

Associations in Multi-Level-Modelling: Motivation, Conceptualization, Modeling Guidelines, and Implications for Model Management

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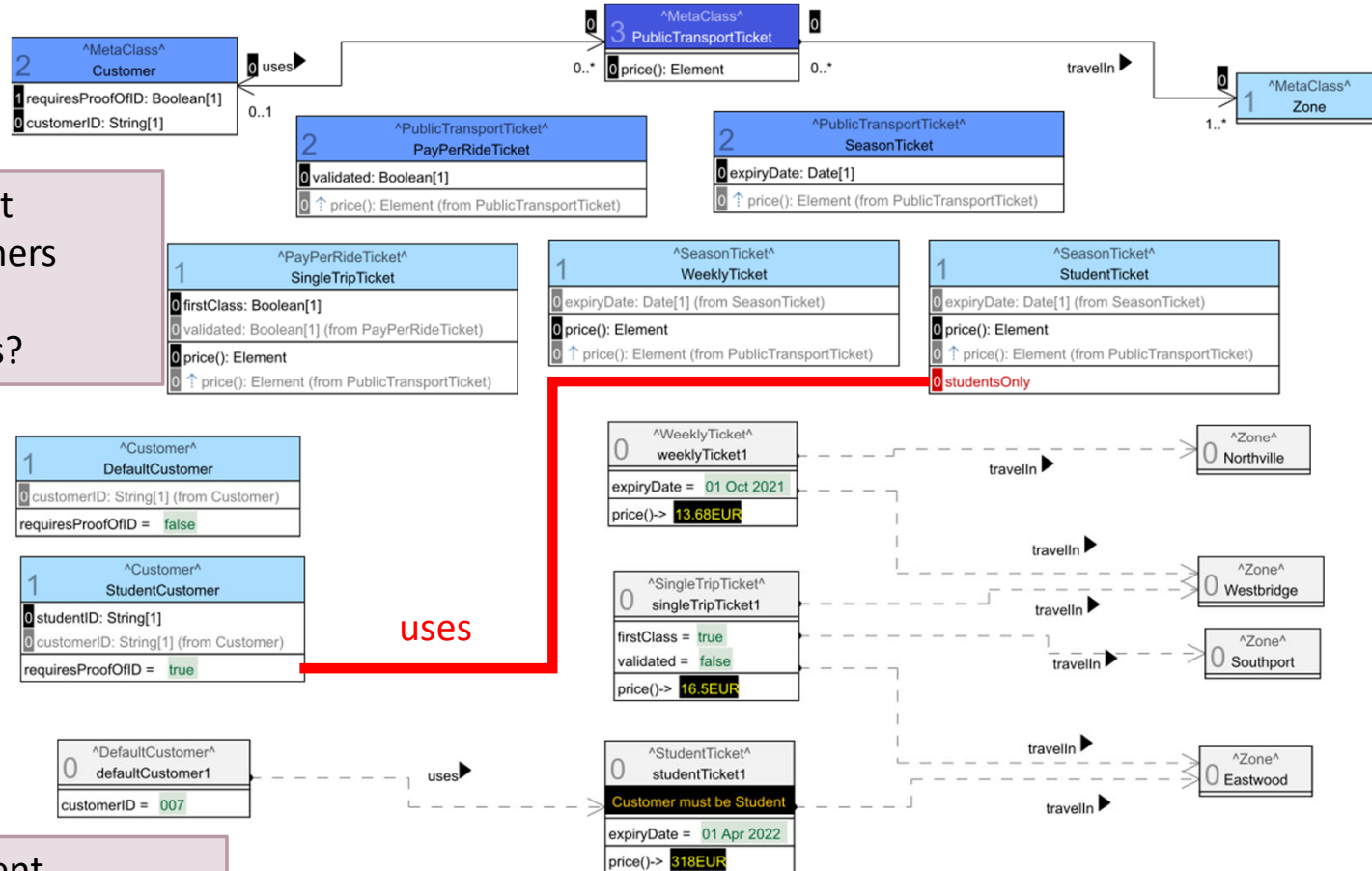
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Current State & Motivation

- Associations are an important concept in object-oriented modelling as well as in multi-level modelling
- However, in MLM they have been neglected to some extent. There are open question such as:
 - Only shallow or across levels? Deferred instantiation?
 - Associations between concepts on different levels?
- There are attempts in most approaches, but attributes tend to be in the spotlight instead.
- As such, the existing concepts of associations vary to a remarkable extent.

- Analysis objectives
 - Specification of Associations in selected MLM approaches: Differences & Commonalities
 - Identification of Research gaps
- Contribute to unified conception of associations for MLM
 - Specific focus of this paper: the „instantiation“ of associations

Associations in MLM: a tricky subject



Can we use a new relationship instead of a constraint to restrict StudentTickets to StudentCustomers?

Does it prevent DefaultCustomers from using StudentTickets?

Does it prevent StudentCustomers from using a WeeklyTicket?

Comparison

	Fmmlx	Melanee	MetaDepth	F-Logic	MultEcore
Specifying the link level	level	potency	potency	potency	potency
Independent level for each end	+	-	-	+	-
Ranges for level allowed	-	-	-	-	+
Associations between different levels	+	-	-	+	-?
mediated	no	mandatory	?	optional	optional?
Constraints to refine semantics	+	+	+	+	+
Built in default constraints	-	-	-	-	-
Underspecified properties	-	-	-	-	-

Focus on selected Requirements

- Associations between different levels
 - Where trees are unbalanced, this is unavoidable
- Mediated Instantiation
 - If mediated instantiation is mandatory, only associations with one potency are possible. Also models could become too large, or the mediation could be an identity mediation with no new information
- Built in default constraints
 - It needs to be discussed which default constraints should be provided.
- Underspecified properties
 - A method is required to state the underspecified properties, e.g., abstract properties or ranges of possible properties
 - A method is required to concretise them, or to leave them underspecified, or how to enforce this

- Associations are of pivotal relevance for MLM
- The diversity of specifications and the existing research gaps indicate the need and opportunities for future research
- Proposed requirements are intended to promote a discussion on association in MLM

- Own contribution (to extend Fmmlx toward the consensus):
 - There are two main scenarios, which are both equally necessary.
 - Supplying a constraint which identifies illegal links (-> using existing concepts)
 - Explicitly naming the possible groups of links (-> introducing a new concept)

- Discussion of requirements and specification of related solution
- Association Properties:
 - Multiplicity,
 - Naming,
 - User defined properties, i.e., Attributes of Associations
- Meta-Associations
 - Inheritance, Delegation, etc. as Associations
- My Future Work
 - Affect on Change Operations