High-Level Distributed Components Specifications using customized UML 2.0 profiles

Solange Ahumada
Eric Madelaine
Antonio Cansado
Emil Salageanu

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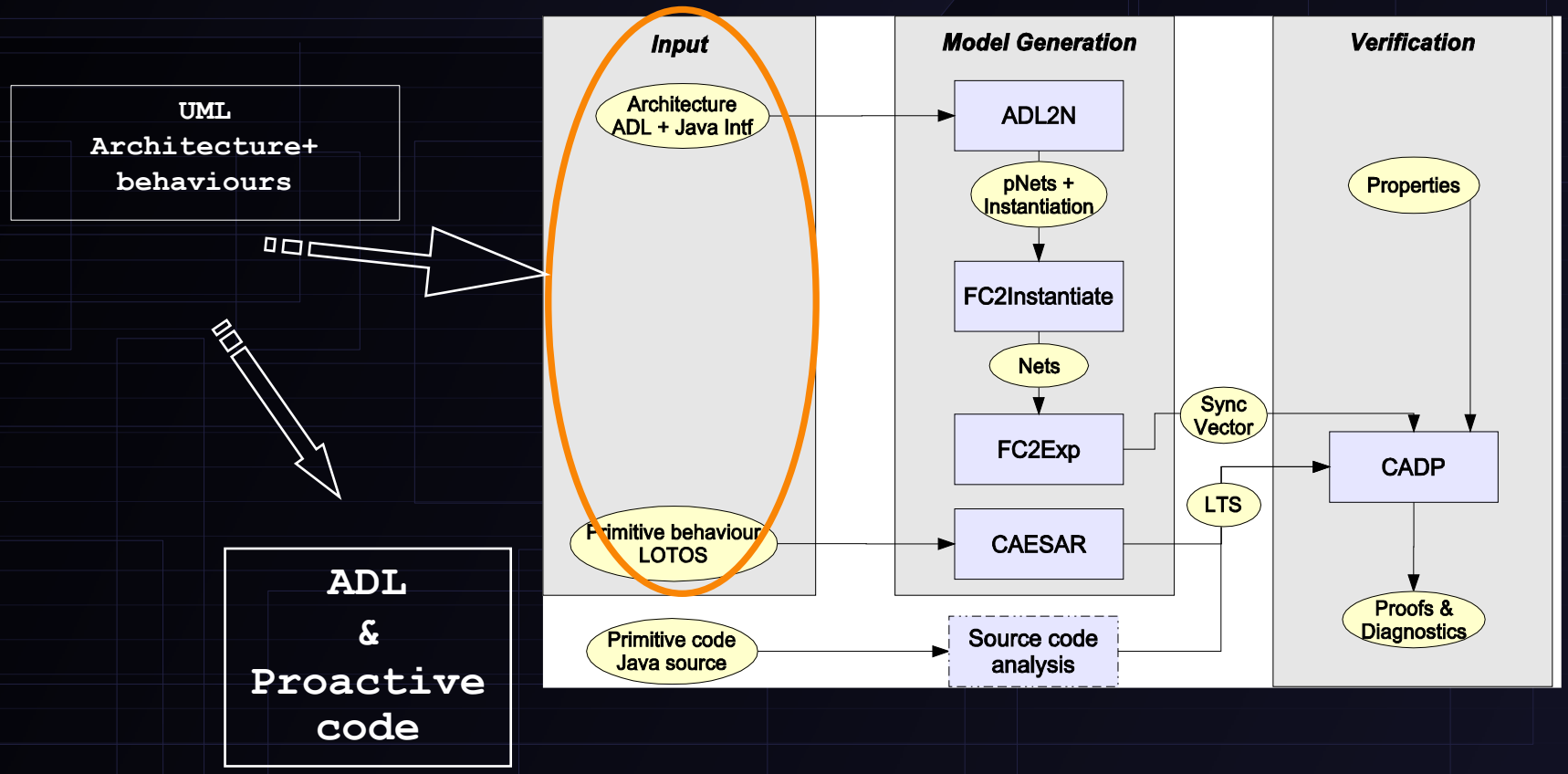
VERCORS Platform



"correct by construction"

Objectives

- Design model for ProActive Applications
  - high level specification
- Design Tool
  - hierarchical component architecture, signatures of interfaces, behaviour specifications
  - Generation of graphs for making proofs, finding conception errors, ...

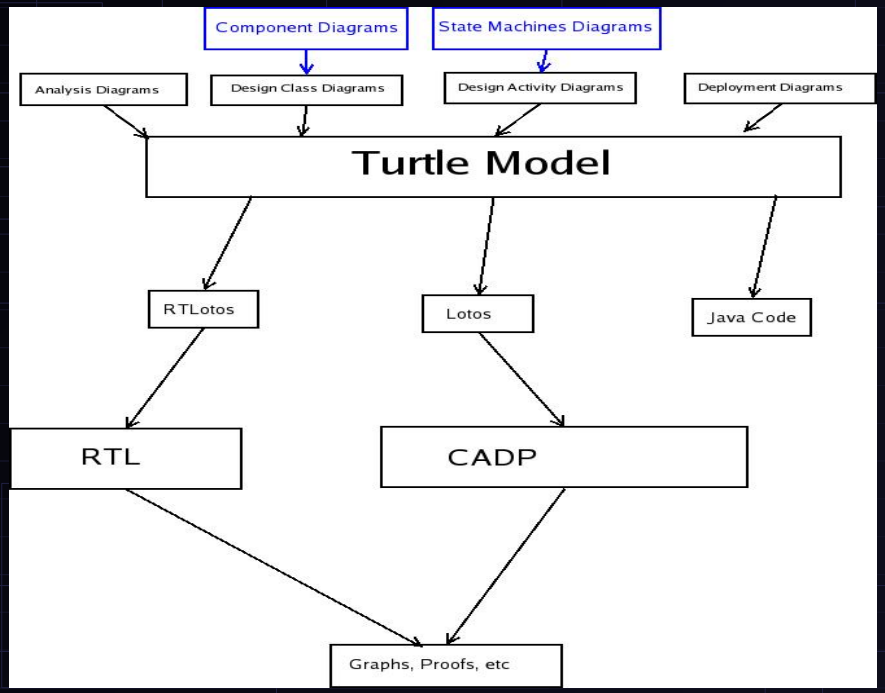
Related works

- Turtle Model
  - Ludovic Apvrille, ENST, LabSoC Laboratory
  - http://labsoc.comelec.enst.fr/turtle
- UML2 components and Fractal
  - Vladimir Mencl and Matej Polak, Charles University, Prague Distributed System Research Group

