Converting UML Behavioral Diagrams to Transition Systems

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Abstract. *This paper presents an approach related to Model-Driven Development and Formal Verification. Our approach transforms up to three different UML behavioral diagrams (sequence, activity, behavioral state machines) into a single Transition System (TS) to support Model Checking of software developed in accordance with UML. We consider properties generated from use case descriptions, which represent the requirements, and the TS translated from the behavioral diagrams. Our verification essentially consists of sequence of scenarios to be checked. Besides, the single TS has a unified view of different perspectives of behavioral modeling of the system, obtained by using various UML diagrams. In order to verify the effectiveness of our approach, we have carried out two case studies. In our experiments we have considered five different diagrams: two from ATM (Automated Teller Machine), and three from SWPDC (Software for the Payload Data Handling Computer), a real space software product, which has been developed for some scientific application projects at INPE. A tool was developed to support this approach. The main contribution of our work is the transformation of a non-formal language (UML) to a formal language (language of the NuSMV model checker) towards a greater adoption in practice of Formal Methods in software development.*

Palavras-chave: *UML, Formal Verification, Model Checking.*

Áreas do INPE: *Laboratórios Associados, Ciências Espaciais e Atmosféricas.*