

Title: Modelling and Management of Multi-Model Data

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Abstract: With the advent of multi-model database management systems, the boundaries of many approaches to data processing were pushed. The aspect of multi-model data introduces a new dimension of complexity and new challenges not seen in single-model systems. We have to address issues arising from the combination of interconnected and often contradictory logical models, such as, e.g., order-preserving/-ignorant, aggregate-oriented/-ignorant, schema-full/-less/-mixed approaches, intra- and inter-model references, intra- and inter-model integrity constraints, or full and partial intra- and inter-model data redundancy. Hence, a number of mature and verified approaches for various data management tasks commonly used for single-model DBMSs cannot be directly applied to multi-model DBMSs.

This thesis aims to propose a new family of unified approaches for both conceptual and logical multi-model modelling and data management. We first analyse the state-of-the-art of related areas. Then we propose abstract data structures to represent multi-model schema and data. These structures are then utilised in the design of approaches for unified schema inference, data migration, schema evolution, and correct backward propagation of changes to the data. All the proposed approaches are implemented and experimentally verified.

Keywords: Multi-Model Data, Conceptual Modelling, Logical Modelling, Schema Inference, Data Migration, Evolution Management, Category Theory