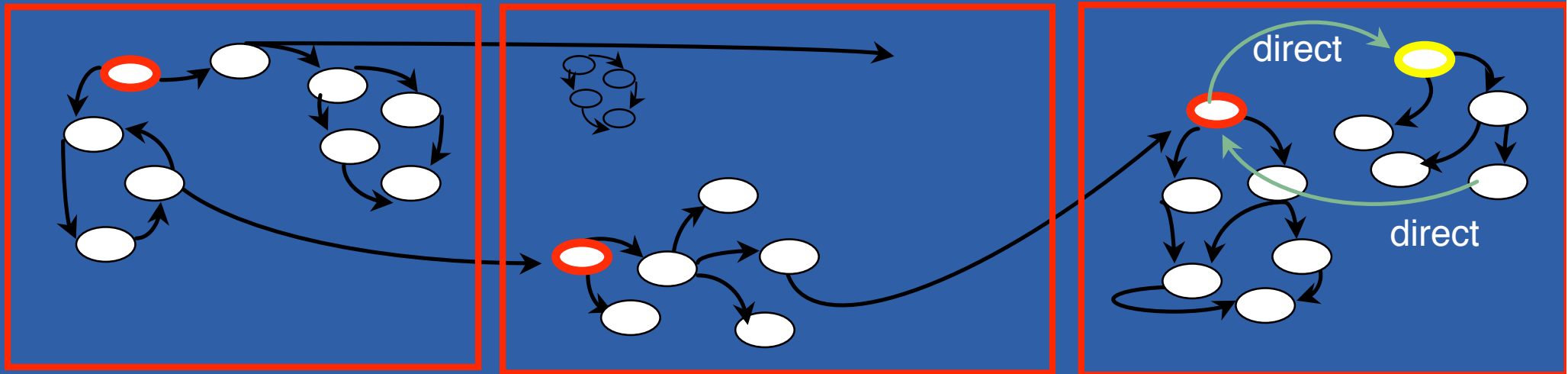
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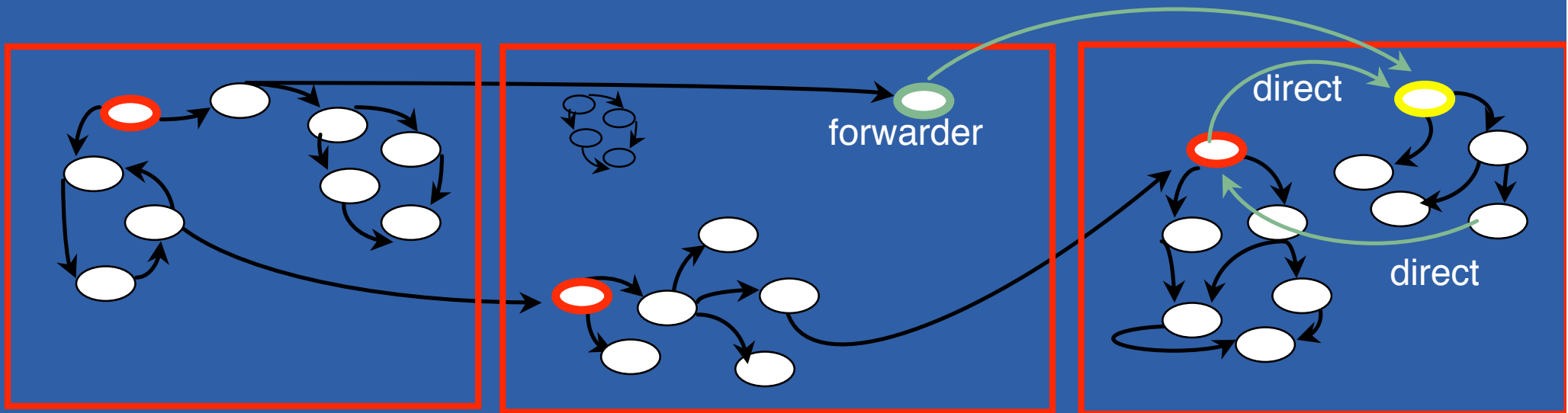
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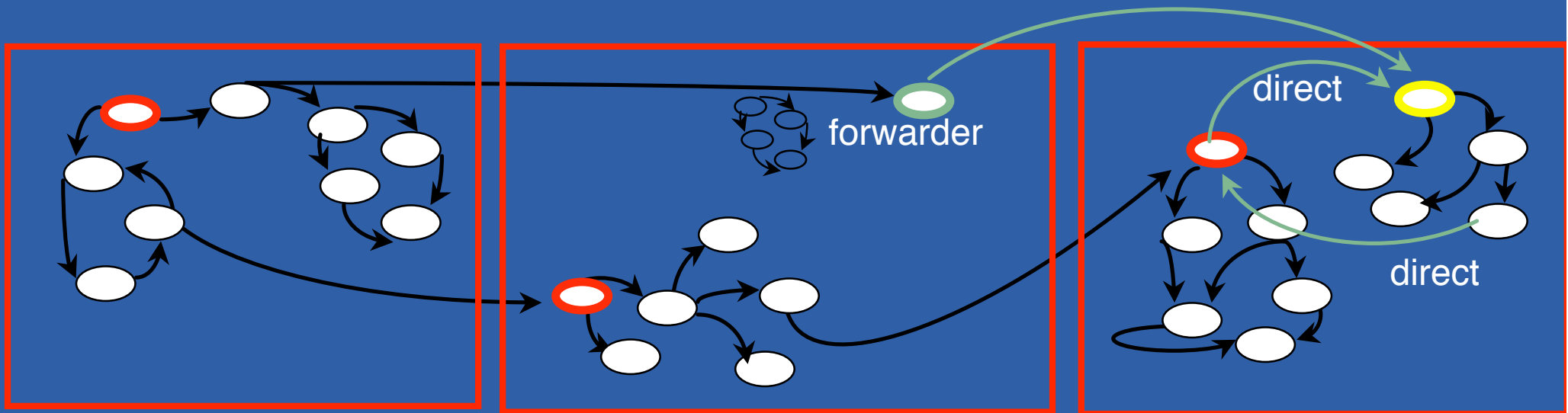
