Tutorial 2

Parallel and Distributed Real-Time Systems

Instructor

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Computer systems embedded in a real-time environment must satisfy stringent response-time constraints in addition to logical correctness constraints. Parallel and distributed computer systems research and development has produced systems capable of attaining very high performance in terms of speed and versatility at very attractive cost-to-speed ratio. Recently, parallel and distributed systems are emerging as a highly promising candidate for implementing the next generation of high-performance embedded real-time systems which are adaptive to the rapidly changing environment. However, “fast” does not necessarily mean “real-time.” Therefore, parallel and distributed systems must be fine-tuned before they can be trusted to monitor and control critical real-time processes. The formal verification of real-time systems to ensure that they satisfy the specified integrity and timing requirements is thus essential if such systems are to be used in safety-critical environments. This tutorial introduces a formal framework and powerful techniques for the design and development of this class of systems, including the aspects of specification, design, analysis, implementation, verification, and validation. Programming in real-time/rule-based languages is described. Specification and verification tools such as Statechart, Modechart, and Estella are used to help design experimental parallel and distributed real-time systems.

About the speaker: Albert Mo Kim Cheng received the B.A. with Highest Honors in Computer Science, graduating Phi Beta Kappa, the M.S. in Computer Science with a minor in Electrical Engineering, and the Ph.D. in Computer Science in 1990, all from The University of Texas at Austin, where he also held a GTE Foundation Doctoral Fellowship. Dr. Cheng is an Associate Professor in the Department of Computer Science at the University of Houston--University Park, where he directs the Real-Time Systems Laboratory. His research interests include real-time systems, multimedia tools, rule-based expert systems, reliable software systems, and fault-tolerant distributed and parallel systems.

He is the author/co-author of over forty refereed publications, and has served or is serving on the program committees of several conferences in his areas of research. Dr. Cheng has received numerous awards, including the National Science Foundation Research Initiation Award, the Texas Higher Education Coordinating Board Advanced Research Program Award, and the University of Houston Research Initiation Grant. He is a member of the honor societies of Phi Beta Kappa, Phi Kappa Phi, Upsilon Pi Epsilon, Beta Alpha Phi, and Golden Key. He has presented tutorials in several conferences, has given invited seminars at many universities, and has served as a technical consultant for several organizations, including IBM. Dr. Cheng is a senior member of the IEEE.