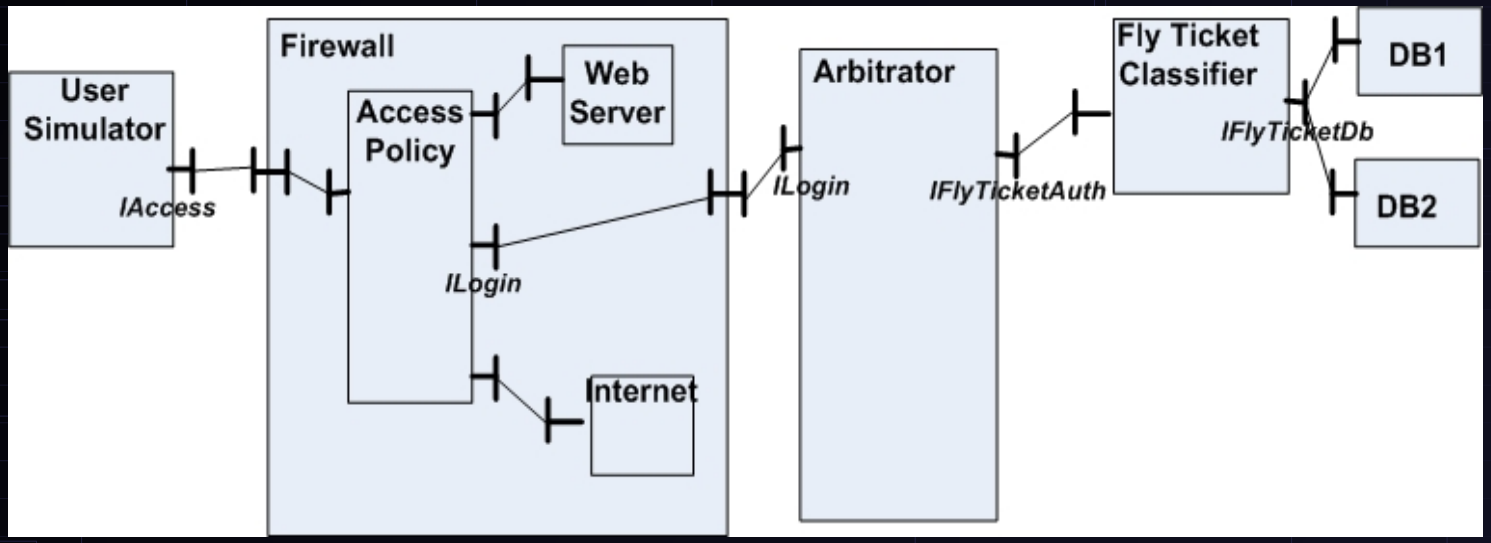
Short Turtle Description

- UML(1.4) profile dedicated to the modelling and formal validation of real-time systems
  - Formal semantics for UML
  - Set of diagrams
- Implemented by TTool
- Analyze of possible system errors

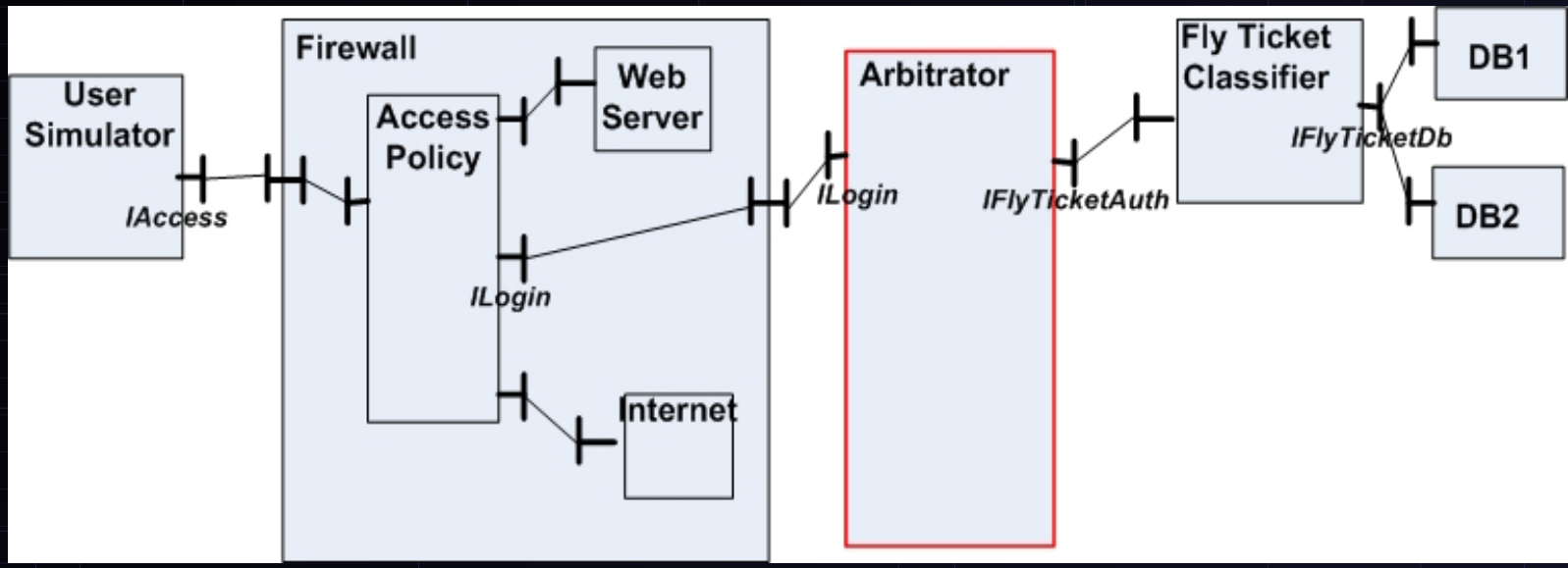
Turtle Model



Fractal Model



Fractal Model



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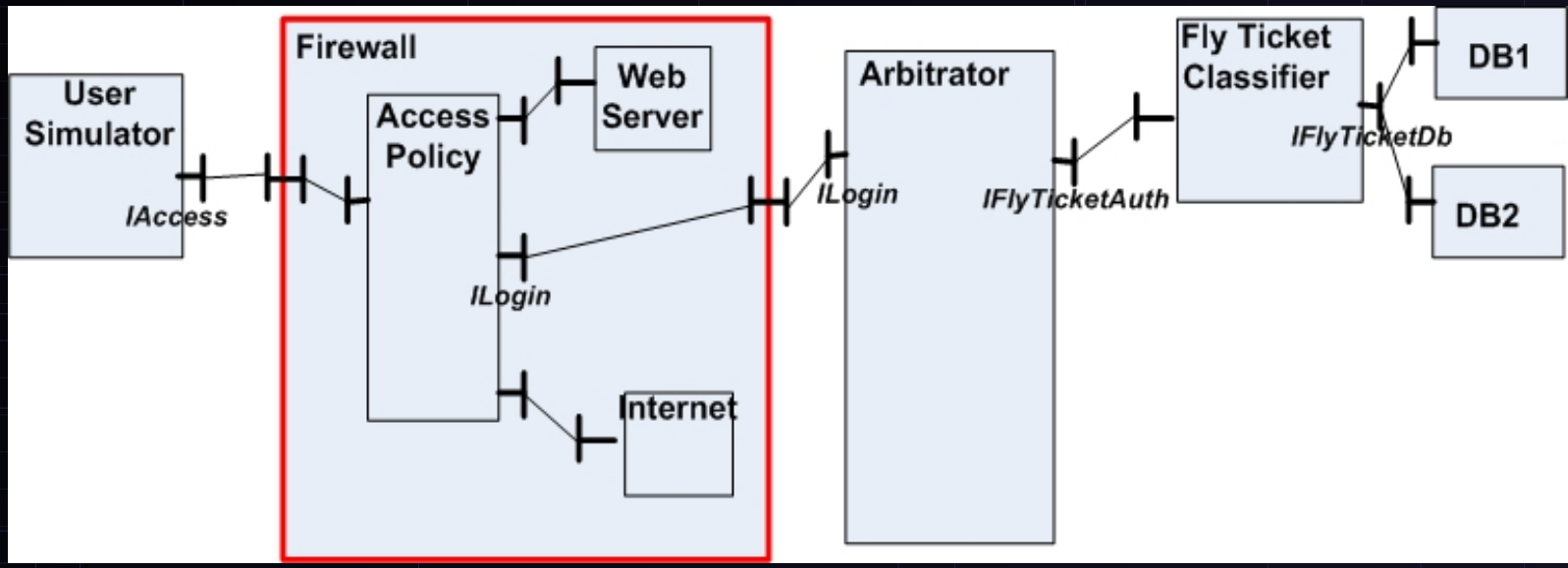