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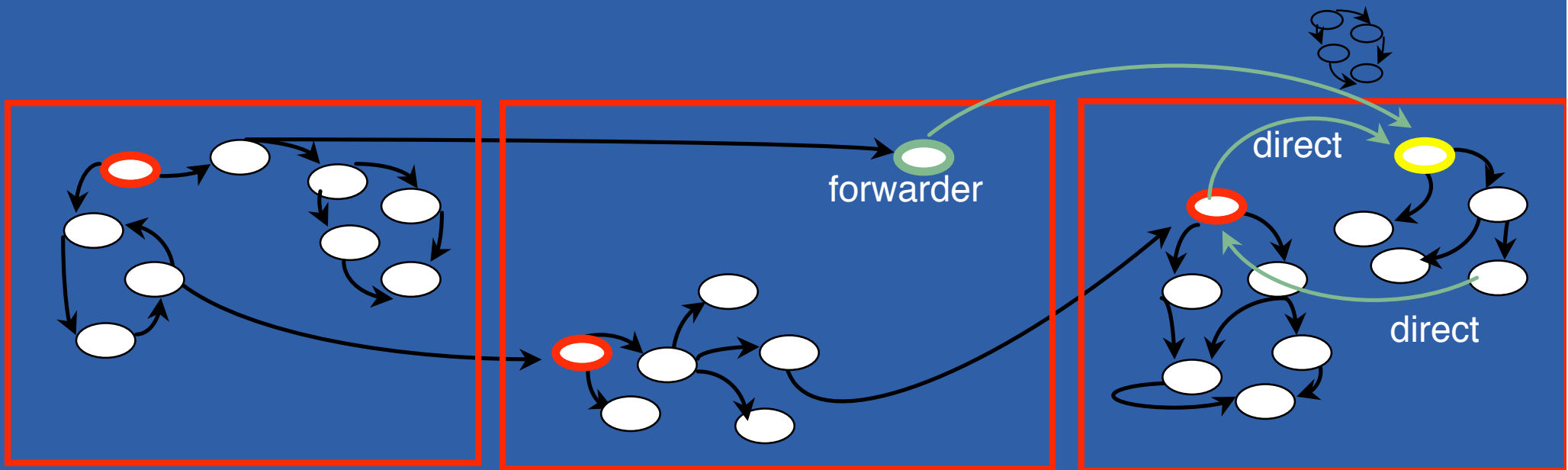
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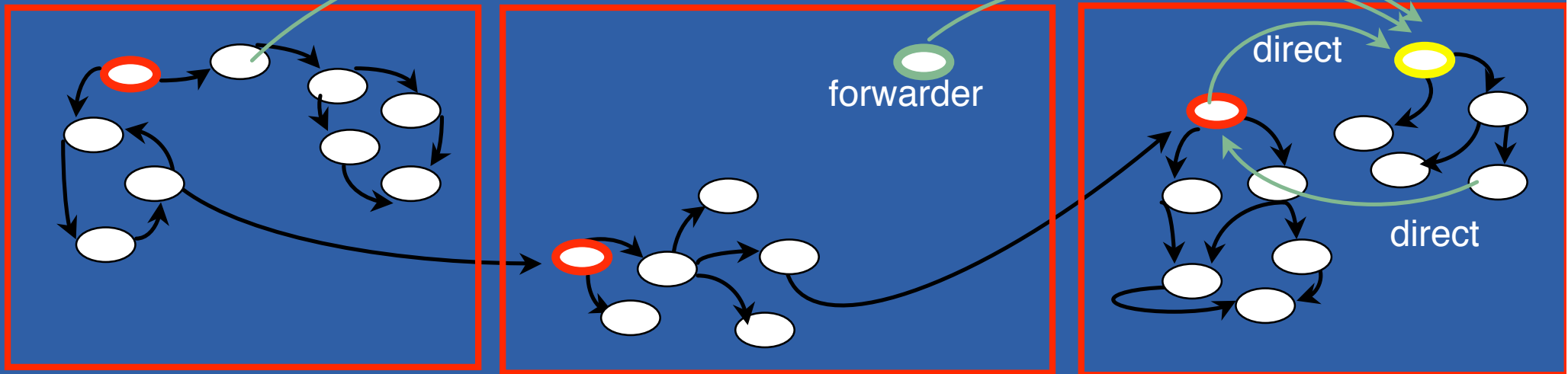
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features

