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Comparing and transforming between data models via an intermediate hypergraph data model.

Spaccapietra, Stefano (ed.), Journal on Data Semantics IV. Berlin: Springer (ISBN 3-540-31001-0/pbk). Lecture Notes in Computer Science 3730. Journal Subline, 69-109 (2005).

Summary: Data integration is frequently performed between heterogeneous data sources, requiring that not only a schema, but also the data modelling language in which that schema is represented must be transformed between one data source and another. This paper describes an extension to the hypergraph data model (HDM), used in the AutoMed data integration approach, that allows constraint constructs found in static data modelling languages to be represented by a small set of primitive constraint operators in the HDM. In addition, a set of five equivalence preserving transformation rules are defined that operate over this extended HDM. These transformation rules are shown to allow a bidirectional mapping to be defined between equivalent relational, ER, UML and ORM schemas. The approach we propose provides a precise framework in which to compare data modelling languages, and precisely identifies what semantics of a particular domain one data model may express that another data model may not express. The approach also forms the platform for further work in automating the process of transforming between different data modelling languages. The use of the both-as-view approach to data integration means that a bidirectional association is produced between schemas in the data modelling language. Hence a further advantage of the approach is that composition of data mappings may be performed such that mapping two schemas to one common schema will produce a bidirectional mapping between the original two data sources.

Keywords: conceptual data modelling; mappings; transformations; multiple representations
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