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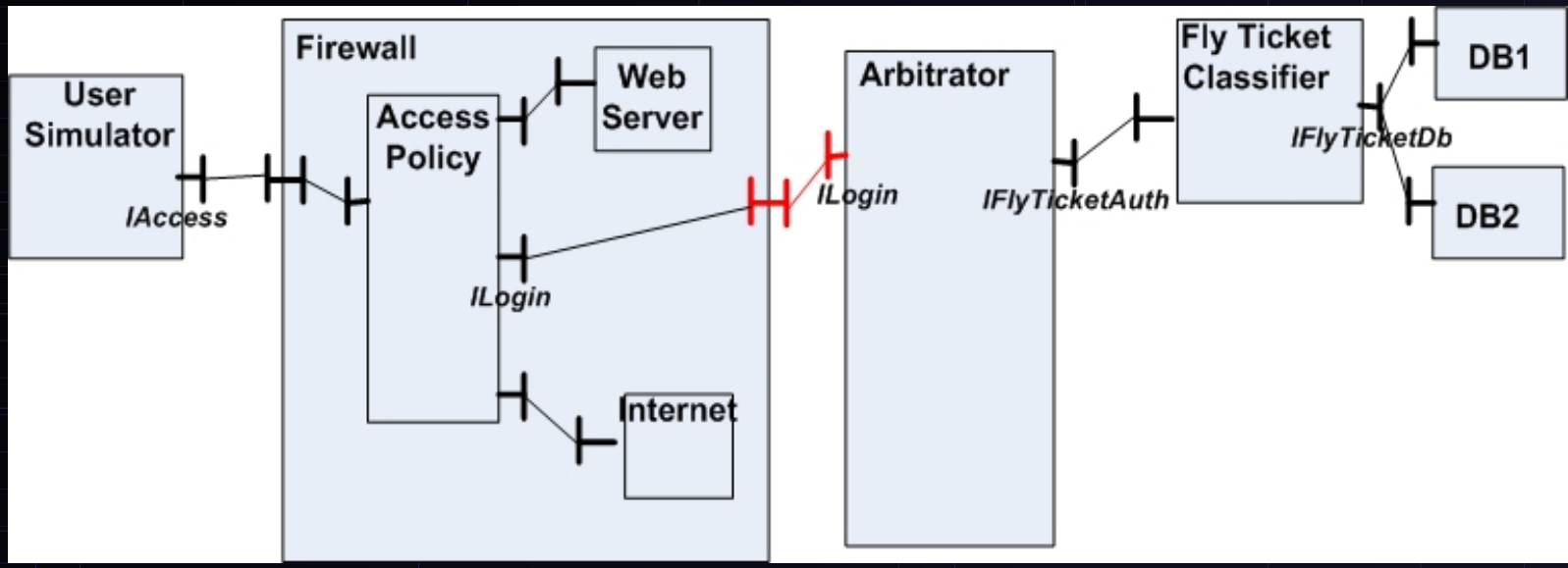
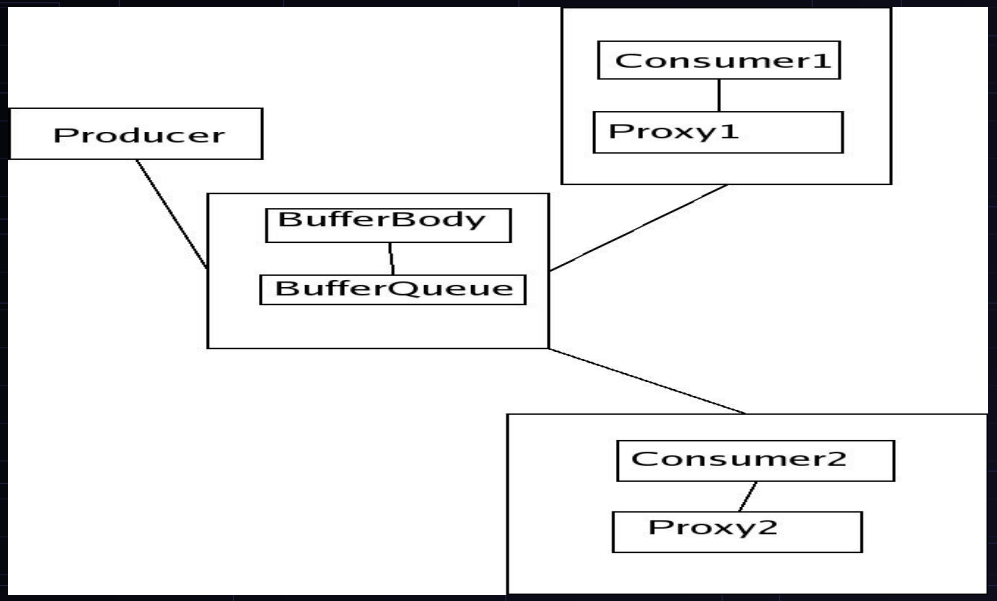


Producer-Consumer Case-Study

- VERCORS Platform
- Objectives
- Related Works
- **Case Study**
- CTTool
- ProActiveTTool
- Conclusion

