Challenge: Maximizing modern hardware

Levyx

Negative impacts of RAM limits, disk I/O and accelerator I/O:

1. **RAM limits require more hardware and more time splitting data and distributing jobs**
2. **Persisting work-in-progress relies on storage I/O, which slows everything down**
3. **Low-level programming is needed to optimally feed HW accelerators**

Solution: RAM-level performance using NVM

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Helium is an ultra-fast system software that solves all three problems:

1. High-performance system-level data access software that emulates RAM using SSDs, expanding addressable memory into the tens of terabytes
2. Provides persistence with negligible performance penalty while allowing multiple uses of data dictionaries
3. Lets applications bypass OS to address FPGAs & GPUs without complex, low-level coding

HELIUM™

Process More Data, Faster

Levyx

With Helium, you can:

1. Dramatically expand direct access to data without adding servers, or…
2. …achieve current performance levels at a fraction of the price*, and…
3. …put server-level capability on workstations or laptops

* A server with 1TB of SSD is about ¼ the cost of one with 1TB of RAM

Use Cases

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Financial risk analytics

Persistent data frames (Python/Spark)

Financial back testing

Storage engine for SSD optimized DBs

Time series DBs

Blockchain and DL

Java object persistence (hibernate)

Trade matching engines

Use Case: Blockchain / Distributed Ledger

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Distributed ledger technology is built on blocks and transactions pointing to each other

These pointers are typically saved using databases like RocksDB or LevelDB

A single transaction might consist of thousands of DB lookups and inserts

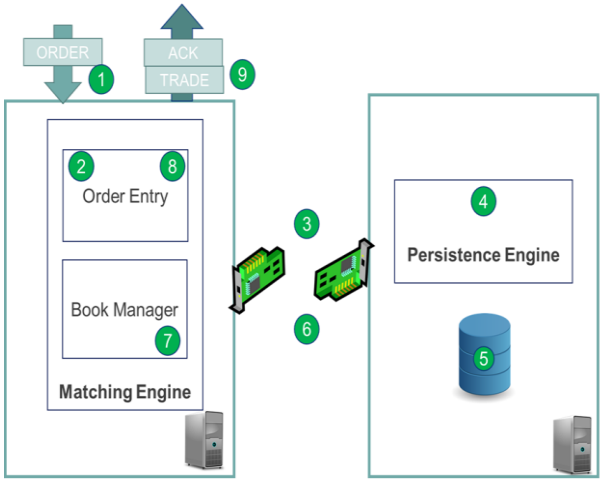
Helium as the storage engine dramatically increases transaction rates, reduces latency and jitter

>10X Increase

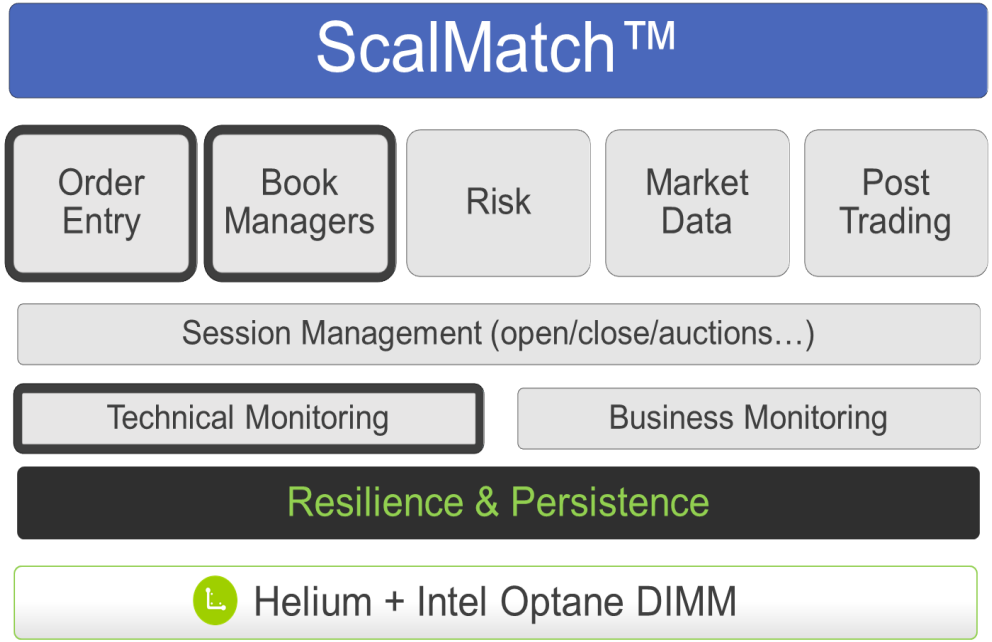
Use Case: Highly Available Matching Engine with Near Zero Risk of Data Loss