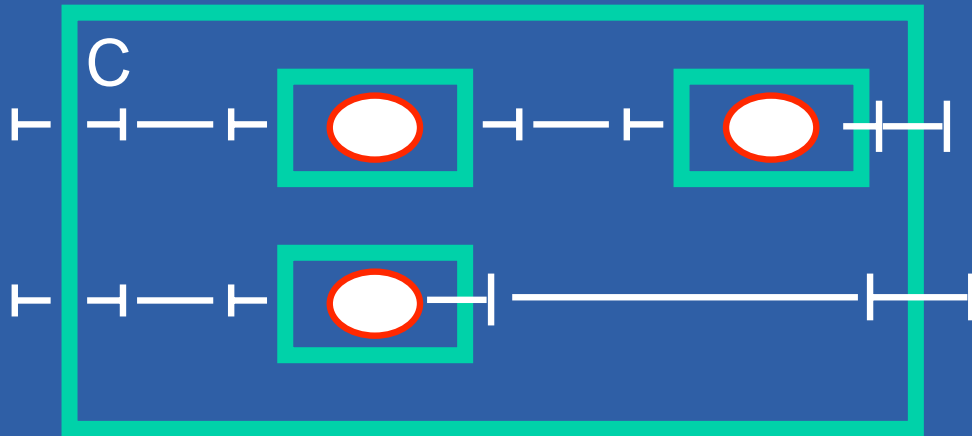
COMPONENTS



ProActive Components for the GRID

 An activity, a process, ...
potentially in its own JVM

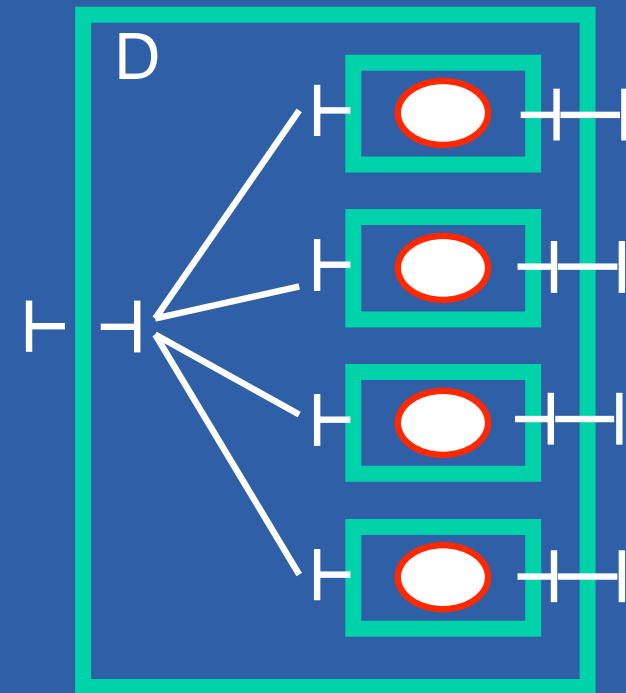
 1. Primitive component



2. Composite component

Composite: Hierarchical, and
Distributed over machines

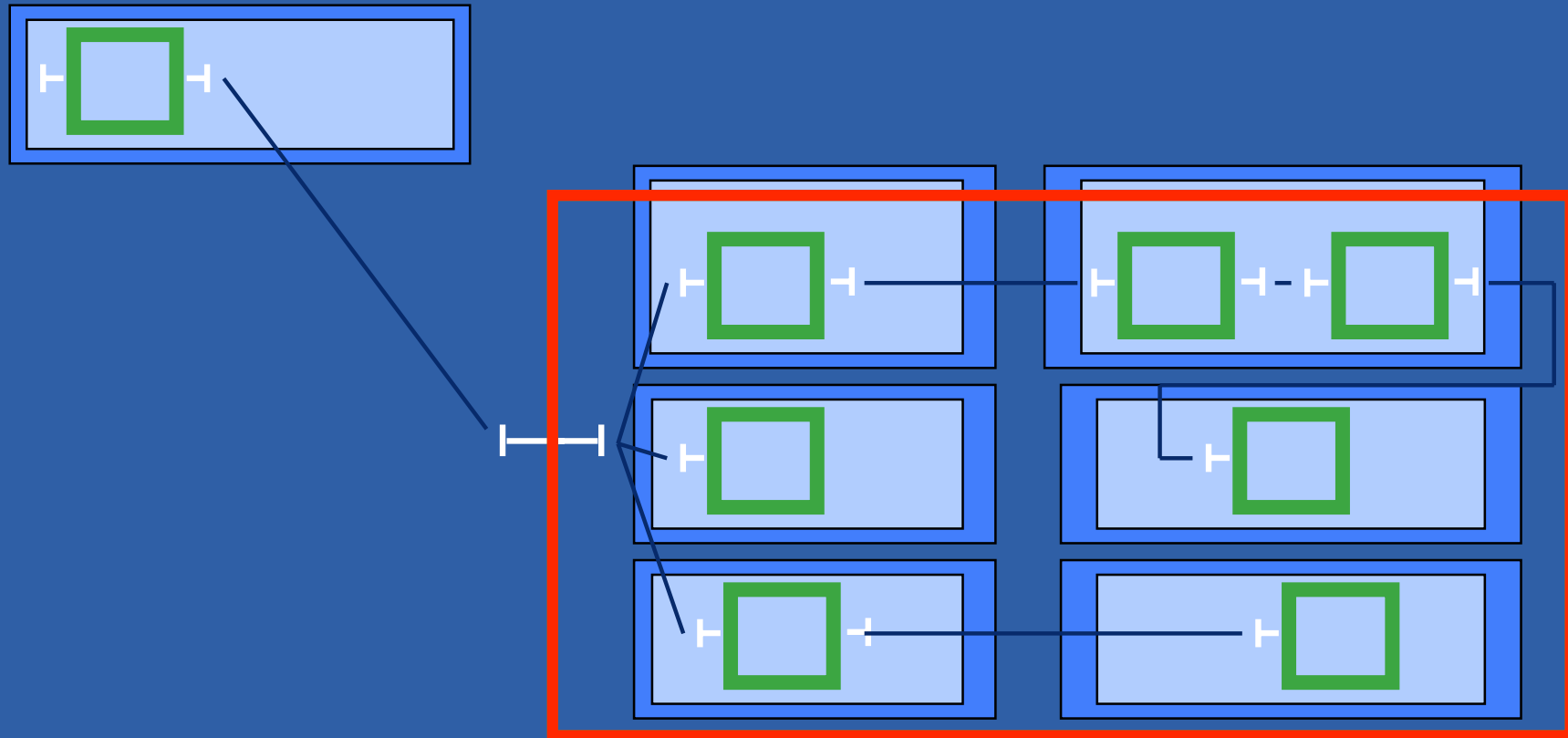
Parallel: Composite
+ Broadcast (group)



3. Parallel and composite
component



Distributed Components



A component can be distributed over several hosts

More information is available on <http://fractal.objectweb.org>





features

**INTERACTIVE CONTROL &
DEBUGGING TOOLS**

With IC2D GUI for the GRID



IC2D: Interactive Control & Debugging of Distribution

The screenshot shows the IC2D monitoring application interface. At the top, there are menu items: Monitoring, Look & feel, Window, and Globus. The main area is titled "World Panel" and displays a hierarchical tree structure of containers and VMs across three hosts: mirage:Linux, pagode:Linux, and owenit:Linux.

- mirage:Linux** (VM id=689577a860d53161:ded, Containers-175091467):
 - ActivePrimeContainer#31
 - ActivePrimeContainer#32
 - ActivePrimeContainer#33
 - ActivePrimeContainer#34
- pagode:Linux** (VM id=272cf6436bcff3fa:e859c, Containers-728729810):
 - ActivePrimeContainer#39
 - ActivePrimeContainer#40
 - NumberSource#27
 - ActivePrimeContainer#29
 - ActivePrimeContainer#41
- owenit:Linux** (VM id=176643bd02a5bc92:ded, Containers-88907713):
 - ActivePrimeContainer#35
 - ActivePrimeContainer#36
 - ActivePrimeContainer#37
 - ActivePrimeContainer#38

Additional components in the owenit:Linux VM include VM id=176643bd02a5bc92:e4457d:f52, Node-1469386767, Main#30, and ConsolePrimeOutputListener#28.