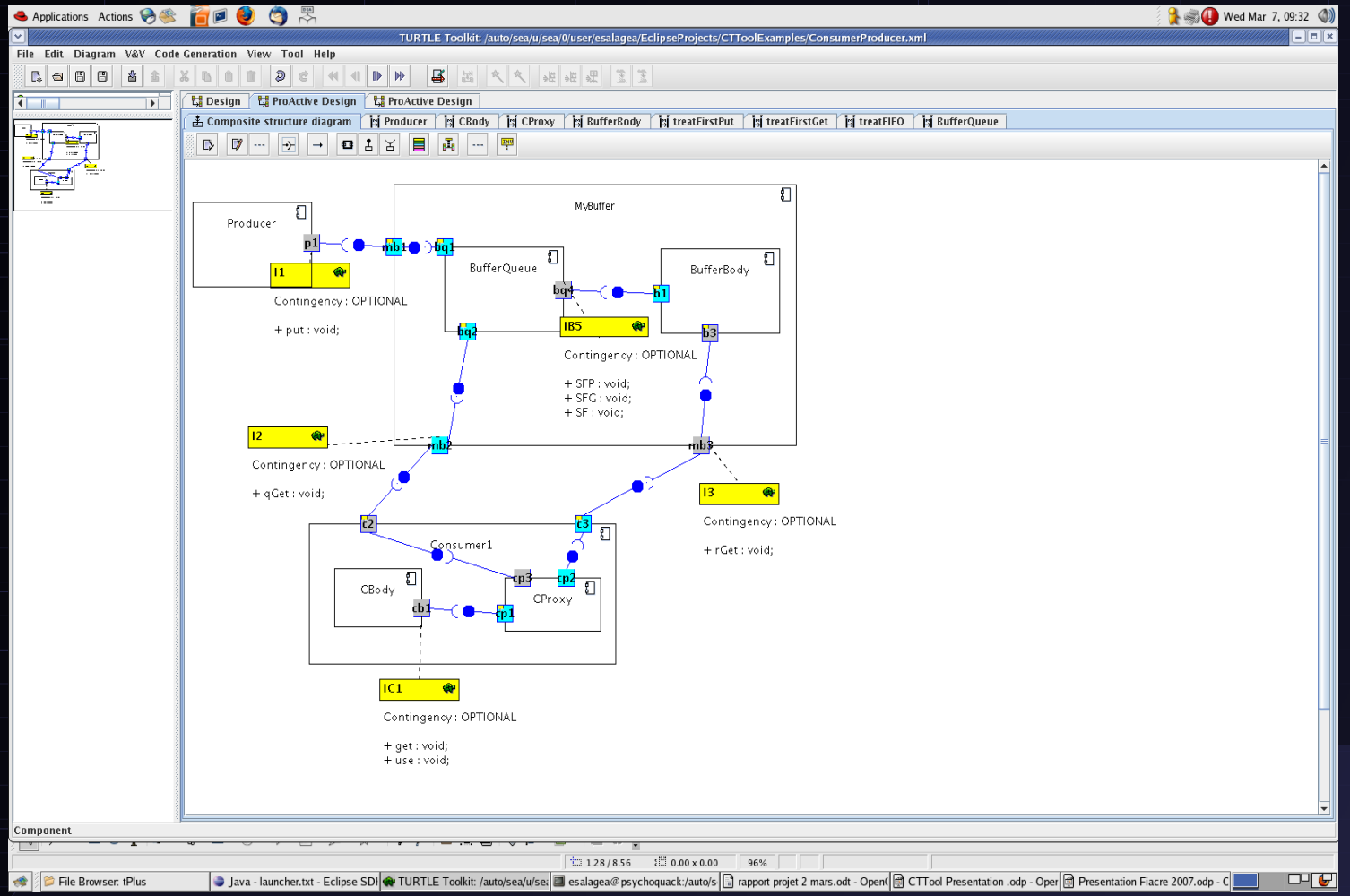


CTTool Overview

- Based on UML 2.0
- Fractal component model
- Editor + verification environment using TTool code base
  - generation of Lotos code
  - bridges to CADP toolset

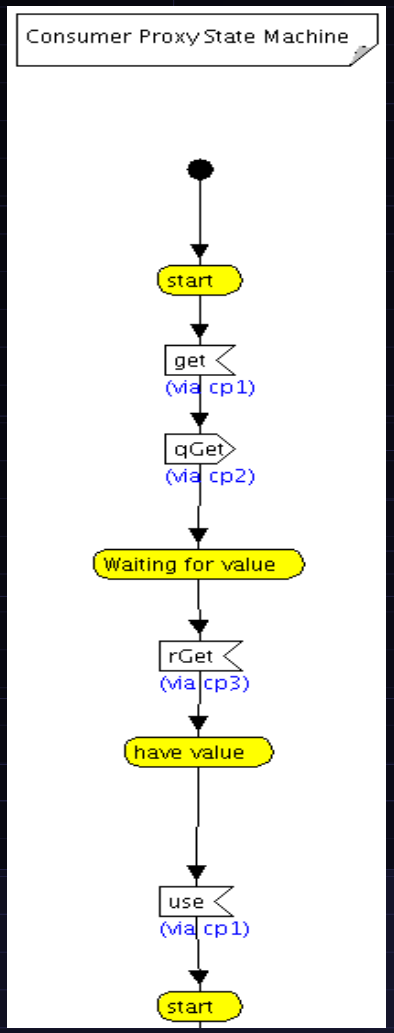
CTTool: Composite Structure Diagrams

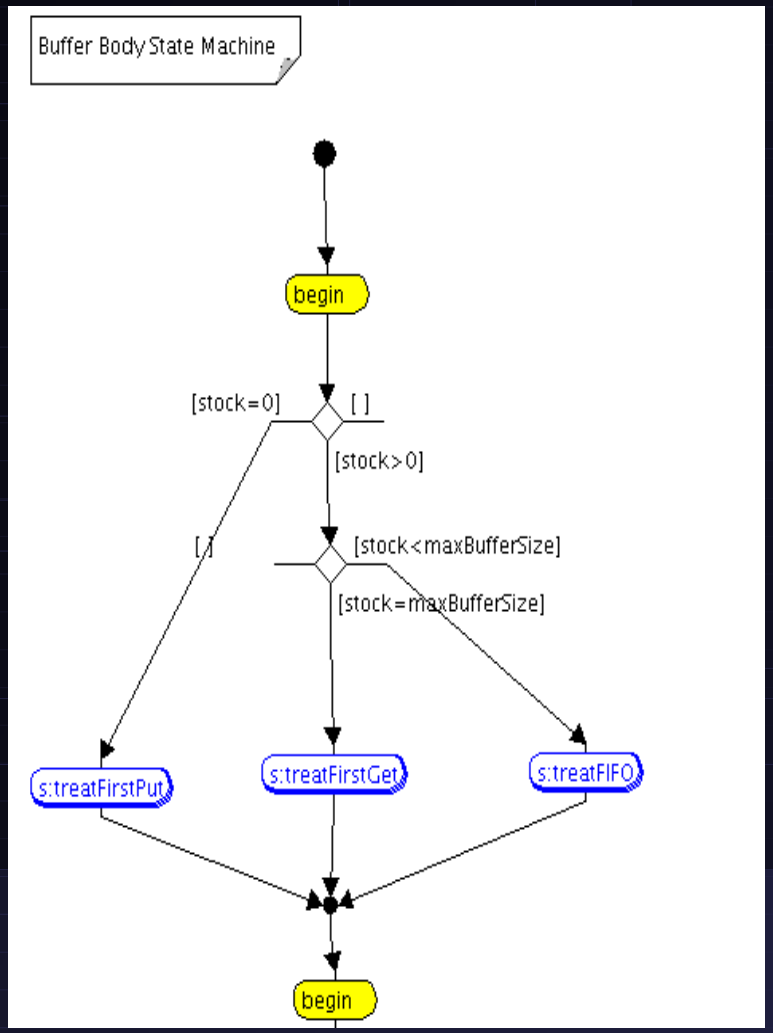
- VERCORS Platform
- Objectives
- Related Works
- Case Study
- **CTTool**
  - **Composite Structure Diagrams**
  - State Machines Diagrams
  - Use of CADP toolbox
- ProActiveTTool
- Conclusion



