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Product Line Architecture for Automatic Evolution of Multi-Tenant Applications

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Jose-Miguel Horcas ; Monica Pinto ; Lidia Fuentes

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Abstract:
Cloud computing is becoming the predominant mechanism to seamlessly deploy applications with special requirements such as massive storage sharing or load balancing, usually provided as services by cloud platforms. A developer can improve the application's delivery and productivity by following a multi tenancy approach, where variants of the same application can be quickly customized to the necessities of each tenant. However, managing the inherent variability existing in multi-tenant applications and, even more importantly, managing the evolution of a multi-tenant application with hundreds of tenants and thousands of different valid architectural configurations can become intractable if performed manually. In this paper we propose a product line architecture approach in which: (1) we use cardinality-based variability models to model each tenant as a clonable feature, (2) we automate the process of evolving the multi- tenant application architecture, and (3) we demonstrate that the implemented process is correct and efficient for a high number of tenants in a reasonable time. We use a running case study in the domain of medical software.

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Authors

Jose-Miguel Horcas
Andalucia Tech, Univ. de Malaga, Malaga, Spain

Monica Pinto

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Andalucia Tech, Univ. de Malaga, Malaga, Spain

Lidia Fuentes
Andalucia Tech, Univ. de Malaga, Malaga, Spain

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