TUTORIAL 2
HARDWARE/SOFTWARE CODESIGN
OF EMBEDDED SYSTEMS

Speakers:

Jörg Henkel, Technische Universität, Braunschweig, Germany, is a key developer of the pioneering COSYMA system for hardware/software codesign and a leading researcher in this area. He has been involved in the ESPRIT basic research project COBRA for hardware/software codesign.

Frank Vahid, University of California, Riverside, CA, is assistant professor of computer science and coauthor of the book “Specification and Design of Embedded Systems”. He has been an active researcher in the system design field for over seven years, and had chip design experience at Hewlett-Packard and AMCC.

Loganath Ramachandran, LSI Logic, Milpitas, CA, is a senior software engineer in software research and development. Previously he worked as a software engineer in design automation at Texas Instruments.

Background: This tutorial is intended for researchers, managers, and designers interested in the development of embedded systems comprised of both software and custom digital hardware components. Familiarity with programming languages, hardware description languages, and synthesis will be helpful.

Description: Investigation of the various aspects of hardware/software codesign is a rapidly expanding area. Codesign techniques permit the design of increasingly complex mixed hardware/software systems at a higher level of abstraction than possible with today’s tools, and result in a substantial reduction in the economically important time-to-market factor. Furthermore, necessary design techniques such as high-level synthesis have matured to the point where they can be used in industrial environments, making hardware/software codesign techniques feasible.

This tutorial first presents a broad overview of hardware/software codesign. After introducing the economically interesting area of embedded systems, the instructors will describe current approaches to hardware/software codesign, discuss algorithms for the key issue of hardware/software partitioning, and present hardware and software synthesis methods and other topics. The tutorial will demonstrate how hardware/software codesign techniques result in the important effects of short turnaround times, reduced time-to-market, and minimized costs. Finally, the instructors will discuss today’s major problems and suggest what is needed for industrial acceptance of hardware/software codesign.

Other areas included will be specification and estimation techniques, different codesign approaches, verification and simulation, and design methodology.