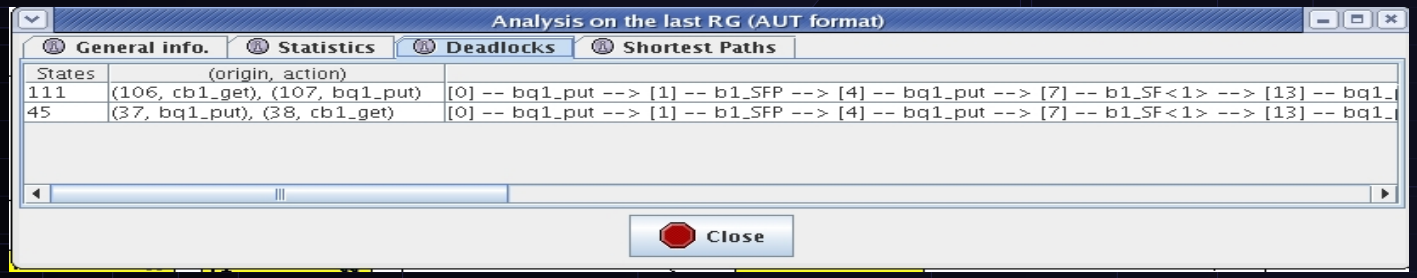
CTTool: State Machine Diagrams

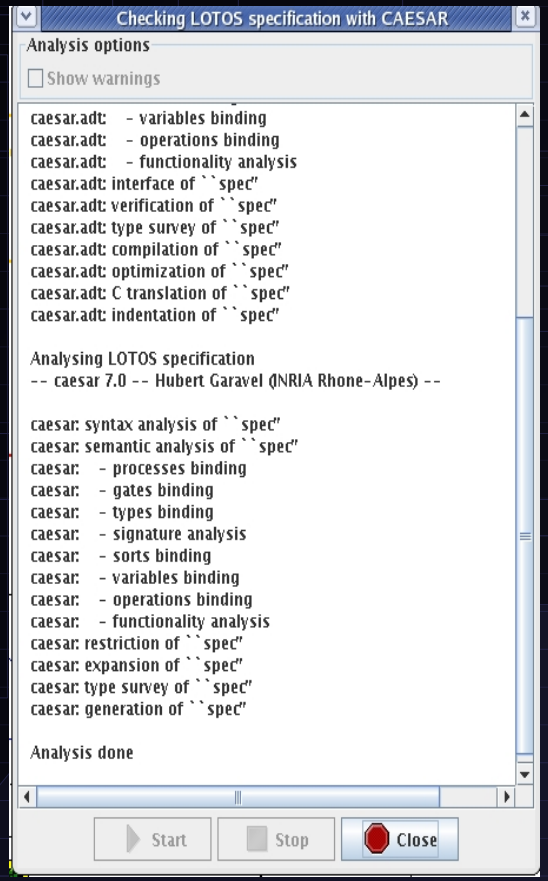
- VERCORS Platform
- Objectives
- Related Works
- Case Study
- **CTTool**
  - Composite Structure Diagrams
  - **State Machines Diagrams**
  - Use of CADP toolbox
- ProActiveTTool
- Conclusion