Levyx

Typical Trading Architecture



Trading Architecture: Combining Levyx, Scalnyx & Intel Cascade Lake with Optane DIMMS



Use Case: Highly Available Matching Engine with Near Zero Risk of Data Loss

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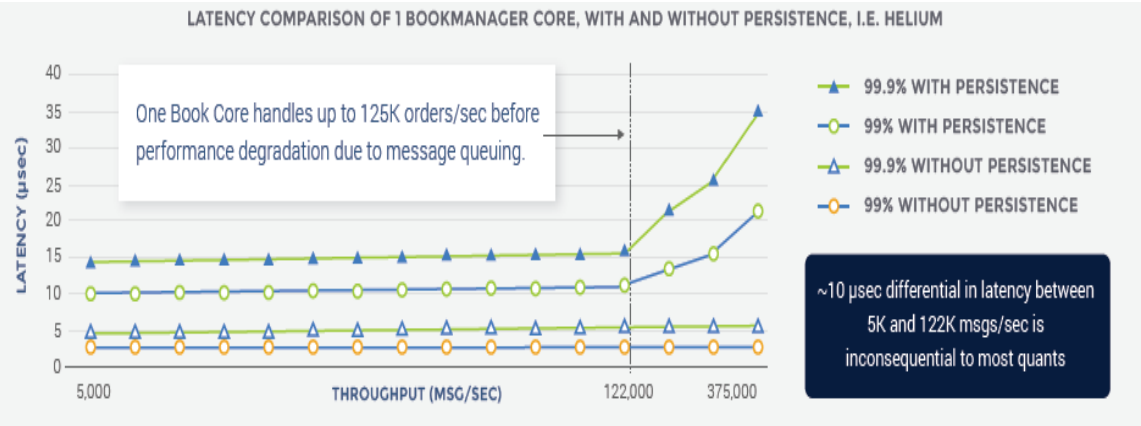
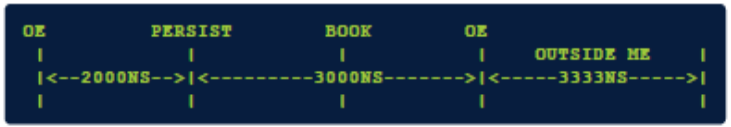
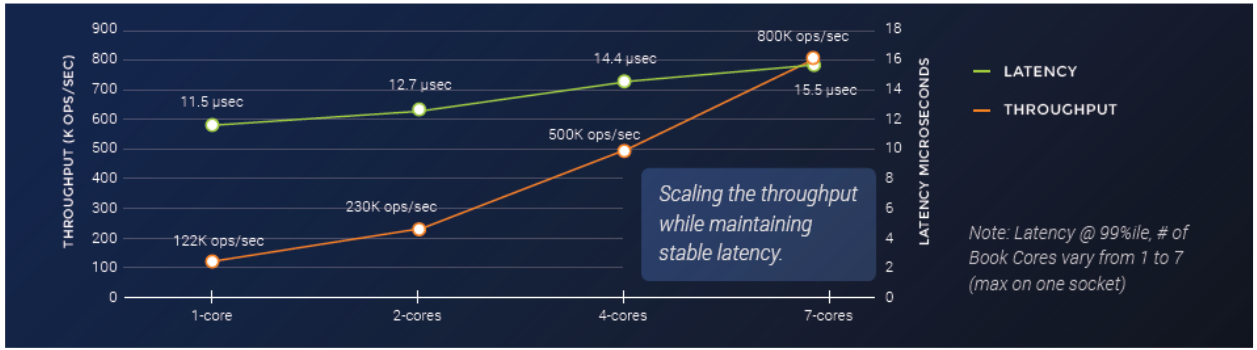




Messages lost only if the messages are between OE and PERSIST

Messages Lost >= 2,000/8,333 or **0.24 messages** on average because:

- Messages that are in OE are refused (so not lost)
- Messages that are only in PERSIST can be replayed



* NOT STAC BENCHMARKS

Business Benefits

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Freedom

Through dramatically expanded addressable application memory

Confidence

Through automatic persistence

Efficiency

Through concurrent access to the same data dictionaries by multiple users

Speed

Through optimized data flow for maximum CPU/FPGA/GPU processing utilization

Savings

Through leveraging lower cost SSD over higher cost RAM