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PowerDEVS: A tool for hybrid system modeling and real-time simulation

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Abstract

In this paper we introduce a general-purpose software tool for discrete event system specification (DEVS) modeling and simulation oriented to the simulation of hybrid systems. The environment, called PowerDEVS, allows atomic DEVS models to be defined in C++ language that can then be coupled graphically in hierarchical block diagrams to create more complex systems. The environment automatically translates the graphically coupled models into a C++ code which executes the simulation. A remarkable feature of PowerDEVS is the possibility to perform simulations under a real-time operating system (RTAI) synchronizing with a real-time clock, which permits the design and automatic implementation of synchronous and asynchronous digital controllers. Combined with its continuous system simulation library, PowerDEVS is also an efficient tool for real-time simulation of physical systems. Another feature is the interconnection between PowerDEVS and the numerical package Scilab. PowerDEVS simulations can make use of Scilab workspace variables and functions, and the results can be sent back to Scilab for further processing and data analysis. In addition to describing the main features of the software tool, the article also illustrates its use with some examples which show its simplicity and efficiency. © 2010 The Author(s).

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