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Extending the standard execution model of UML for real-time systems.

Hinchey, Mike (ed.) et al., Distributed, parallel and biologically inspired systems. 7th IFIP TC 10 working conference, DIPES 2010, and 3rd IFIP TC 10 international conference biologically-inspired collaborative computing, BICC 2010, held as part of WCC 2010, Brisbane, Australia, September 20–23, 2010. Proceedings. Berlin: Springer (ISBN 978-3-642-15233-7/hbk; 978-3-642-15234-4/ebook). IFIP Advances in Information and Communication Technology 329, 43-54 (2010).

Summary: The ongoing OMG standard on the “Semantics of a Foundational Subset for Executable UML Models” identifies a subset of UML (called fUML, for Foundational UML), for which it defines a general-purpose execution model. This execution model therefore captures an executable semantics for fUML, providing an unambiguous basis for various kinds of model-based exploitations (model transformation, code generation, analysis, simulation, debugging etc.). This kind of facility is of great interest for the domain of real time systems, where analysis of system behavior is very sensible. One may therefore wonder if the general-purpose execution model of fUML can be used to reflect execution semantics concerns of real-time systems (e.g., concurrency, synchronization, and scheduling.). It would practically mean that it is possible to leverage on this precise semantic foundation (and all the work that its definition implied) to capture the precise execution semantics of real-time systems. In this paper, we show that this approach is not directly feasible, because of the way concurrency and asynchronous communications are actually handled in the fUML execution model. However, we show that introducing support for these aspects is technically feasible and reasonable in terms of effort and we propose lightweight modifications of the Execution model to illustrate our purpose.

Keywords: fuml; MDD; model simulation; concurrent systems; real-time systems

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