Performance Tuning in vCore

Overview

vCore achieves high-performance user-facing systems, by taking a user-centric approach (top-down design rather than bottom-up).

This is because in a system that needs to operate over massive fast-moving datasets, with humans-in-the-loop, the physical limit of how much information a human can consume, vastly restricts how much data needs to be calculated and transported from server to client.

The architecture makes use of this limitation through various techniques:

- Lazy calculations of derived columns that are not visible and are not part of the dependency tree of a data element that is visible.
- Data virtualization so only data elements in the viewport need to go on-the-wire.
- Conflation and throttling to an update rate that is human digestible.
- Statically defined high-load streaming table operations like aggregations, filters.
- Rapid app dev framework to massively shorten the innovation cycle when new aggregations/filters are identified and need to be statically defined.

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Performance Characteristics

vCore can be used in a wide variety of scenarios. For example, a vCore system can easily run with ~100MM rows, ~400 columns and sustained update rate of ~500k-1MM rows per second.

These numbers are not upper limits, and the absolute limits depend on many factors including but not limited to: Level of normalization – the more normalized, the better.

- Column derivations – the more done within vCore, the better.
- Pivots/group by – the more they are known statically, the better.
- Filters/sorts - the more they are known statically, the better.
- Data distribution – the less extreme the better

Because of the way the system is designed, constraining one variable usually translates to concessions in other variables.

For example, halving the desired update rate could roughly translate to doubling the number of rows & columns supported, reducing the number of rows can help increase the number of columns supported. This gives a lot of flexibility when tuning the system.

Fast Straight Out-of-the-box

vCore is fast and efficient. Performance tuning is only required in some of the more extreme use-cases. This short video shows some of the performance capabilities before any tuning takes place

By the Numbers

100 MM Number of rows in a Velox table	**10 k** Number of updates per seconds	**100 k** Number of concurrent browser sessions	**5 ms.** Time to pivot a grid containing 1M rows
1 MM Sustained update rate of rows per sec	**1** Only one copy of shared datasets in memory.	**> 250** API's simultaneously connected.	**> 100** Grids within a single user session

About Velox

Velox enables software development teams to build high-performance user-facing systems up to 10x faster.

The Velox full-stack application development platform (vCore) provides professional developers with tools that amplify their expertise in Java and Web programming, allowing them to focus on building differentiating business functionality.

Founded in 2018 by 3 veterans of front-office technology, vCore is the catalyst broker dealers, investment banks, exchanges and data and tech vendors need to accelerate their digital transformation and modernization journey.