At the bottom, there are control options: Display topology, proportional, ratio, filaire, a "Reset Topology" button, and Monitoring enable.

The "Messages" panel at the bottom shows a log of events:

```

13:52:15 (AWT-EventQueue-0) => Received object ActivePrimeContainer#29 to move to rmi://pagode/Containers-728729810
13:52:15 (AWT-EventQueue-0) => Object ActivePrimeContainer#29 migrated.
13:52:16 (AWT-EventQueue-0) => Successfully migrated org.objectweb.proactive.examples.eratosthenes.ActivePrimeContainer to rmi://pagode/Containers:728729810
    
```

The "World Panel Legend" window provides a key for the visual elements used in the main monitoring interface:

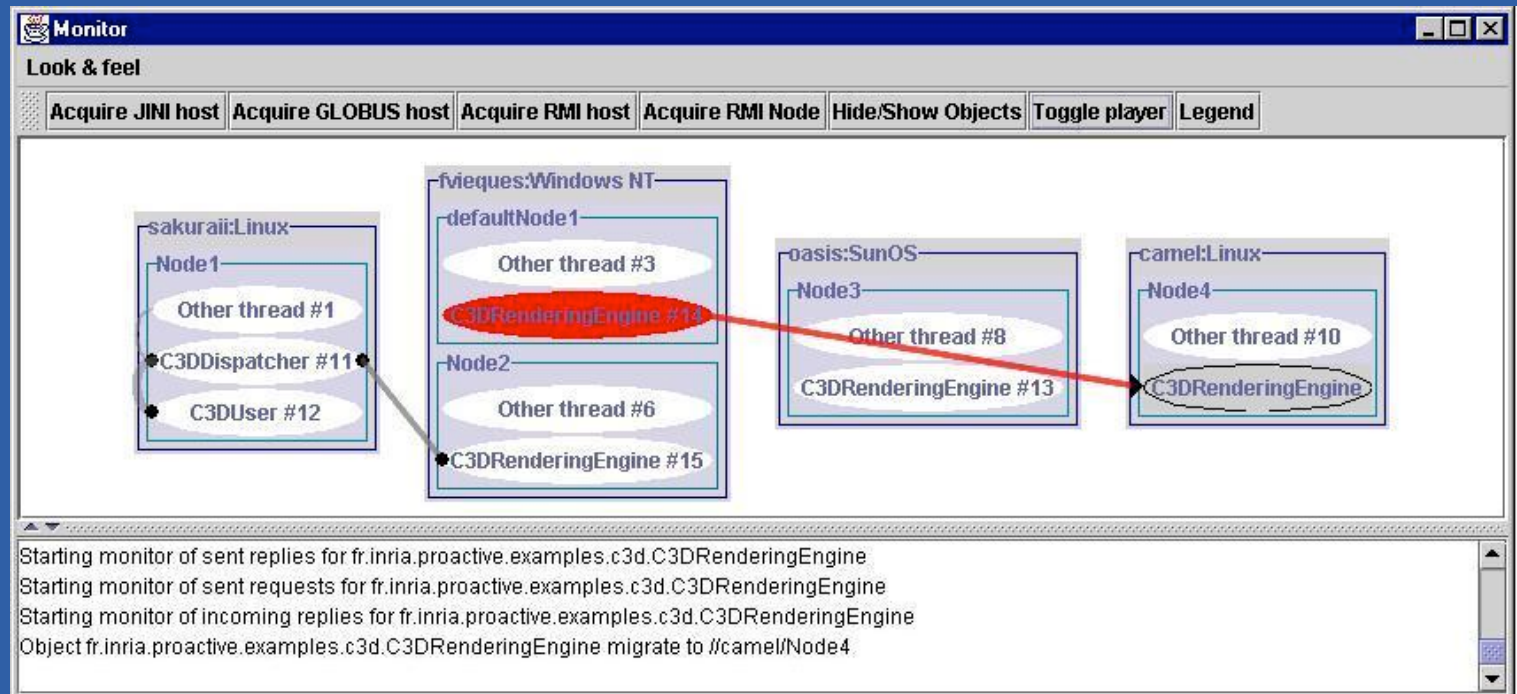
- Active objects:**
 - Green oval: Active by itself
 - White oval: Serving request
 - Grey oval: Waiting for request
 - Yellow oval: Waiting for result (wait by necessity)
 - Red oval: Migrating
- Pending Requests:**
 - White oval with colored dots: Pending requests:
 - Green square: 1
 - Red square: 5
 - Blue square: 50
- Nodes:**
 - Light blue rectangle: RMI Node
 - Dark blue rectangle: Jini Node
- Hosts:**
 - Light pink rectangle: Standard Host
 - Dark pink rectangle: Globus Host