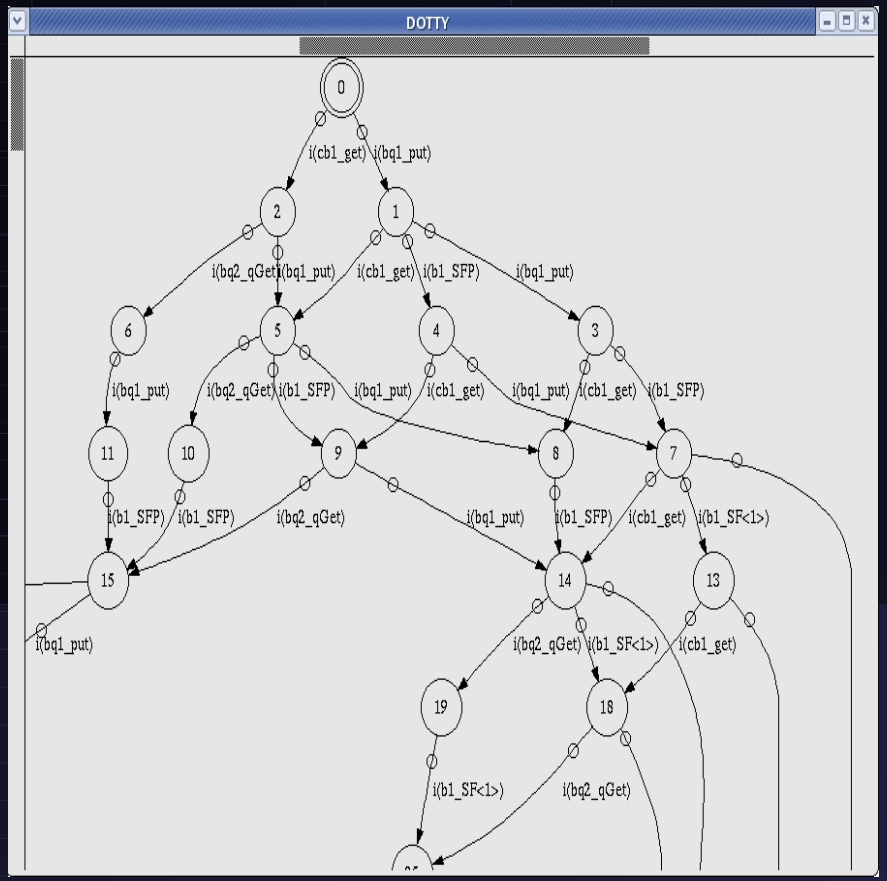




CTTool: use of CADP toolbox

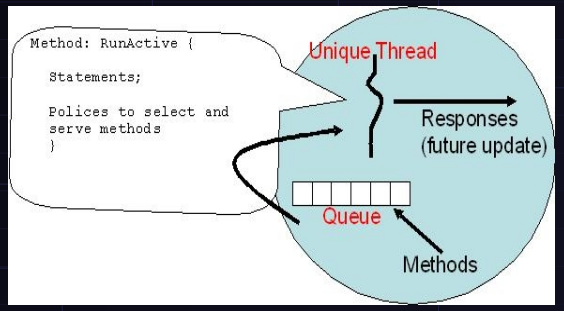


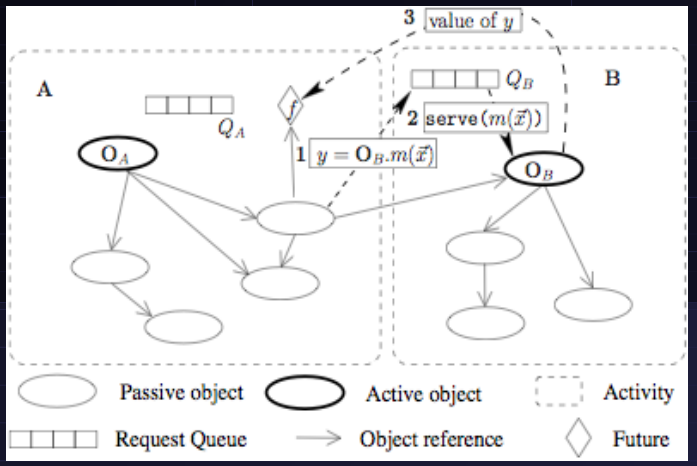




ProActiveTTool

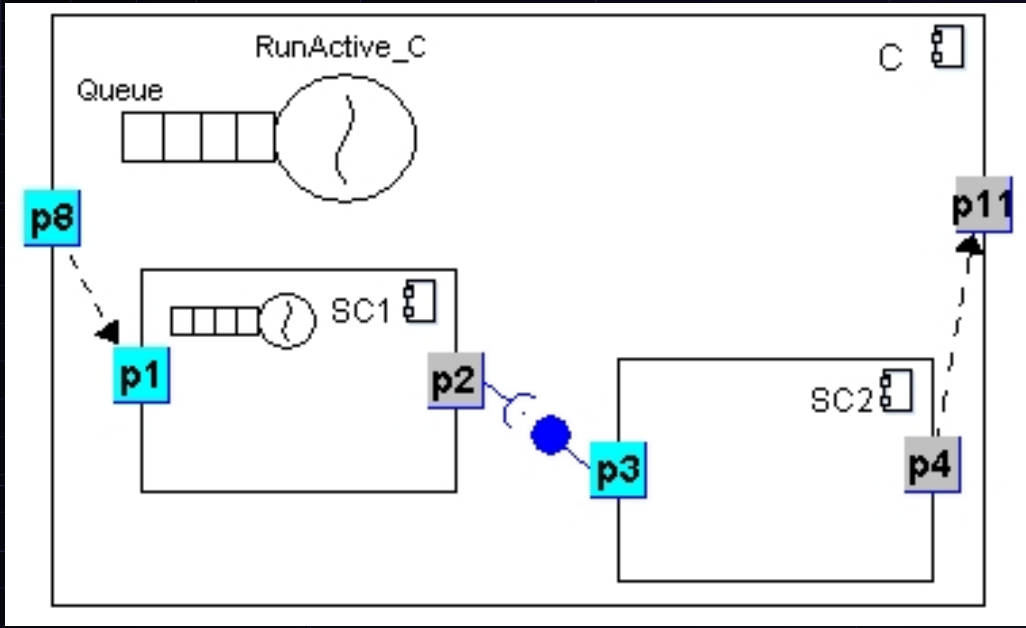
- Proactive Overview
  - Active Object
  - Proxy, Future
  - Queue
  - RunActivity
    - Serving Policy





