Formal Methods - An Overview and Perspectives

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Abstract

Producing in a cost effective manner, computerized systems which satisfy given quality requirements, raises challenging scientific and technological problems.

The application of *Formal Methods* in systems engineering, that is, methods relying upon the use of mathematics and logic, is considered in principle, as the basis of rigorous development methods. However, the effective exploitation of existing theories of Computer Science comes up against difficulties that can be explained by the inherent complexity of the methods, the increasing complexity of applications, the lack of trained engineers and the lack of theoretical results.

We present an overview of formal methods, in particular of their application to the development of critical systems. We focus on specification and validation methods and illustrate by concrete examples their use and their limitations. Finally, we discuss perspectives, and identify new research directions related to recent evolutions of information technologies.