

INRIA/OASIS ProActive: main related projects

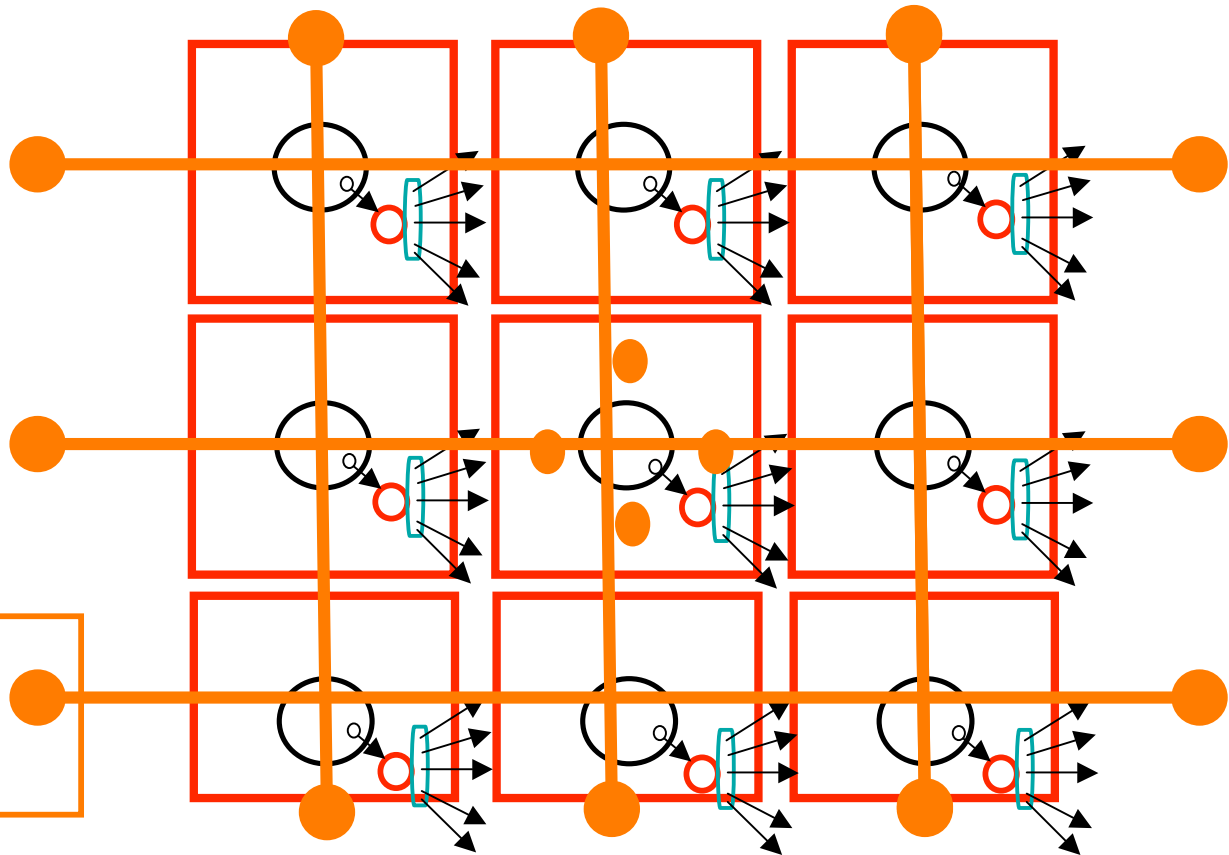
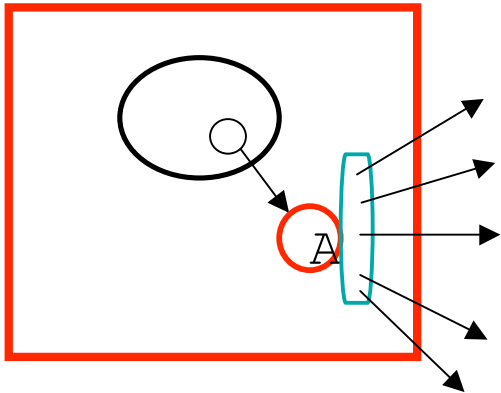
- Extension of the Fractal Component model for the Grid (2 years, dec 2004, INRIA <-> France Telecom)
 - Study extensions/optimizations of the already existing ProActive Fractal implementation
 - Sophisticated Collective invocations
 - Optimization of the Dynamic reconfiguration capabilities
 - Definition and Composition of non-functional attributes
- Grid5000 (2 years, all institutional research French teams in Grid)
 - Experimental Grid (standard configuration, but modifiable)
 - Test alternative programming models and applications at a large scale
- Ph'D students (French ministry funding)
 - Components (platform & theory) : 2
 - Programming model (remote exception, fault-tolerance, legacy code):3
 - Deployment (security, P2P, load balancing):2

