A Representation-Theoretical Analysis of the OMG Modelling Suite

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Overview

- Background and motivation
- Modelling basics: interpretive mappings
- Class and object modelling in UML
- Layering and “instance-of”
- Methodology metamodels
- Future work
Background

- My work: modelling and metamodelling (OO), methodologies (not only software development)
- Representation theory
- University of Santiago (Spain), Neco, University of Technology Sydney, European Software Institute
- Projects: OPEN/Metis, OOSPICE, FAME, AS 4651, ISO/IEC 24745
Motivation

- UML and related are de facto standards
- They pose some serious issues
- Objective: develop a theoretical, technology-agnostic information modelling foundation
- Representation theory fits well: experiment
Some Current Issues

- What is Object in UML 1.x?
- What is InstanceSpecification in UML 2?
- What is a metaclass? How can be a class an instance of a metaclass?
- How are modelling artefacts related to the process that creates/uses them?
- How can modelling languages and methodologies be provided to practitioners in a better fashion?
Modelling Basics

- Subject under study
- Representation relationship
- Backward/forward
- Homomorphism

- Interpretive mappings:
  - Isotypical Model
  - Prototypical
  - Metatypical
Kinds of Interpretive Mappings

- **Meta**: "something like this"
- **Proto**: "a book"
- **Formalism-based**: "this book"
- **Memory-based**: Book

Diagram:
- "this book" → iso → "something like this" → proto → "a book" → meta → Book

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UML Class Modelling

class diagram

class model

the icon on paper or screen

the conceptual class construct

the software object constructs

the “real” entities

Book

myBook

yourBook

iso

meta

e tc.

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UML Object Modelling

myBook: Book

object diagram

myBook: Book

object model

myBook

iso/proto

iso

iso/proto

myBook

iso

?
Layering and “Instance-Of”

UML Spec

Class

My Model

what is this?

Book:
Class

Running System

myBook:
Book

UML Spec

Class

My Model

really

Book:
Class

iso

Running System

myBook:
Book
Layering and “Instance-Of”

- AS 4651 and ISO/IEC 24745 WD use clabjects and powertype patterns
- Atkinson & Kühne’s deep instantiation also valid
Methodology Metamodels

- MOF is not really an auto-model
- SPEM and UML not at the same level
- AS 4651 and ISO/IEC 24745 WD, based on XMIS, do comply

Methodology Metamodel

Product Side

SPEM
AS 4651 and ISO/IEC 24745 WD

Standard Metamodel
- ModelUnit
- ModelUnit Kind

My Methodology
- Class
- Class: MUK

My Model
- Book: Class
- Book

Running System
- myBook: Book

XMI S
- Class
- Object
- Association
- Clabject
- etc.
Current and Future Work

- ISO/IEC 24745 “Standard Metamodel”
- Prototype tools: Xome and MethodComposer
- Ontological and epistemological issues, category theory: journal paper
Interested?

- Ask some questions!
- Contact me:

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