Using Automated Transformation to Enable Scaleable Consistency Checking

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Consistency Problem

Class Design View
(UML class diagram)

C2 Architecture View
(represented in UML)
View Integration Framework

Software Development Cycle

- Mapping
  - names
  - traces
  - associations

- View Analysis
  - (UML/SIMPL)

- Differentiation
  - match detection
  - consistency
  - conformance

- Transformation
  - abstraction
  - translation
  - generalization

- View Synthesis
  - Rational Rose™

Why Transformation?

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**Transformation Simplifies!**

**Example**

What is the relationship between Port and Warehouse?
UML/Analyzer automates Abstraction

Class x Generalization x Class x Generalization x Class equals Generalization
Class x Generalization x Class x Association x Class equals Association
Class x Generalization x Class x Aggregation x Class equals Aggregation
Class x Dependency x Class x Generalization x Class equals Dependency
Class x Association x Class x Generalization x Class equals Association
Class x Association x Class x Association x Class equals Association
Class x Aggregation x Class x Dependency x Class equals Dependency

Minima! Redundancy Model

Scalable Consistency?
Every derived view adds to the integration problem!
Transformation Dimensions

Abstraction (e.g., Class to C2 diagram)
Consolidation (e.g., sequence to class diagram)
Translation (e.g., state to sequence diagram)

generic
specific
abstract
refined

C2ADEL

class
state
sequence
collaboration

UML/Analyzer Tool

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Conclusion

- Consistency checking and transformation can be computer supported
- Mismatches can be identified as early on as they are created – need a well-defined way of capturing information
- Integration Scalability can be mitigated by minimizing the model redundancy
- Enables development measurement and evaluation (e.g., completeness)