

Preface

Electronic systems consist of a large number of interacting hardware- and software components. Only the hardware often is assembled of more than a billion transistors. To cope with this increasing complexity system description languages, which allow modeling at high level of abstraction, have been introduced and are focus of current research. They facilitate architectural exploration as well as Hardware/Software Co-Design. SystemC has become the de-facto standard for modeling at the system level.

The SystemC model serves as reference for subsequent development steps. Errors in a SystemC model are very critical, since they will propagate and become very costly. Thus, developing verification methods for SystemC is of very high importance. Existing formal verification approaches at lower abstraction levels are already very sophisticated and require a profound technical understanding to be further improved.

This book makes a significant contribution to the ongoing research activities. It is based on the master thesis of Vladimir Herdt, which he has written as a student in the Group of Computer Architecture (AGRA) at the University of Bremen, Germany.

Compared to existing approaches, the proposed method works more efficiently and thus can verify much larger (non-terminating) systems. It works by extending symbolic simulation with stateful exploration and efficiently handling repeating behavior in the presence of symbolic values. Besides the carefully formulated theoretical presentation, the proposed method and additional optimizations have been implemented and evaluated on relevant examples. The comprehensive evaluation clearly shows the advantages of the proposed approach.

The significance of the obtained scientific results is further confirmed by the publication “Verifying SystemC using Stateful Symbolic Simulation”, which is based on the thesis and has been accepted for presentation at Design Automation Conference (DAC) 2015, San Francisco, USA – the most renowned conference for electronic system design.

I hope you will enjoy reading this book.

Complete Symbolic Simulation of SystemC Models
Efficient Formal Verification of Finite Non-Terminating
Programs

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