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Abstract

Many embedded systems are subject to stringent timing requirementsthat compel them to "react" within pre-de_ned time bounds.The said "reaction" may be understood as simply outputting the resultsof a basic computation, but may also mean engaging in complex interactionswith the surrounding environment. Although these strict temporalrequirements advocate the use of simple and predictable hardwarearchitectures that allow for the computation of tight upper-bounds onthe software response time, meanwhile most of these embedded systemssteadily demand for more and more computational performance, whichweighs in favor of specialized, complex, and optimized multi-core andmany-core processors on which the execution of the application can beparallelized. However, it is not straightforward how event-based embeddedapplications can be structured in order to take advantage and fullyexploit the parallelization opportunities and achieve higher performanceand energy-e_fficient computing. The P-SOCRATES project envisions thenecessity to bring together next-generation many-core accelerators fromthe embedded computing domain with the programming models andtechniques from the high-performance computing domain, supportingthis with real-time methodologies to provide timing predictability.

This paper gives an overview of the system model and software stackproposed in the P-SOCRATES project to facilitate the deployment andexecution of parallel applications on many-core infrastructures, whilepreserving the time-predictability of the execution required by real-timepractices to upper-bound the response time of the embedded application.