OASIS ProActive : task 3.1

- Object Oriented Approach: OO SPMD
 - Distributed active objects
 - Asynchronous remote method invocations with futures
 - Typed group method invocations
 - OO SPMD programming based on typed group

From Typed Groups to OO SPMD

- `A ag = newSPMDGroup ("A", [...], VirtualNode)`
`B vg = ag.compute(param);`
 // In each member
 - `myGroup.barrier ("north","south","east","west");`
 - `myGroup.barrier ("1D",vg); //Sub-group barrier`
 - `myGroup.barrier ("2D"); // Global Barrier`



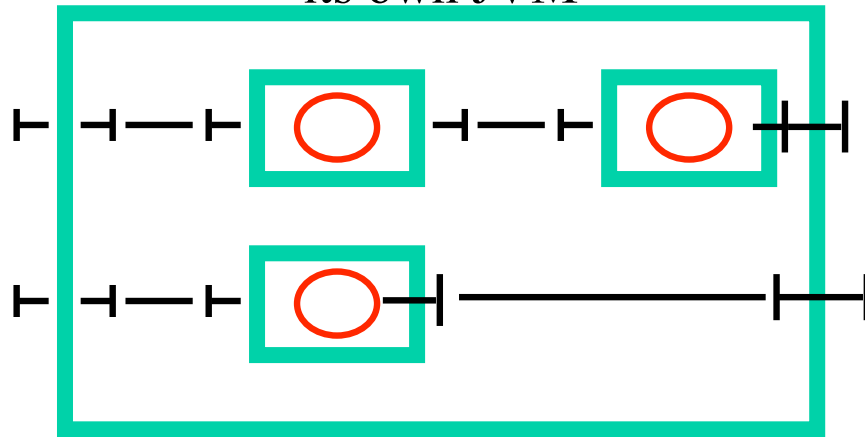
Not based on raw
messages, but
Typed Method Calls

OASIS ProActive : task 3.2

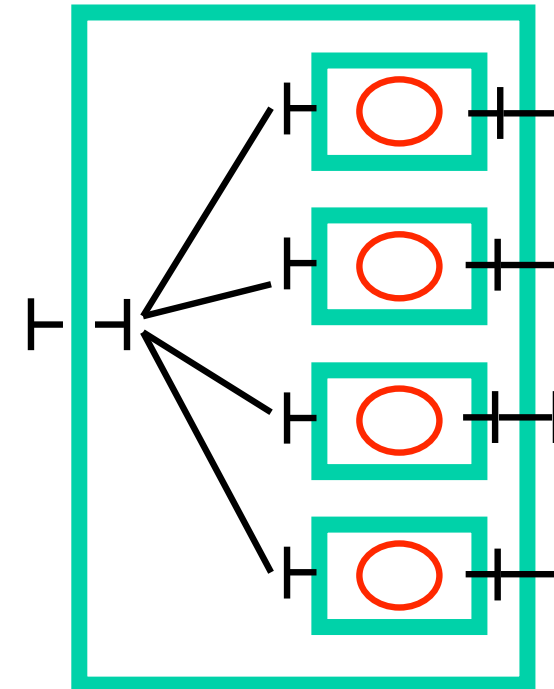
- A Distributed Implementation of the Hierarchical Fractal Component model
 - Primitives, composites (including parallel):use/provide
 - Extensible controller (e.g. life cycle, migration)
 - Asynchronous service invocation with futures (optimization for crossing composite vs reconfiguration capability)
 - Wrap legacy codes as components
 - Point-to-point or collective invocation (broadcast, scatter, gather, MxN redistribution)
 - Non functional attributes for deployment or other non functional properties (composable)
 - ADL definition (& GUI) and packaging

