Tutorial T8

Scheduling Issues in Embedded Real-Time Systems

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Abstract

The correctness of most computations in an embedded real-time application depends not only on the logical value but also on the time at which the results are produced. Examples of such applications include automotive systems, process control applications, aerospace applications, multimedia streaming, etc. Since the mid-1970s, various algorithms have been developed to schedule their real-time tasks without violating their timing constraints. In recent years, it has become apparent that next generation of embedded real-time systems must also deal with additional challenges such as power and thermal management constraints of modern day integrated circuits (IC). In this tutorial, we will discuss several models of real-time applications, introduce the different notions of real-time guarantees, review of scheduling algorithms with different real-time guarantees for single and multi-core systems, including algorithms that deal with emerging challenges such as processor’s power and thermal constraints.

Speaker Biography

Parmesh Ramanathan received the B. Tech degree from the Indian Institute of Technology, Bombay, India, in 1984, and the M.S.E. and Ph.D. degrees from the University of Michigan, Ann Arbor, in 1986 and 1989, respectively. Since 1989, Dr. Ramanathan has been faculty member in the Department of Electrical and Computer Engineering, University of Wisconsin, Madison, where he served as a Department Chair from 2005-2009. He has served as consultant to AT&T Laboratories, Telcordia Technologies, and Hewlett Packard Laboratories. He was also a Visiting Professor at Kanwal Rekhi School of Information Technology, Indian Institute of Technology, Bombay, India in 2004 and Visiting Researcher at Microsoft Research in 2010. Dr. Ramanathan’s research interests include real-time systems, wireless and wireline networking, faulttolerant computing, and distributed systems. He has served as an Associate Editor for IEEE Transactions on Mobile Computing, Associate Editor for IEEE Transactions on Parallel and Distributed Computing (1996--1999) and Elsevier AdHoc Networks Journal (2002--2005). He was General Chair of Mobisym (2011) and MASS (2013). In 2009, he was elevated to Fellow of IEEE for his contributions to real-time systems and networks.