Maintaining Semantic and Structural Metadata in the Metadata View Graph Framework

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Abstract

The Metadata View Graph is a metadatabase capable of maintaining semantic and structural metadata for views of a database. Semantic metadata provides dynamic rules which are used during query optimization and structural metadata provides indexes which are used during query execution. Since both types of metadata represent the current contents of the database, both types of metadata must be maintained when the contents of the database change.

Although both types of metadata use the same update logs, these logs are typically processed twice because the semantic metadata must be maintained *before* query execution while structural metadata is usually maintained *during* query execution. However, when a query execution plan requires both types of metadata, it is most efficient to process the update logs once and maintain both types of metadata at the same time. This creates a conflict when the update paths for the semantic and structural metadata overlap.

This paper presents several methods for efficiently maintaining semantic and structural metadata. The paper analyzes the maintenance cost for both types of metadata and proposes two strategies for processing overlapping update paths.

Keywords: Metadata Maintenance, View Maintenance, Constraint Maintenance, Dynamic Semantic Rules, View Cache, Query Optimization.