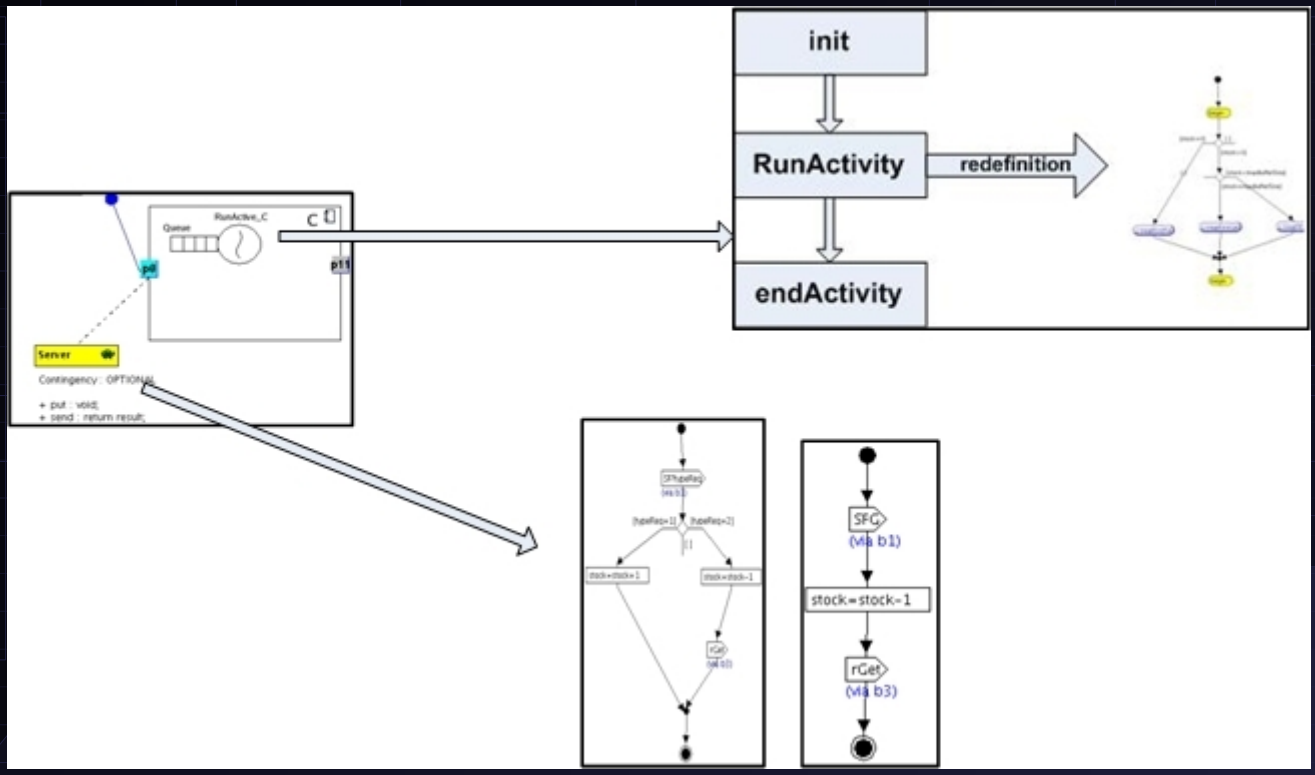
ProActiveTTool

Component Overview



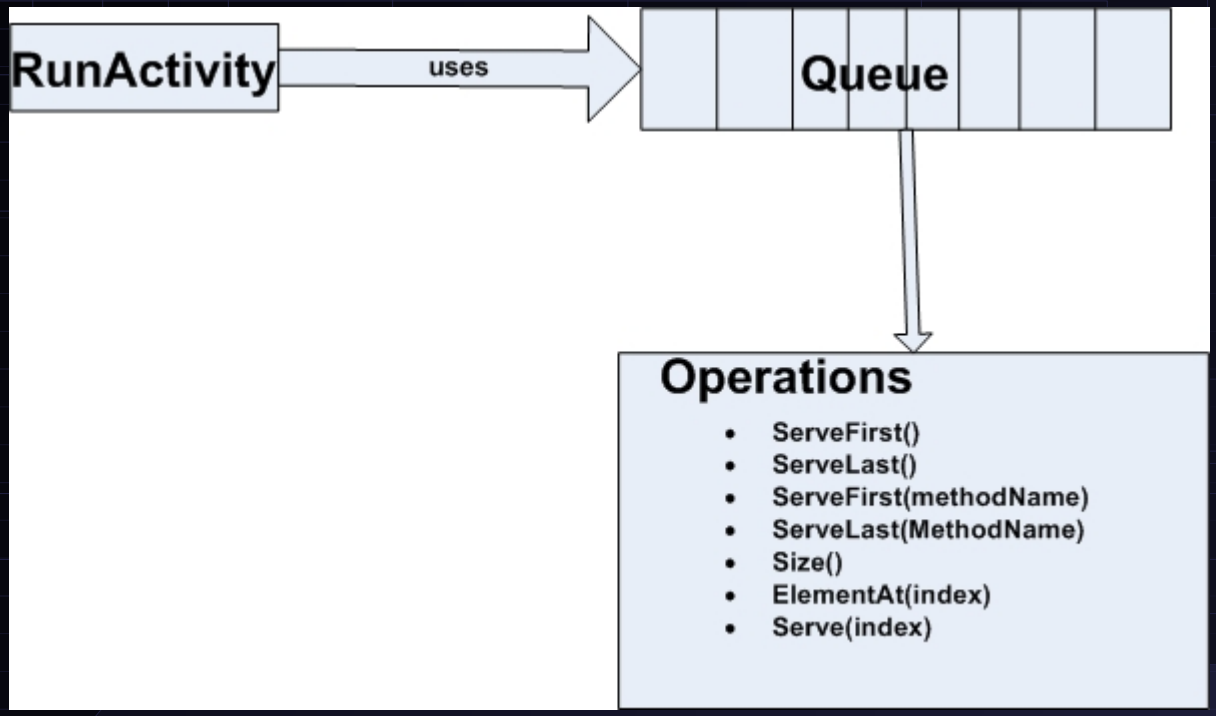
ProActiveTTool

- Component Specification
  - Serving Policy
  - Methods' State Machines



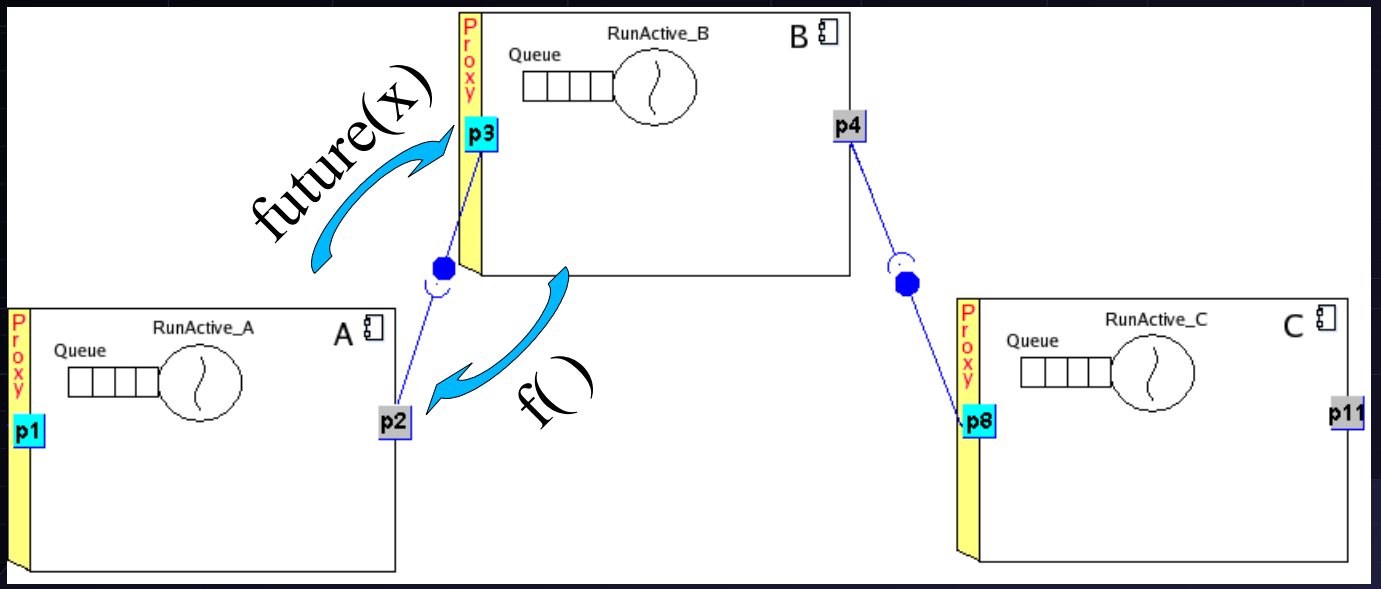
ProActiveTTool

Queue Operations



ProActiveTTool

- Rendez-vous
  - Proxy
  - Future Updates
  - Automatic Continuation



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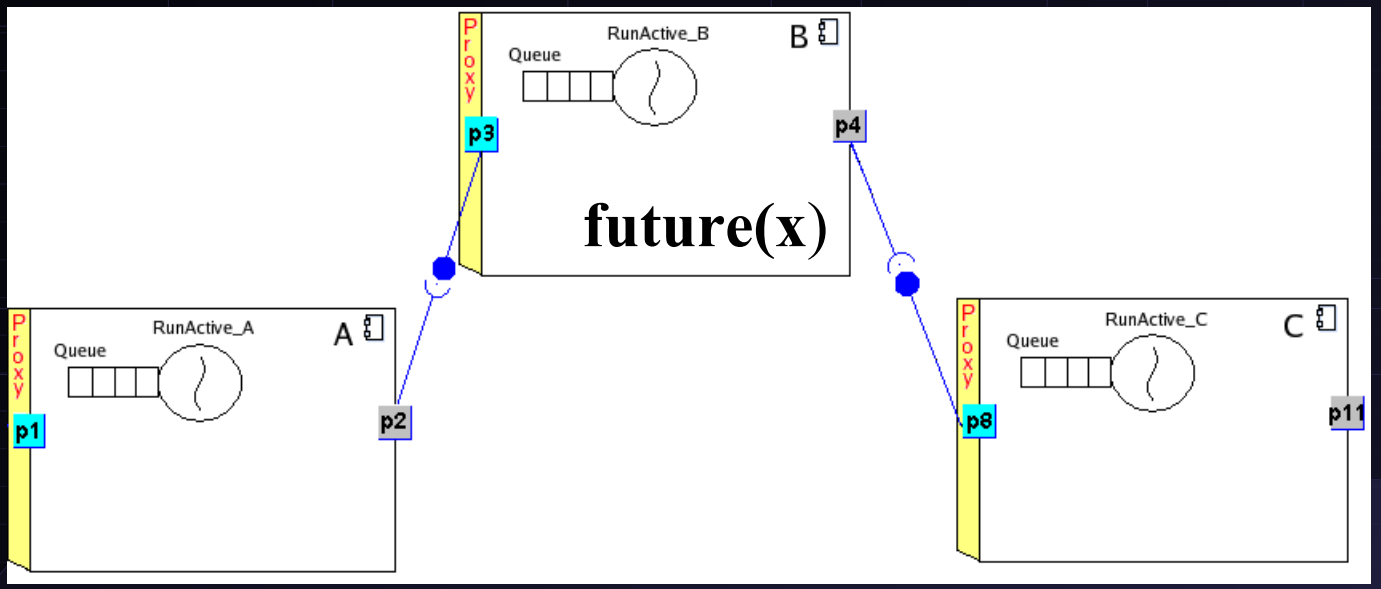

