

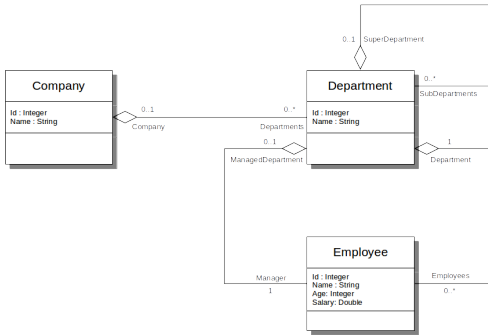
B.Sc. Thesis Exposé

Megamodel-driven Traceability Recovery & Exploration of Correspondence & Conformance Links

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Motivation I

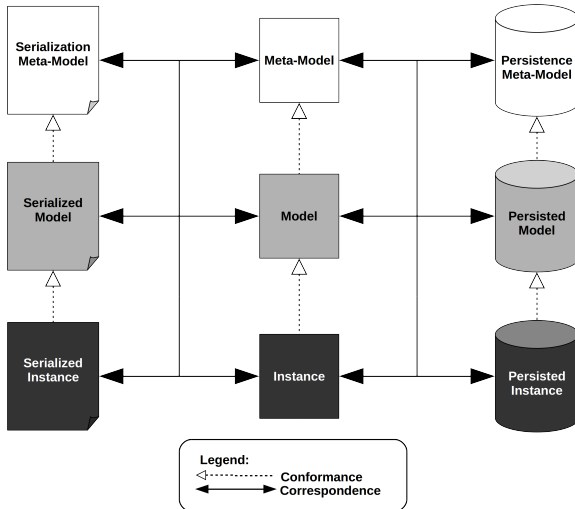


The *101companies* Human Resources Management System

Given an application-/domain-model, it can be ...

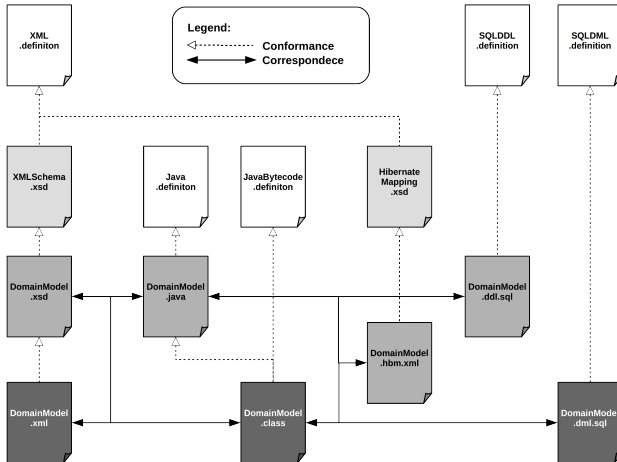
- ... **serialized**, e.g. to XML
- ... **persisted**, e.g. into a relational database

Motivation II



O/R/X Correspondence & Conformance Scenario

Motivation III



O/R/X Correspondence & Conformance Artifact Links

Formal Background

- Parthood/Mereology[2][3]

$x \text{ partOf } x$

$x \text{ partOf } y \wedge y \text{ partOf } x \Rightarrow x = y$

$x \text{ partOf } y \wedge y \text{ partOf } z \Rightarrow x \text{ partOf } z$

$x \text{ properPartOf } y \Leftrightarrow x \text{ partOf } y \wedge \neg(y \text{ partOf } x)$

- Correspondence[2]

$(a_1, a_2) \in R \subseteq L_1 \times L_2$

$\wedge \forall b_1 \in L_1 : b_1 \text{ partOf } a_1 \Rightarrow (\exists! b_2 \in L_2 : b_2 \text{ partOf } a_2 \wedge b_1 \text{ correspondsTo}_R b_2)$

$\wedge \forall b_2 \in L_2 : b_2 \text{ partOf } a_2 \Rightarrow (\exists! b_1 \in L_1 : b_1 \text{ partOf } a_1 \wedge b_2 \text{ correspondsTo}_R b_1)$

$\Rightarrow a_1 \text{ correspondsTo}_R a_2$

- Conformance[2]

$\forall x \in \text{Any} : x \in L \subseteq \text{Any} \Leftrightarrow \exists d \in D \subseteq \text{Any} : x \text{ conformsTo } d$

Research Hypotheses

RH1 Fragment Correspondence Hypothesis

$\forall a_1 \in L_1, a_2 \in L_2 \exists b_1 \in L_1, b_2 \in L_2 :$

$a_1 \text{ correspondsTo}_R a_2 \Rightarrow b_1 \text{ partOf } a_2 \wedge b_2 \text{ partOf } a_2 \wedge b_1 \text{ correspondsTo}_R b_2$

RH2 Fragment Conformance Hypothesis

$\forall a_1 \in L, a_2 \in D \exists b_1 \in L, b_2 \in D :$

$a_1 \text{ conformsTo } a_2 \Rightarrow b_1 \text{ partOf } a_2 \wedge b_2 \text{ partOf } a_2 \wedge b_1 \text{ conformsTo } b_2$

Note, these hypotheses may be problematic / to weak,
because parthood is reflexive they are inherently true.

Research Questions

RQ1 Is correspondence to some extent strictly mereologically induced?

$\forall a_1 \in L_1, a_2 \in L_2 \exists b_1 \in L_1, b_2 \in L_2 :$

$a_1 \text{ correspondsTo}_R a_2$

$\Rightarrow b_1 \text{ properPartOf } a_2 \wedge b_2 \text{ properPartOf } a_2 \wedge b_1 \text{ correspondsTo}_R b_2$

RQ2 Is conformance to some extent strictly mereologically induced?

$\forall a_1 \in L_1, a_2 \in L_2 \exists b_1 \in L_1, b_2 \in L_2 :$

$a_1 \text{ conformsTo } a_2$

$\Rightarrow b_1 \text{ properPartOf } a_2 \wedge b_2 \text{ properPartOf } a_2 \wedge b_1 \text{ conformsTo } b_2$

Thesis Objectives

- TO1 Implementation of a MegaL/Xtext-extension capable of recovering traceability links representing parthood, correspondence and conformance relationships between code fragments.
- TO2 Implementation of a MegaL/Xtext-extension allowing for an user to visually explore traceability links, i.e. parthood, correspondence and conformance relationships between code fragments
- TO3 Providing an extensive discussion comparing MegaL[1] with related approaches on traceability recovery.
- TO4 Providing an extensive discussion comparing MegaL[1] with related approaches on ontologies for software artifacts or software engineering in general.
- TO5 Providing an answer for the research questions.

References I

- [1] Jean-Marie Favre, Ralf Lämmel, and Andrei Varanovich.
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- [2] Ralf Lämmel.
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- [3] Achille C. Varzi.
Parts, wholes, and part-whole relations: The prospects of mereotopology.
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