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DO RIO DE JANEIRO



**Alessandro Cavalcante Gurgel**

**Blending and Reusing Rules  
for Architectural Degradation Prevention**

**DISSERTAÇÃO DE MESTRADO**

Dissertation presented to the Programa de Pós-Graduação em Informática of the Departamento de Informática, PUC-Rio, as partial fulfillment of the requirements for the degree of Mestre em Informática.

Advisor: Alessandro Fabricio Garcia

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**Prof. Alessandro Fabricio Garcia**

Advisor

Departamento de Informática – PUC-Rio

**Profa. Christina von Flach Garcia Chavez**

Departamento de Ciência de Computação – UFBA

**Profa. Cláudia Maria Lima Werner**

Universidade Federal do Rio de Janeiro – UFRJ

**Prof. Carlos José Pereira de Lucena**

Departamento de Informática – PUC-Rio

**Prof. José Eugenio Leal**

Coordinator of the Centro Técnico Científico da PUC-Rio

Rio de Janeiro, 11/04/2012

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## Alessandro Cavalcante Gurgel

Graduated in Computer Engineering from Universidade Federal do Rio Grande do Norte (2010, Brazil, Rio Grande do Norte). He is a member of the OPUS research group at the Laboratório de Engenharia de Software of PUC-Rio (LES / PUC-Rio). His main studies are related to Software Engineering, more specifically to Software Architecture and Design.

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## Abstract

Gurgel, Alessandro Cavalcante; Garcia, Alessandro Fabricio (Advisor). **Blending and Reusing Rules for Architectural Degradation Prevention.** Rio de Janeiro, 2012. 87p. Msc. Dissertation, Pontifícia Universidade Católica do Rio de Janeiro.

During the maintenance of software systems, their architecture often degrades through processes of architectural erosion and drift. These processes are often intertwined and, as a consequence, a given module in the code becomes the locus of both erosion and drift symptoms. Architects should elaborate strategies for detecting co-occurrences of both degradation symptoms. Strategies for enabling the detection of these symptoms are based on design rules. While the specification of design rules is time-consuming, they are often similar across different software projects. In this context, the contribution of this dissertation is threefold. First, it presents **TamDera**, an unified domain-specific language for: (i) specifying rule-based strategies to detect both erosion and drift symptoms, and (ii) promoting the hierarchical and compositional reuse of design rules across multiple contexts. Second, a tool implementation for supporting the language usage and rule enforcement is also presented in this dissertation. Third, we evaluated the language in supporting the description and reuse of design rules on five software projects. Our evaluation revealed that architects could be benefited by using **TamDera** to blend and reuse rules for detecting erosion and drift occurrences in multiple scenarios.

## Keywords

Software architecture, architectural degradation and reuse.

## Resumo

Gurgel, A. C.; Garcia, A. (Orientador). **Composição e Reuso de Regras para Prevenção da Degradação Arquitetural**. Rio de Janeiro, 2012. 87p. Dissertação de Mestrado - Departamento de Informática, Pontifícia Universidade Católica do Rio de Janeiro.

Durante a manutenção de sistemas de software, os projetos arquiteturais podem se degradar através dos processos de erosão e descaracterização arquitetural. Estes processos estão usualmente entrelaçados e, conseqüentemente, sintomas de descaracterização arquitetural favorecem a manifestação posterior de sintomas de erosão e vice-versa. De fato, estudos empíricos recentes revelam que estes sintomas tendem a afetar os mesmos módulos de um sistema. Desta forma, arquitetos devem elaborar estratégias híbridas para uma prevenção simultânea de ambos os processos de degradação arquitetural. Embora as especificações de regras arquiteturais demandem um esforço considerável, estas são frequentemente similares em diversos projetos de uma mesma companhia ou de um mesmo domínio de aplicação. Essa dissertação descreve a linguagem específica de domínio **TamDera** para: (i) especificar estratégias de regras para permitir prevenção simultânea de ambos os processos de erosão e descaracterização arquitetural, e (ii) prover o reuso tanto hierárquico quanto composicional de regras de projetos em múltiplos contextos. Essa dissertação apresenta a avaliação empírica da linguagem em termos de provisão de suporte para descrição e reuso de regras de projeto em cinco projetos de software. O presente trabalho também apresenta um protótipo que suporta a utilização da linguagem para detecção de sintomas de degradação arquitetural.. Nossos resultados sugerem que arquitetos podem se beneficiar de abordagens que permitam a definição e reuso de regras híbridas para detectar ocorrências de ambos os processos de erosão e descaracterização arquitetural in diversos cenários.

## Palavras-chave

Arquitetura de software, degradação arquitetural e reuso

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