Avis de soutenance de thèse

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Sujet de thèse :

« New Approaches to Manage Inconsistencies in UML Models for better MDE »

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Abstract

Complex software systems are often modeled as a collection of related UML diagrams, each of which describes particular aspects of the system being investigated. These diagrams might contain inconsistencies due to the overlapping multi-view nature of UML and the incremental and iterative nature of the used software development process. Thus, it is mandatory to detect, analyze and fix these inconsistencies before implementing the system to undergo changes during a software life cycle, correct errors, and accommodate new requirements in early stages of the software development. As for the model-based development, incompatibilities, loss of information, unsatisfied constraints and other inconsistencies exist also in the MDE (Model Driven Engineering) context. In fact, model inconsistencies do not allow a full benefit of MDA (Model Driven Architecture) as an innovative software development approach; since the main advantages of MDA such as the sustainability, productivity gains and the consideration of execution platforms are all negatively influenced by the fallouts of the model inconsistencies.

In this thesis, we manage inconsistencies by elaborating a transverse view of the aforementioned activities. First, we identify and describe possible inconsistencies that can be encountered in UML models by proposing a new taxonomy for such inconsistencies. Second, we propose a method for detecting the inconsistencies in UML models based on formal constraints defined at the meta-model of UML. These constraints are described using EVL (Epsilon Validation Language) by matching related diagrams features at the meta-level. The proposed method also helps correct the inconsistencies being detected. To this end, we third lay the foundation of a semi-automatic method that lets the modelers select the most appropriate repair action for resolving inconsistencies. The method is based on the AHP (Analytic Hierarchical Process) technique and takes as an input a set of possible repair actions.

Keywords: MDE, UML, models' inconsistencies, inconsistency management, constraint-based method, Epsilon Validation Language, Decision theory, Analytic Hierarchical Process.