TUTORIAL 3

CAD TOOLS FOR MIXED-SIGNAL SIMULATION, SYNTHESIS AND LAYOUT

Speakers:

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Philippe Reynaert, Mentor Graphics EDC, Leuven, Belgium, who also has industrial experience with Silvar Lisco, is now technical director at the Mentor Graphics European Development Center, where he is responsible for integrated circuit CAD, including DSP synthesis and mixed-signal simulation.

Background: This tutorial is intended for all those needing additional exposure to the increasingly important field of analog and mixed-signal design, including CAD tool developers, tools users, and designers. Only a limited familiarity with CAD and mixed-signal design is required.

Description: For reasons of cost and performance, the microelectronics industry has always faced the challenge of placing more and more function on a single chip. In recent years, this has also resulted in the growing practice of integrating analog interface circuitry with digital signal processing or control in the same IC. Mixed-signal ASICs are now the fastest growing market segment in electronics for telecommunications, and similar trends apply to consumer, automotive, household, and other areas. To manage the increasing complexity when integrating complete systems in such ASICs and to guarantee their correctness poses problems for mixed-signal designs. First, despite the progress made in recent years, analog CAD tools are not quite up to the same level of maturity as digital CAD tools. Secondly, the integration of analog and digital functions onto the same chip creates some specific interaction problems that have to be handled as well, which means that mixed-signal design is more than just putting analog and digital together.

The tutorial will give an overview of the state of the art in CAD tools for mixed-signal design, and will begin with a description of the general design flow for mixed-signal ASICs. The first part of the tutorial will describe mixed-signal simulation tools, both mixed-mode and multi-level (including analog behavioral) capabilities. This includes simulating the interaction between analog and digital circuits. The second part will address analog synthesis and layout tools. Here an overview will be given of the history and the present status of these tools, discussing functional aspects and highlighted with some algorithmic details. The tutorial will be illustrated with practical examples of recent realizations, describing real-world experiences with mixed-signal design using CAD tools. It also includes results from the ongoing ESPRIT project ADMIRE, which aims at developing an advanced mixed-signal design environment.