ALGEBRAIX
D A T A

Why Is Our Technology Important?

ALGEBRAIX® technology can query any data using any query language and produce results faster. Our technology provides data independence via a universal data management platform that works with multiple database models: key value, relational, semantic, and graph, among others.

Running on commodity hardware, our premier W3C-compliant RDF semantic database, SPARQL Server™, applies this technology to solve the scalability and performance challenges of semantics. This enables the practical use of semantics at scale to provide competitive advantages in data integration, analytics, and search applications.

Algebraix Data has taken a quantum leap in data performance, scalability, and total cost of ownership. Our innovative data algebra based approach to data management represents the most important and most disruptive database technology since the advent of the relational database more than 40 years ago.

Has the Technology Been Validated?

Our technology demonstrates greater than 100X performance and scalability for RDF/SPARQL on the SP2 benchmark versus the leading RDF stores on commodity hardware. Load speeds of 300k RDF triples per second on a single node have also been demonstrated. ALGEBRAIX implementations have demonstrated self-management, self-tuning, point-in-time queries, and the ability to exploit the best characteristics of multiple models.

How Does It Achieve High Performance and Scalability?

Simply put, our optimizer has far more choices: It can avoid computation by applying algebraic simplifications of content, recognizing frequently referenced computations and persisting results so they can be reused, enabling automatic synthesis of new data structures to support recognized query patterns, and substituting algebraic expressions or results from prior queries and inferences.

When computation is required, the optimizer is free to choose the best data structures and algorithms for the given computation. When given a set of operations to execute, the optimizer can maximize re-use of intermediate results by executing them in an optimum sequence while the use of data algebra ensures the correctness of all optimizations before they are implemented.

The disk-resident nature of the system allows it to scale far beyond memory-only systems and retain intermediate results for later reuse.

The resultant performance and scalability of ALGEBRAIX technology outclasses competing technologies and represents a new data management paradigm.

What Is Data Algebra?

As polynomial algebra is the algebra of polynomials and matrix algebra is the algebra of matrices, data algebra is the algebra of data. It is derived directly from first principles using Zermelo-Fraenkel set theory, the foundation of all modern mathematics. As a consequence of parsing data and datum as set and element respectively, the structural complexity required to represent various data models is had by exploiting successive power sets of a Cartesian product. In addition to the usual set theoretic operations of union, intersection, and complement, other useful binary and unary operations relevant to particular structures are identified and lifted through the sequence of power sets. When applicable, algebraic properties such as associativity, commutativity, and distributivity, along with other properties and theorems derivative of these, are used to manipulate the algebraic translation of database queries for optimization.

Data Algebra is a universal data model as it can represent multiple models, such as RDF, Relational, XML, key value, hierarchical, etc.

How Is the Data Algebra Implemented?

Queries are translated directly into data algebra. Then, optimization occurs at the algebraic level. Next, an optimal functional cover is computed for the algebraic operations. Additional optimizations (again with an algebraic underpinning) ensure that these functions operate with the most efficient representations of the data. This yields an execution plan that is provably correct, efficient, and fast.

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