Statecharts的组合语义与求精

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Abstract

Statecharts is widely used as a behavioral modeling language for reactive systems for its concise and intuitive expression. It can represent the system behavior at different levels of abstraction, and therefore can represent the result of every refinement step in the process of system modeling. However, it's beyond its capability to reason about whether the model semantics of the lower level preserves that of the higher level and whether the models they describe satisfy some properties. In this aspect, the formal language XYZ/E can be used complementarily. The XYZ/E is an executable linear temporal logic. It can express both the properties and behavior of systems. In this paper, the semantics of Statecharts is defined inductively using the Basic Transition System, and its temporal semantics is expressed by an XYZ/E formula. The semantics we give is modularly compositional. The semantic preserving of different refinement steps can be guaranteed by the semantic definition directly. Models that Statecharts specify and their properties are represented in the same logic, so the assertion that a model meets its specification is expressed by logical implication.

摘要

由于简洁、直观的表达能力,Statecharts被用于许多反应系统的行为建模.Statecharts可表示不同抽象层次的系统行为,因而可用来表示逐步求精建模中各步的结果.但对于求精过程中下层是否保持了上层的语义、所建模型是否满足某些性质的问题,却难以在其自身的框架下进行讨论.在这方面,形式化语言XYZ/E可与其互补.XYZ/E是一种可执行线性时序逻辑语言,既可表示系统的性质,又可表示系统的行为.递归地在基本迁移系统上解释Statecharts语义,用XYZ/E公式表示它的时序语义.这一语义是模块级可组合的.求精过程的语义保持,可直接从语义定义得到保

证.Statecharts所描述的系统行为模型和性质在同一个逻辑中表示,因此,系统行为是否满足所需性质的问题可由逻辑蕴涵式表示.

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