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UML Statecharts的模型检验方法

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Abstract

UML (unified modeling language) has been widely used in software development. Verifying if a UML model meets the required properties has become a key issue. An approach of model checking UML Statecharts is given in this paper. At first, the UML Statecharts is structurally expressed by extended hierarchical automata. Then, the deduction rules of operational semantics are defined. The correctness of operational semantics can be ensured through finding the maximal non-conflict transition set. For the system with infinite runs, the operational semantics can be mapped to a Büchi automaton. Linear temporal logic properties of the system can be verified based on the automata theory of model checking. The method of verifying a complex multi-object system modeled by Statecharts and collaboration diagram is also presented in this paper.

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摘要

统一建模语言UML已广泛应用于软件开发中,验证UML模型是否满足某些关键性质成为一个重要问题.提出了对UML Statecharts进行模型检验的方法.首先用扩展层次自动机结构化地表示UML Statecharts,然后给出其操作语义,通过寻找最大无冲突迁移集可以保证语义的正确性.对于具有无穷运行的系统,该操作语义可以映射到一个Büchi自动机.使用基于自动机理论的模型检验方法来验证UML Statecharts的线性时态逻辑性质,并给出方法验证由Statecharts和协同图建模的复杂多对象系统.

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