The Future of Model-Driven Development
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Why Modeling Is Important
• Software has recently become a very important part of safety critical systems
• Things like missile controls, breaking systems, and others are all controlled by software
• A need exists to ensure the software is correct, but verifiable and provable languages, such as Ada, are too complex
• The solution: MDD through the use of modeling languages/toolkits such as RSA-RTE and kiltera

Rational Software Architect
• The real time edition of RSA (RSA-RTE) is used to create models of systems
• The symbolic execution can then be analyzed to determine correctness

Application: Mindstorms

Symbolic Execution

Current Analyzer

Refactoring with Language

• Uses the Visitor Pattern
• Parses kiltera code and builds the Abstract Syntax Tree
• Builds the State Space Tree
• Produces analyses and reports such as Deadlocks and Stable States
• Will be re-factored using the Language Definition Framework

Definition

\[
\begin{align*}
\Delta_1 & \\
\Delta_2 &
\end{align*}
\]

• Sequential and Parallel Processes
• Channels as first-class objects
• Channels can be passed between processes and PCs
• Channels can be triggered
• Channels can listened to in parallel

Kiltera

• Links to original analysis
• Provides incremental test case generation

Our Group’s Work

R. Rahman. Design and Implementation of an Analyzer for a Timed \( \pi \)-calculus. 2010
E. Posse. Symbolic simulation of \( \pi \_klt \). 2010

Incremental Test Case Generation
Process of automatic generation of test suites for UML-RT Models, and the effects of model changes on the generated test cases