With any ProActive application
Features:
Graphical and Textual visualization
Monitoring and Control



IC2D: Dynamic change of Deployment Drag-n-Drop Migration

Drag-n-Drop
tasks
around the
world



IC2D: Job Management

The screenshot displays the IC2D Job Monitoring application. The main window is titled 'Job Monitoring' and features a 'Monitoring Control' panel with tabs for 'Job view / Hosts', 'Job view / Virtual Nodes', and 'Host view'. A table with columns 'Job', 'Host', 'JVM', 'VN', 'Node', and 'AO' is visible. The tree view shows two jobs:

- Job JOB--1823899366** (Host: froques.inria.fr):
 - PA_JVM-1823899366_froques.inria.fr
 - User
 - User-1434133406
 - C3DUser#1
 - C3DRenderingEngine#6

- Job JOB--1821590872** (Host: froques.inria.fr):
- PA_JVM-1721540834_froques.inria.fr
- PA_JVM1372625145_froques.inria.fr
 - Renderer
 - Renderer1164475990
 - C3DRenderingEngine#3
 - C3DRenderingEngine#4
 - C3DRenderingEngine#2
- PA_JVM-1726157821_froques.inria.fr
- PA_JVM-1821590872_froques.inria.fr
 - Dispatcher
 - Dispatcher-1447214868
 - C3DDispatcher#5
- PA_JVM-1804646597_froques.inria.fr

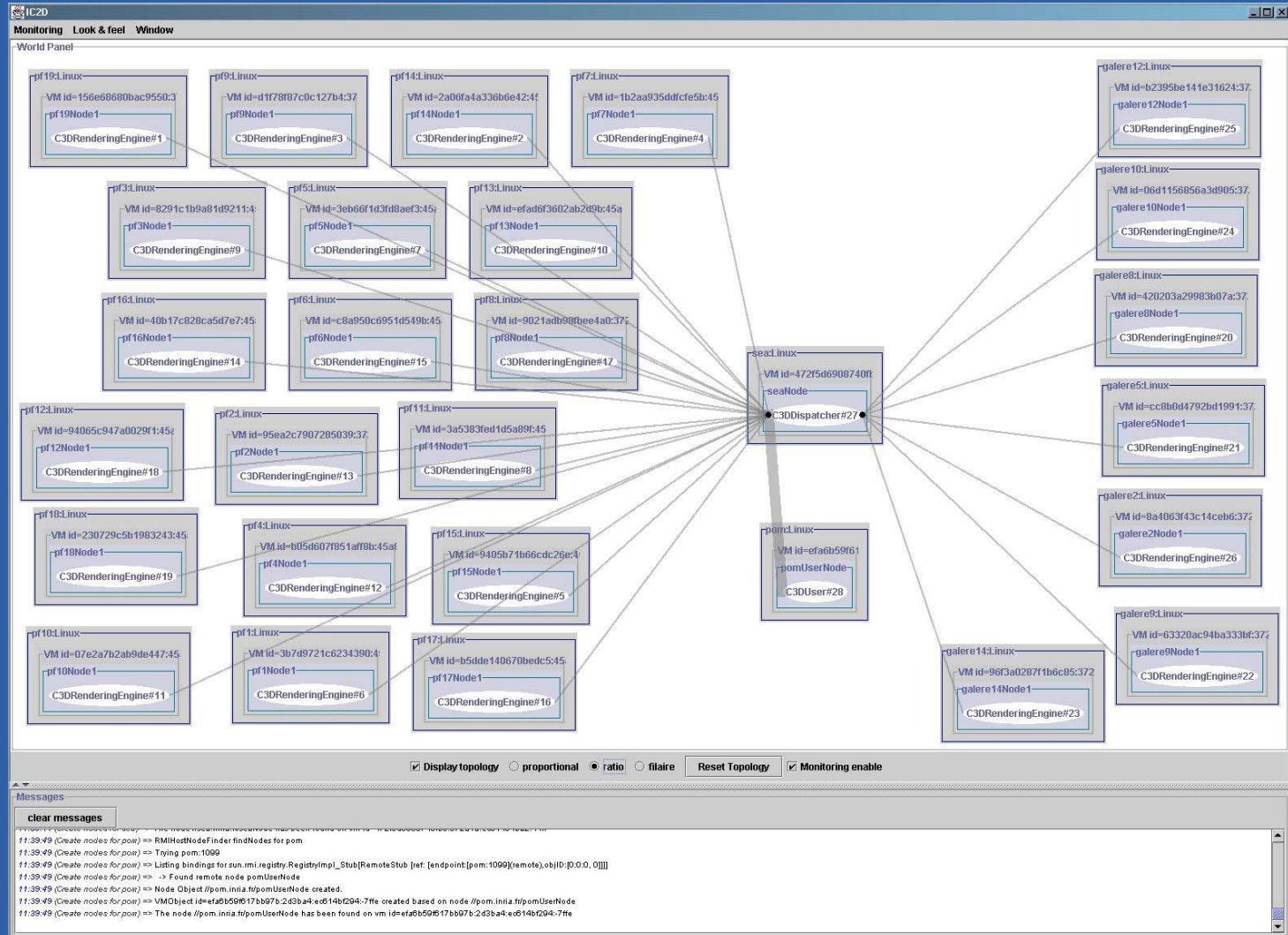
The left panel shows a 'World Panel' with a hierarchy of VMs and renderers. The bottom panel displays system messages and a file explorer.



