# Axiom: Composable Query Engines Built on Velox (Invited Talk)

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## Abstract

Over the past several years, Velox — an open-source C++ library — has become a shared foundation for data-intensive computation, providing reusable building blocks (expression evaluation, aggregation, sort, join, a nested/complex type system, vectorized functions, and Arrow-compatible memory) that power engines across the industry, from Presto (Prestissimo) and Spark (Gluten) to PyTorch data loading (TorchArrow). Velox unified the execution layer; Axiom completes the stack. Axiom is the front-end for Velox: SQL and DataFrame parsing, logical planning, cost-based optimization, and query orchestration that together turn a query into an optimized, multi-fragment Velox plan. The result is a composable path from SQL or DataFrame to execution, assembled from shared, battle-tested components rather than rebuilt per system. This talk introduces Axiom, shows how its front-end composes with Velox's execution engine into complete query engines, and discusses the design decisions that keep the components reusable across diverse systems and workloads.

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**Speaker Biography:** Masha Basmanova is a software engineer at Meta and co-creator of Velox and Axiom, open-source C++ libraries for high-performance query execution. Velox provides reusable execution components now used across Presto, Spark, and ML training pipelines, and in cloud offerings from IBM and Google; Axiom adds the front-end — SQL/DataFrame parsing, logical planning, and cost-based optimization — to form a complete stack on top of Velox. Her work has appeared at VLDB (2022, 2024) and IEEE ICDE (2022). She is a regular VeloxCon speaker and gave the keynote at VeloxCon China 2025. She holds an MS in Mathematics and has 20+ years in systems engineering.


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