ProActive / Fractal Components for the GRID

○ An activity, legacy code (MPI, C,...) potentially in its own JVM



2. Composite component



3. Parallel and composite component

Composite: Hierarchical, and Distributed over machines

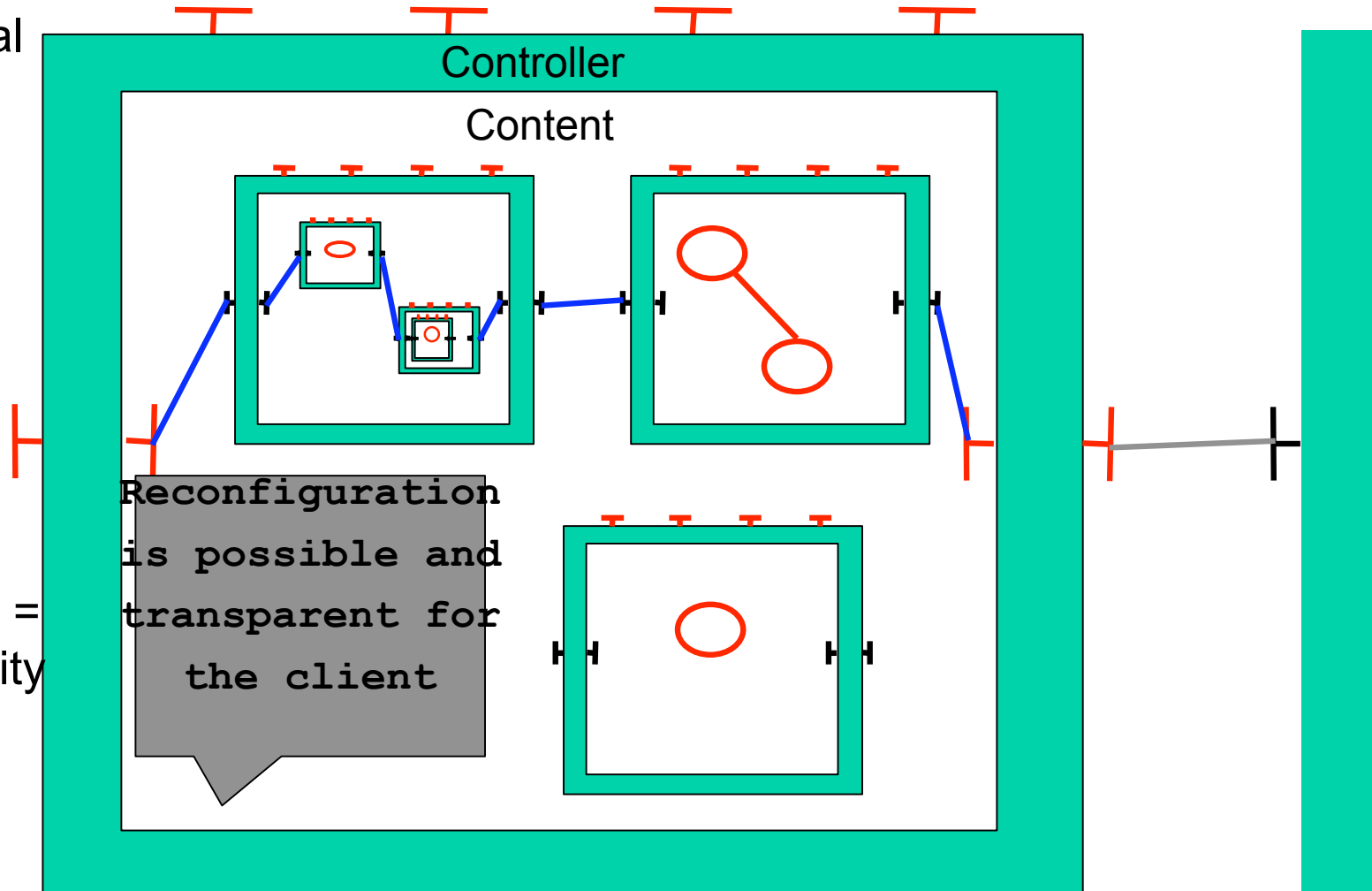
Parallel: Composite

+ Broadcast (group)