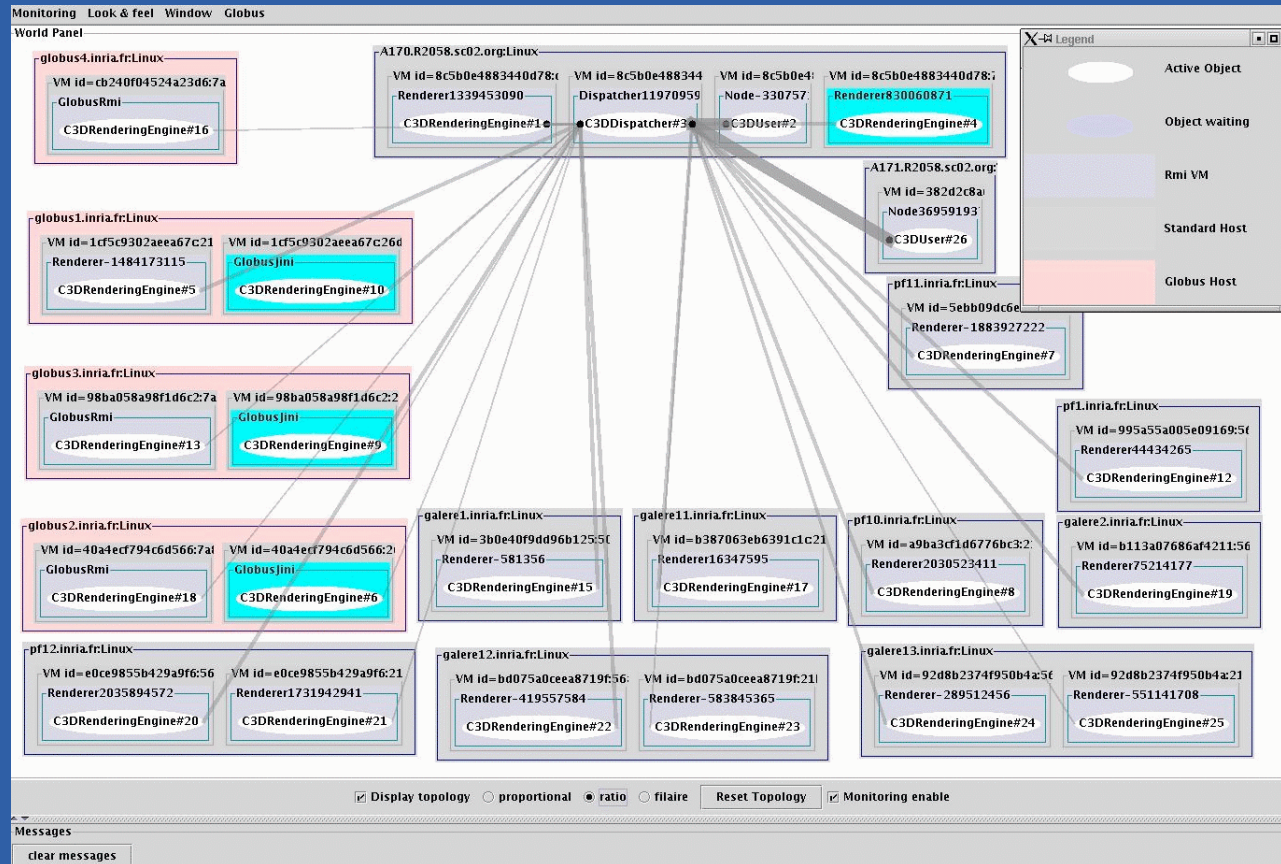
IC2D: Cluster Visualization

Visualization
of 2 clusters
(1Gbits links)

