The Generic Modeling Environment
Akos Ledeczi
Vanderbilt University
Research Assistant Professor, Institute for Software Integrated Systems

Model-Based Integration of Component-Based Embedded Avionics Systems
Mark Schulte
The Boeing Company

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The Generic Modeling Environment (GME), a tool suite that supports MDA, has an open, extensible, and modular component-based architecture. GME’s main elements include a metaprogrammable graphical editor, a metamodeling environment, and an integrated constraint manager. The tool suite supports different backends for model storage and provides various interfaces for programmatic access to model data. Domain language specifications configure the metaprogrammable graphical editor to define how the architecture will map domain-specific idioms to the general concepts that GME supports. Metamodels consist of UML class diagrams and OCL constraints.

Model-Based Integration of Component-Based Embedded Avionics Systems
Mark Schulte

For modern large-scale avionics systems, composing and integrating application component software to meet physical constraints and functional requirements while satisfy cross-cutting concerns of hard and soft real-time deadlines, fault tolerance, and distribution is a challenging and error prone process resulting in costly verification and testing. A Model Integrated Computing approach offering explicit modeling of component configurations, analysis of models to ensure cross-cutting requirements are met prior to integration, and automated assembly generation from these models results in significant advances over current approaches. These MIC methodologies have been applied to Bold Stroke – a flight-tested product line open architecture used in several Boeing projects – under the DARPA Model-Based Integration of Embedded Software (MoBIES) program. This presentation describes these tools, the resulting
process and performance, and the measured potential to dramatically improve integration ability in large-scale distributed real-time embedded systems.