

## Motivation

Users of distributed systems have ever-increasing non-functional requirements (e.g., performance, reliability, availability) on the quality of the services provided by systems. Assessing the system quality against those requirements imposes the application of quality analysis and evaluation. Quality analysis consists of checking, analytically solving, or simulating models of the system, which are specified using formalisms like CSP, CCS, Markov-chains, Petr-nets, Queuing nets, etc. However, system developers are usually not keen on using such formalisms for modeling and evaluating system quality. On the other hand, they are familiar with using architecture description languages and object-oriented notations for building system models. In that context and in order to render the use of traditional quality analysis techniques more tractable, we have developed an architecture-based environment that facilitates the specification and quality analysis of distributed systems at the architectural level.

## Research

The architecture-based environment that we have developed comprises:

- **An extensible Architecture Description Language (ADL)** for modeling software architectures, which is defined in relation with standard UML elements.
- **Specialization of the ADL for qualitative analysis** of distributed systems, which lies in enabling the specification of the functional behavior of architectural elements and in the provision of a tool that translates the resulting architectural models into PROMELA models so as to allow model checking using SPIN.
- **Specialization of the ADL for quantitative analysis** of distributed systems, which lies in enabling the specification of quality measures, stimuli and parameters, together with providing tool support for translating the resulting architectural models into traditional models for quality analysis by existing tools. We have more specifically concentrated on performance and reliability analysis.
- **Support for the systematic composition of software architectures** using model checking.

## Contributors

- [Valérie Issarny](#)
- Christos Kloukinas
- [Apostolos Zarras](#)

## Supporting Grant

- [DSoS](#) -- FP5 IST - Dependable Systems of Systems

## Follow-up

- Most of our research is inspired by this work although we moved from "static" distributed system design to "dynamic system development" based on on-the-fly composition of networked systems.

## Publications

- Titre [Quality Analysis of Dependable Systems: A Developer Oriented Approach](#)  
Auteurs Zarras Apostolos; Kloukinas Christos; Issarny Valérie [Détail](#)  
*Architecting dependable systems*  
, Springer, (Ed.) (2003) 197-218 [Accès au texte intégral](#)
- Titre [Systematic aid for developing middleware architectures](#) Auteurs Issarny Valérie;  
Kloukinas Christos; Zarras Apostolos [Détail](#)  
*Communications of the ACM*  
45:6 (2002) 53-58 [Accès au texte intégral](#)
- Titre [Composition of Software Architectures](#) Auteurs Kloukinas Christos [Détail](#) Thèse.  
Université Rennes 1 (12/02/2002) [Accès au texte intégral](#)