Featuring
the current
communications
(proportional)



Monitoring of RMI, Globus, Jini, LSF cluster Nice - Baltimore with IC2D



Width of links proportional to the number of communications



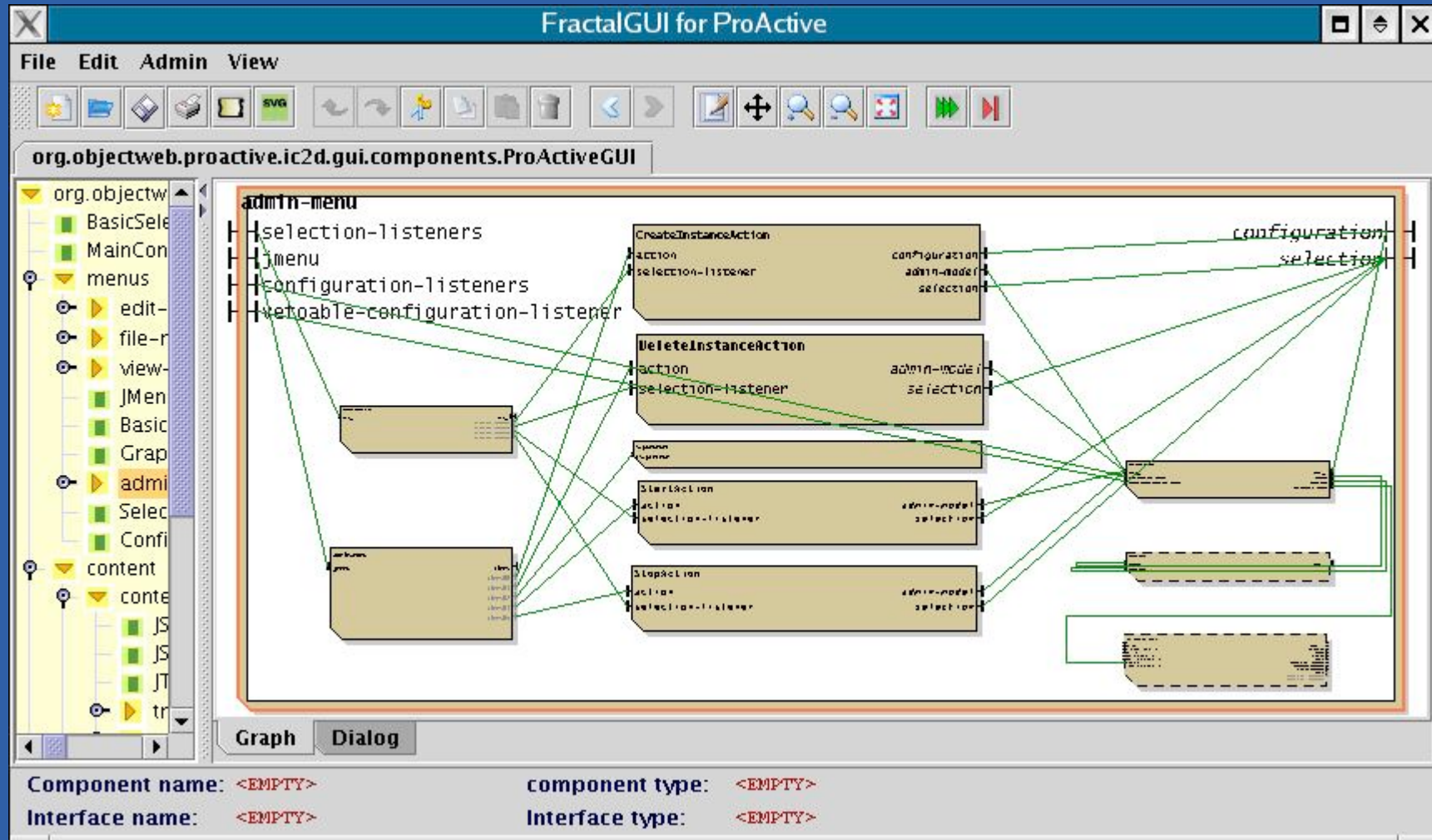


AN OPEN SOLUTION FOR THE GRID

OPEN-SOURCE EASY-TO-USE
STANDARD EXTENSIBLE



On-going work : GUI for Components





GET STARTED AT

<http://proactive.objectweb.org>

Thank You!

