



# Systematic Methodology for Real-Time Cost-Effective Mapping of Dynamic Concurrent Task-Based Systems on Heterogenous Platforms

*Zhe Ma, Pol Marchal, Daniele Paolo Scarpazza, Peng Yang, Chun Wong, José Ignacio Gómez, Stefaan Himpe, Chantal Ykman-Couvreur, Francky Catthoor*

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This material is mainly based on research at IMEC and its international university network partners in this area in the period 1997-2006. In order to deal with the concurrent and dynamic behaviors in an energy-performance optimal way, we have adopted a hierarchical system model (i.e., the gray-box model) that can both exhibit the sufficient detail of the applications for design-time analysis and hide unnecessary detail for a low-overhead run-time management. We have also developed a well-balanced design-time/run-time combined task scheduling methodology to explore the trade-off space at design-time and efficiently handle the system adaptations at run-time. Moreover, we have identified the connection between task-level memory/communication management and task scheduling and illustrated how to perform the task-level memory/communication management in order to obtain the design constraints that enable the this connection. A fast approach is also shown to estimate at the system-level, the energy and performance characterization of applications executing on the target platform processors.

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