

Abstract

The software simulation of modern electronic designs is mandatory, given the extremely high costs associated with the manufacture and production of integrated circuits. Industry standard circuit simulators use mathematical techniques that do not always guarantee a successful simulation outcome, resulting in a significant loss of productivity as the circuit designer attempts to diagnose the source of the failure. The research in this dissertation addresses the problem of improving the diagnosis of circuit simulation non-convergence through computer automation of the diagnostic process. SOAR – Simulation Output Analysis and Recommendations – is the software application that implements the proposed solution to the problem.

Analysis of circuit simulation convergence failure requires the intelligent use of heuristics derived from long experience. This knowledge can be encapsulated into a rule-based expert system environment that emulates the reasoning of experienced circuit designers. SOAR integrates expert system technology with the Agile Programming techniques used in the Ruby on Rails web development framework. Utilizing a database to store and retrieve simulation information gives SOAR the ability to diagnose simulations ranging in size from gate-level circuits to full chip architectures with virtually no increase in processing time. SOAR delivers a web based user interface for an expert system that generates simulation convergence solutions displayed in an easily interpreted format.