DRS - Derivational Reasoning System

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Abstract

The high reliability requirements for airborne systems requires fault-tolerant architectures to address failures in the presence of physical faults, and the elimination of design flaws during the specification and validation phase of the design cycle. Although much progress has been made in developing methods to address physical faults, design flaws remain a serious problem. Formal methods provides a mathematical basis for removing design flaws from digital systems.

DRS (Derivational Reasoning System) is a formal design tool based on advanced research in mathematical modeling and formal synthesis. The system implements a basic design algebra for synthesizing digital circuit descriptions from high level functional specifications. DRS incorporates an executable specification language, a set of correctness preserving transformations, verification interface, and a logic synthesis interface, making it a powerful tool for realizing hardware from abstract specifications. DRS integrates recent advances in transformational reasoning, automated theorem proving and high-level CAD synthesis systems in order to provide enhanced reliability in designs with reduced time and cost.