Data Integration as a Declarative Rdf Contract: An Axiom Case Study in Schema Alignment, Pipeline Definition, and Controlled Change

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Abstract:

Data integration depends on agreement about business meaning, entity identity, process dependencies, and the changes permitted within an integration. These concerns are often documented separately, making it difficult to determine whether a local mapping change remains consistent with the wider integration contract. This paper presents an approach used in Axiom in which these concerns are expressed through declarative Resource Description Framework (RDF) contracts.

The study uses a synthetic sales order integration example linking source orders, customers, and line items to a shared target model. It examines schema alignment, scoped identity, pipeline inputs and outputs, validation requirements, and controlled customization. ETL and ELT configurations are used to show how the same intended business meaning can be preserved even when staging and transformation occur at different points in the pipeline.

The case study shows how mapping and identity requirements can be reviewed together, and how explicit process descriptions can expose missing publication conditions. It also distinguishes between extending a model, such as adding a descriptive field, and changing protected elements such as business keys. Counterexamples involving missing identifiers, conflicting records, and interrupted publication highlight obligations that declarative contracts alone cannot guarantee.

Keywords:

Rdf contracts, semantic data integration, schema alignment, process orchestration, controlled customization.