The Fractal Component Model (INRIA/FT)

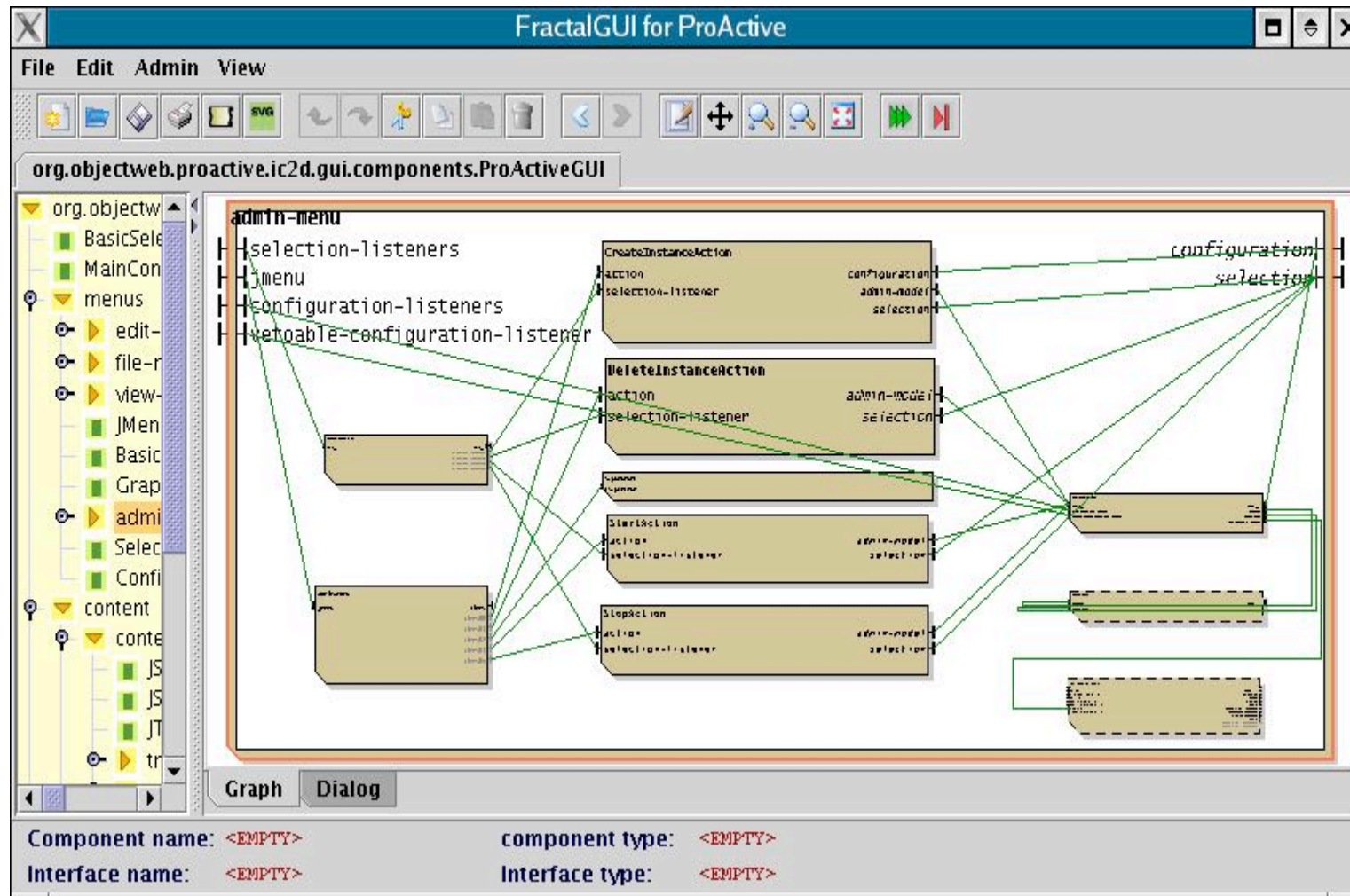
Controllers =
non-functional
properties

Component Identity Binding Controller LifeCycle Controller Content Controller

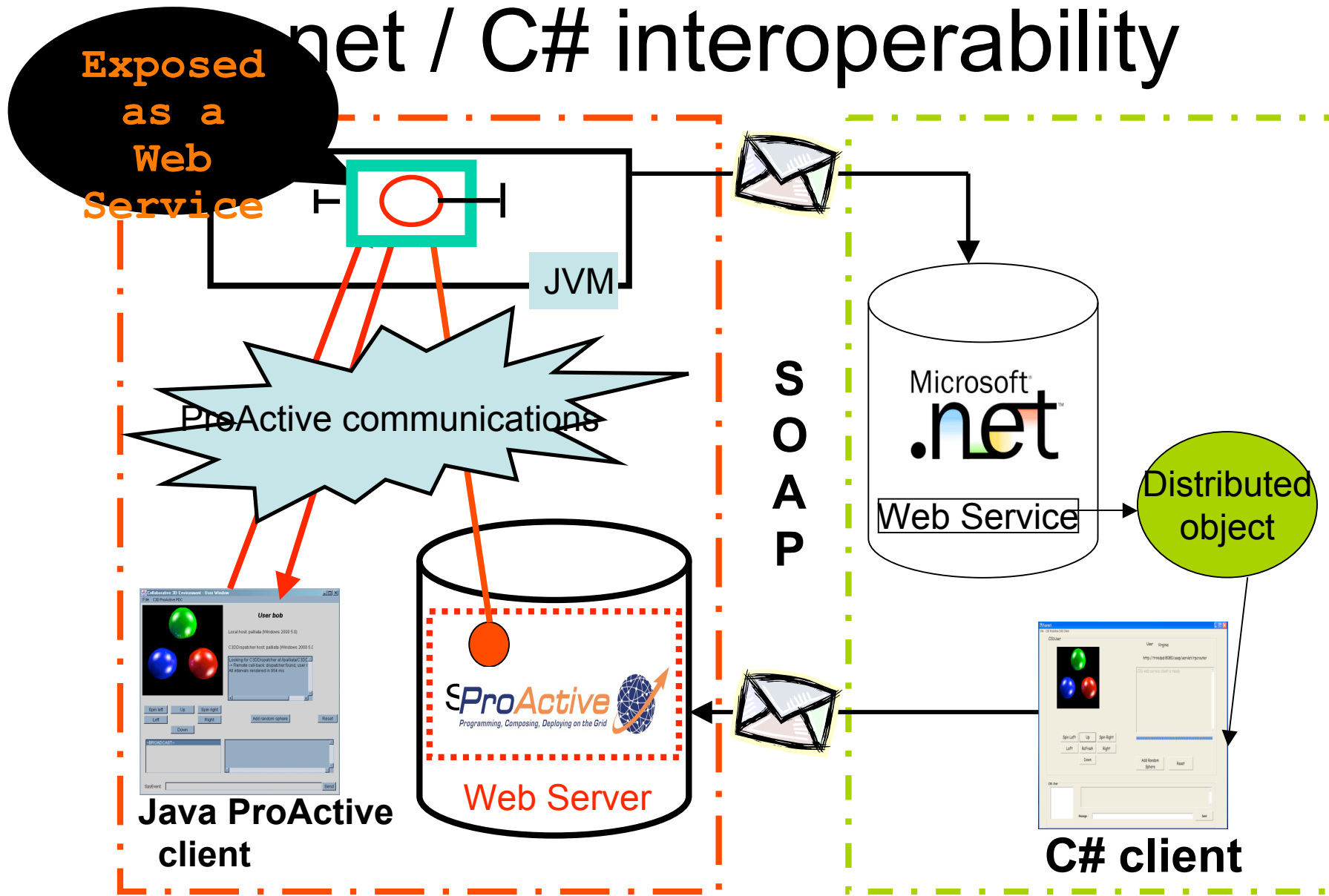


Component =
runtime entity

GUI, ADL files with composed attributes, Packaging



net / C# interoperability



OASIS ProActive : task 3.3

- Use components as skeletons/patterns for computation and synchronization on the Grid
 - Compare skeletons and Hierarchical component approaches
 - Using the hierarchical nature of ProActive components and the reconfiguration capabilities