

# Evolution of the Fractal Project

## Fractal V3

Fractal Workshop  
Nov 29th 2005

**T. Coupaye (France Telecom)**  
**J.-B. Stefani (INRIA)**



## Fractal Ecosystem (1/2)

### → Yesterday

- V0 in January 2002, V1 in July 2002: Julia implementation + a few tools (RMI, GUI, ADL v0)
- V2 in September 2003: Convergence with Think, Kilim, ProActive ; evolution of Fractal ADL (extensibility)

### → Today

- 7 execution platforms (a.k.a. implementations: focus on membrane engineering)
  - Julia reference implementation for **java middleware** (FT, INRIA)
  - Think framework for dedicated **embedded systems** in C (FT, INRIA)
  - ProActive java implementation targeting **grid computing** (INRIA, FT)
  - AOKell : AspectJ-based Java implementation for membrane programming (INRIA, FT)
  - Plasma C++ implementation and extensions for autonomic QoS management in **multimedia applications** (INRIA)
  - FractNet .NET (J#, C#, VB.NET, Cobol.NET) implementation based on AOKell (LSR)
  - FracTalk SmallTalk implementation (EM Douai)
  - ... (one in China to come !)



## Fractal Ecosystem (2/2)

### ➤ An interesting set of R&D activities and Tools

- Formal models and calculi (INRIA, Verimag)
- Configuration (Fractal ADL, Think ADL - FT, INRIA, STM), navigation/query (EMN, FT)
- Dynamic reconfiguration (FT, INRIA)
- Management - Fractal JMX (FT)
- Packaging, deployment (INRIA, LSR, Valoria)
- Security, isolation (FT)
- Correctness: structural integrity (FT), behavioural contracts based on assertions (ConFract - I3S, FT), behavior protocols (Charles U., FT), temporal logic (Fractal TLO - FT), automata (INRIA), test (Valoria)
- QoS management (Plasma - INRIA, Qinna - FT)
- Self-adaptation, autonomic computing (Jade - INRIA, Safran- EMN, FT)
- Components & aspects (FAC, Julius, AOKell - INRIA, FT)
- Components & transactions (Jironde- INRIA)
- ...

### ➤ Some operational usages

- Jonathan, Jabyce, Dream, Perseus, Speedo, JOnAS (persistence), GoTM, CLIF...

**Dissemination in industry (FT, STM, Nokia), universities including teaching (Grenoble, Chambéry, Nantes...), conferences (JC, LMO, SC, Euromicro...)**



## Agenda

- Evolution of the Fractal ecosystem
- **Fractal V3 specification management**
- **Fractal code base management**
- **Fractal community management**

### → Technical points to discuss

- Interfaces
  - Functional vs control: no ontologic difference, a distinction may be used the usage (access rights) and the implementation (by a membrane or not)
- Bindings
  - Semantics of communications (synchronous/asynchronous, unicast/multicast/gathercast)
  - Semantics of bind/**unbind** wrt bindings and components creation/**destruction**
- Containment
  - « Peer-to-peer » bindings: « system composites » are not mandatory
  - Semantics of add/**remove** wrt components creation/**destruction**
- Structure of membranes
  - Interceptors in membranes specified by the model ?
  - Components in membranes specified ?
  - A priori no: the model is agnostic wrt membrane programming*
- Semantics of sharing
  - Which component is actually responsible for the management of a shared component -> notion of « ownership » ?

### → Technical points to discuss (cont)

- Memory management
  - Need for explicit component destruction operation (cf. bindings, containment, mapping to languages without GC) ?
- State management for reconfiguration
  - Can we go beyond {get,set}State ?
- Activity/behaviour/execution model
- Type system(s)
  - Syntactic (current), structural & behavioural contracts
  - Mutable vs immutable types ?
- Remove « Adherence » to Java in APIs (e.g. Fc suffix, memory management)

### → Organization of the specification (proposition)

- Core
  - Current controllers for (re)configuration: bindings, containment, lifecycle + state (?)
- “Library of controllers”
  - “Most useful controllers” (?)
  - “Membrane typology” (primitive, parametricPrimitive, etc.) ?

### → Organization of work on specification (proposition)

- Editing structure
  - Editors
    - T. Coupaye (France Telecom)
    - J.-B. Stefani (INRIA)
  - Editing committee (**To be finalized**)
    - D. Caromel (INRIA)
    - T. Coupaye (France Telecom)
    - T. Ledoux (EMN)
    - P. Merle (INRIA)
    - L. Seinturier (INRIA)
    - J.-B. Stefani (INRIA)
  - Contributors
    - Anybody (discussions on mailing-list)
- Organization of work
  - Sub-groups ?
  - Integration of contributions

### → Cartography/matrix implementations/tools

- Can I use Fractal Explorer with AOKell ?
- Can I use Fractal JMX and ConFract with ProActive ?
- Can I use Fractal ADL with Think ? With FractNet ?

### → Mix of controlers from distinct implementations

- Toward an (ADL-based) retargetable configuration chain`

### → (Conformance) test suites

### → Demonstration platforms (?)

### → Maintainance of the code bases(s) ?

- Versions dependencies (Julia, ASM, AspectJ...)

### → Fractal on ObjectWeb web site

- More visibility to implementations, extensions, tools, reports, tutorials, bibliography, etc.
- More visibility for usage/"sucess stories"
  - Jonathan, DREAM, CLIF, Speedo, Perseus, GoTM, Jabyce
- Webmaster(team)

### → Fractal workshop 2006+ proposition

- More structured event (proceedings)
- Standalone event in sumer 2006 or ECOOP tutorial/workshop
- Satellite of OBJECWEBCON or other event in 2007