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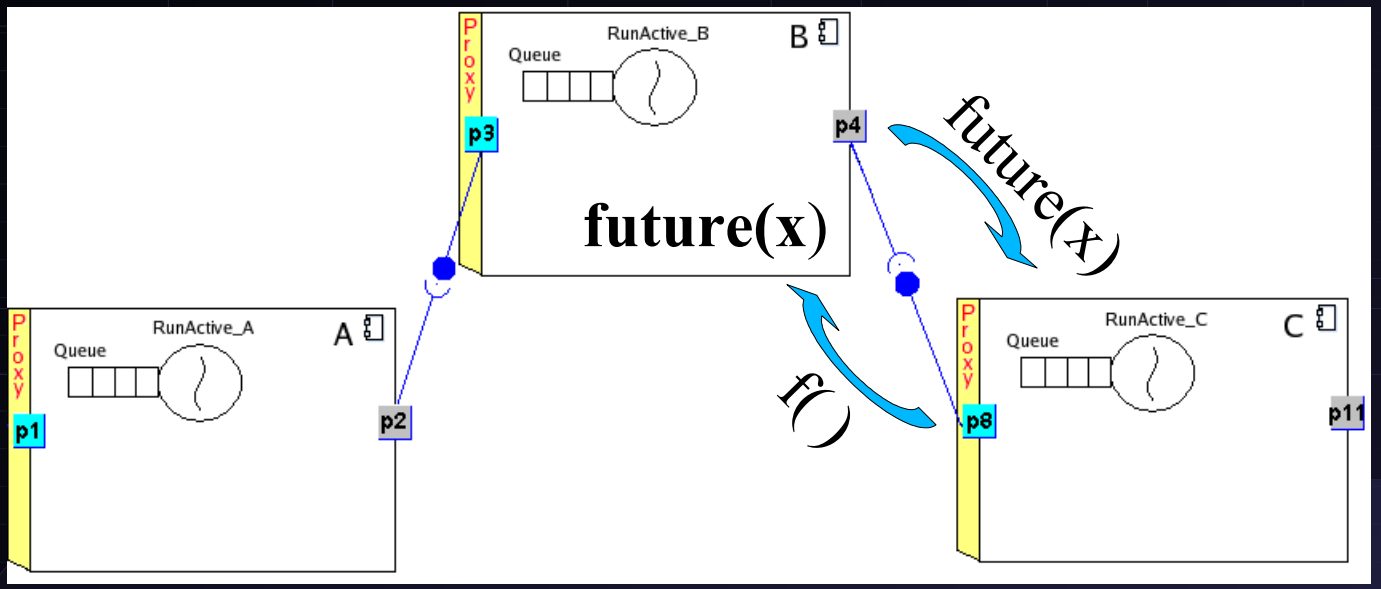

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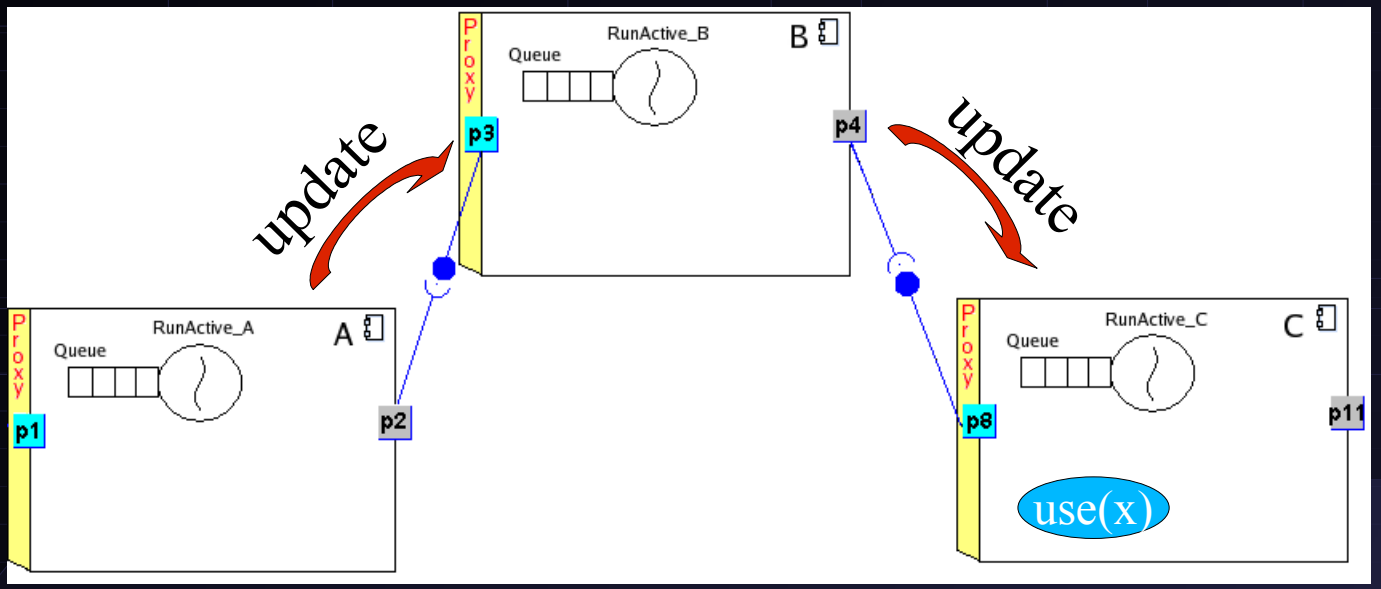

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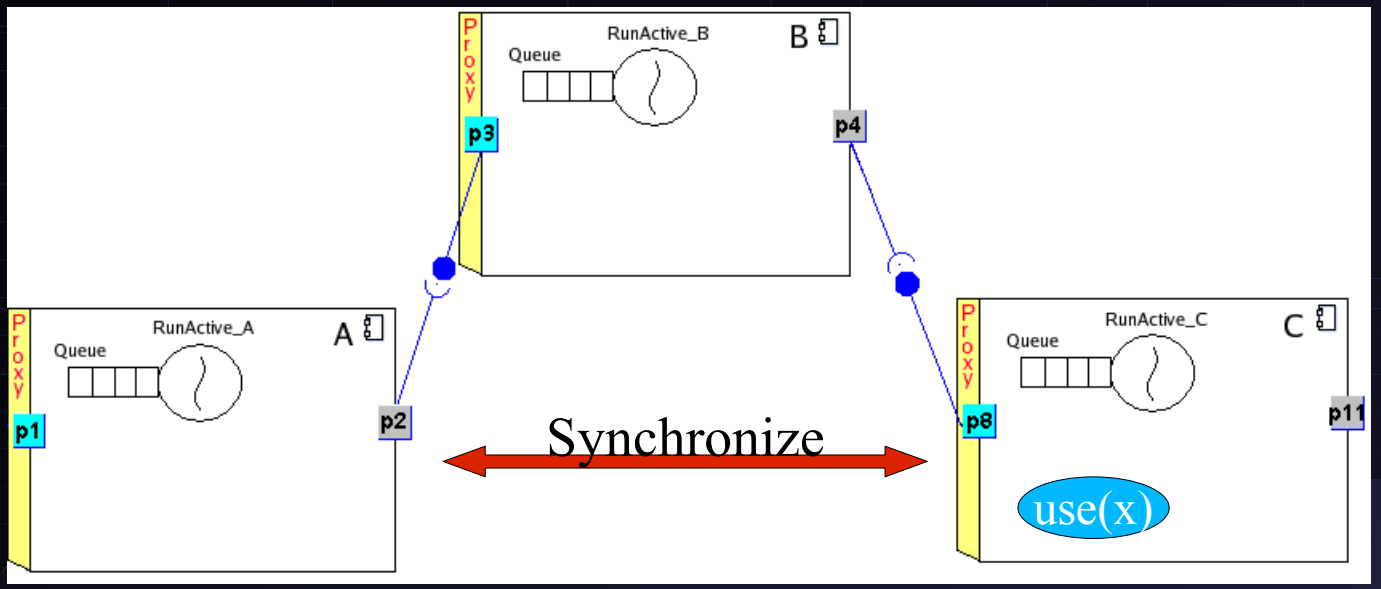

ProActiveTTool

- Multiple Components
  - Collective Interfaces
  - 1-n bindings

Conclusion

- Current state
  - Design and verification environment for Fractal based Applications
- Further work
  - UML2 profile for ProActive applications
  - Formal semantics for components, bindings, communication
  - Design and verification environment for ProActive Applications