A Survey of Model-Based Software Development

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March 3, 2010

"The entire history of software engineering is that of the rise in levels of abstraction."

- *Grady Booch, The limits of Software, 2002.*

Introduction

- Model-Based Software Development
  - Specification-Driven Development
    - Requirement specification
  - Model-Driven Development
    - Design models
  - Architecture-Centric Development
    - Software architecture
  - Generative and Component-Based Software Development
    - Composition specification
- Model-Implementation Mappings

Introduction

- Literature Review
  - Defines a set of evaluation criteria (17 dimensions)
  - Reviews model-based development (11 approaches)
  - Develops a comparison table (17 x 11)
- Reflections and Evaluations (Today's focus!)
  - Fundamental Questions
  - Research Challenges
  - Essential Development Themes
  - Practical Applicability

Fundamental Questions

- What makes model-implementation mapping different from automatic programming?
- How are model-driven development and architecture-centric software development related with each other?

Research Challenges

- Behavior Modeling
  - Formal, Informal, or none of them?
- Code Generation
  - Code is model, code is code, code is plain text, code is ?
- Consistency Management
  - Reverse engineering is expensive and risky, round-trip engineering is not mature, then what?

Essential Development Themes

- Domain Specificity
  - Reuse, reuse, and reuse
- Information Hiding
  - N degrees of separation
- Metamodeling
  - Make your model understandable to the machine
- Iterative Transformation
  - Use intermediate models

Practical Applicability

- Specification-driven development is dead
  - But, application generator is still ALIVE
- Model-driven development is struggling
  - Domain-specificity is the only way out
- Architecture-centric development is smiling (with tears)
  - Consistency management, hmmm …
- Generative and component-based development is waiting
  - Decomposition is angle, composition is ghost


Thanks!