Levyx

Using Flash to attain Ultra-low latency, Hi-performance for Hybrid Transactional/Analytical Processing

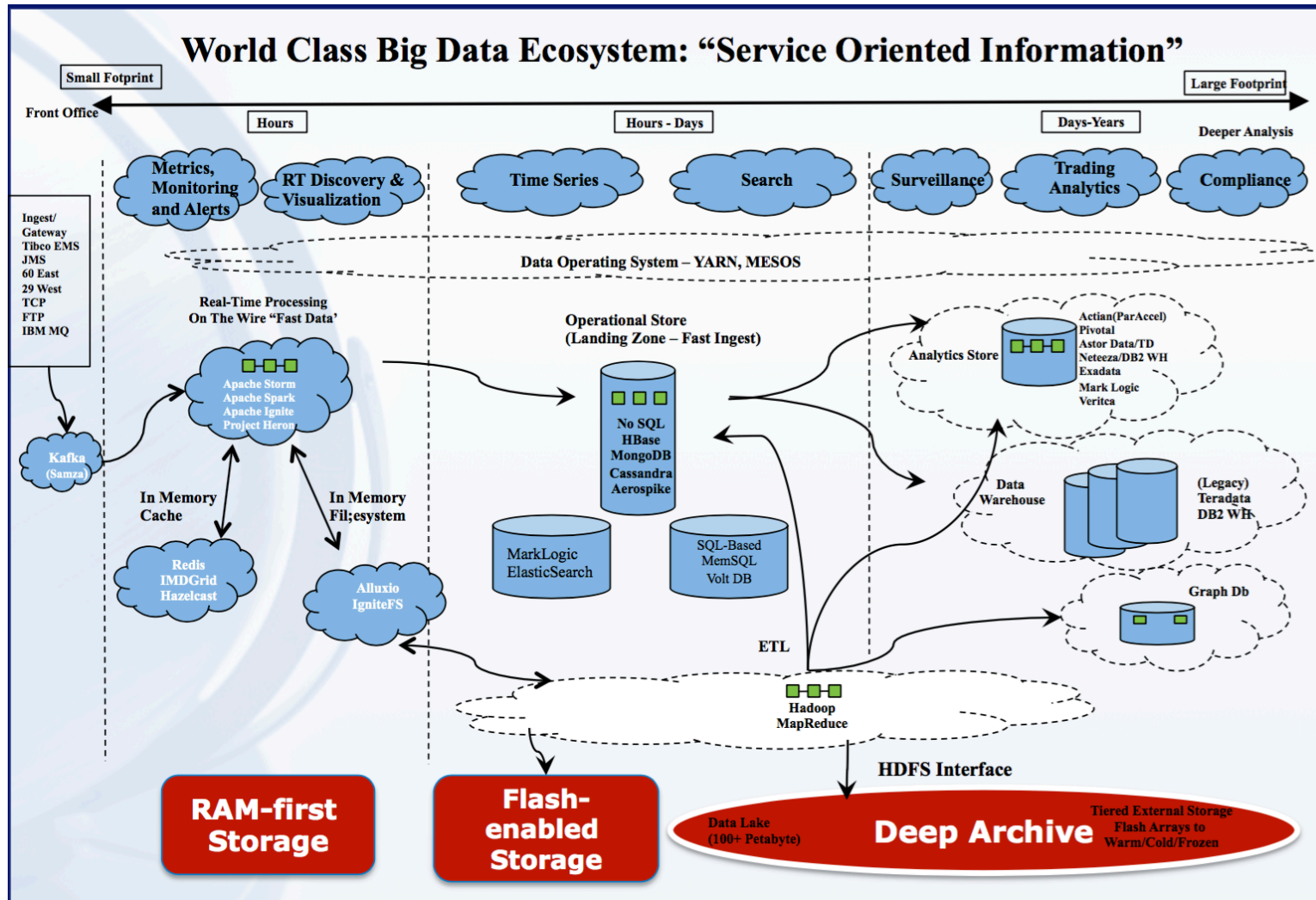**Faster…Simpler...Cheaper..**

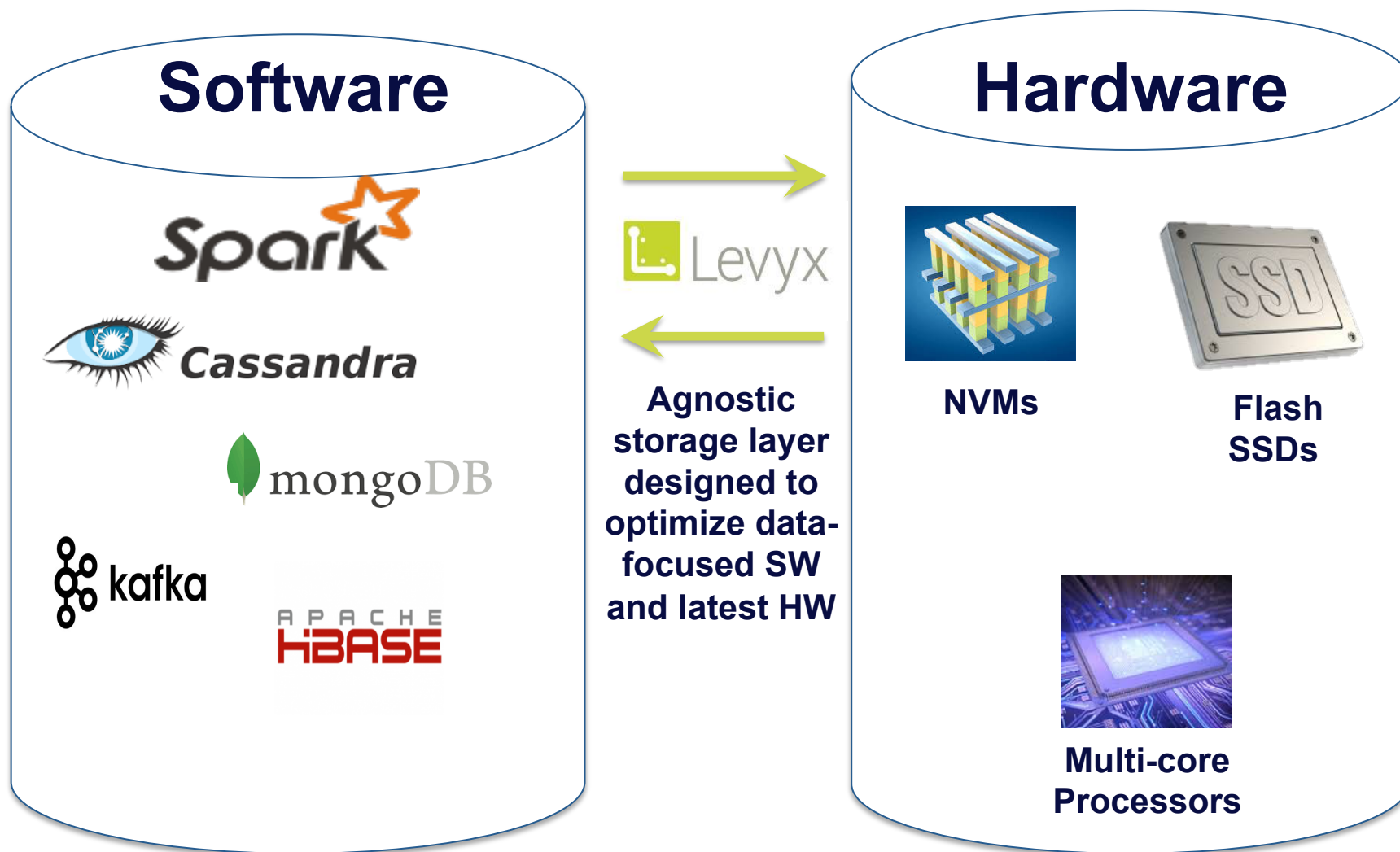**October 2016**

Levyx Company Overview

- Mission:
  - Provide Middleware Software that maximizes performance, minimizes latency, and reduces cost/complexity for Big Data and other database scale out server Platforms
- Founded in 2013 , Headquartered in Irvine, CA
  - Reza Sadri, CEO
    - Entrepreneur, PhD UCLA CS. Database specialization
  - Tony Givargis, CTO
    - UC Irvine Professor, PhD CS, Embedded Systems
- Series "A" funding led by OCA Ventures
- One Major OEM (Data Grid use case)
- Patent-Pending Indexing technology
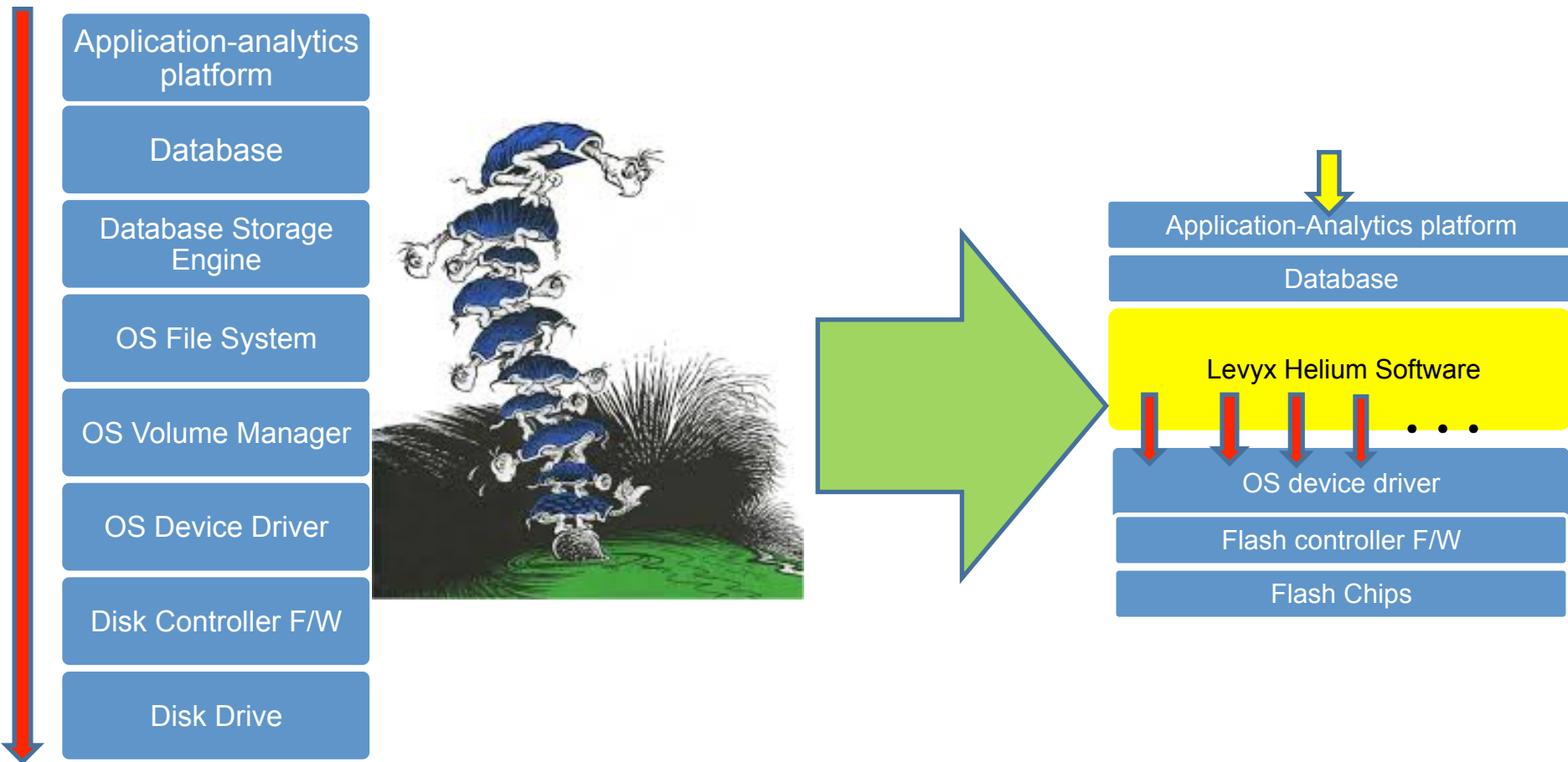
Trading Analytics Architecture

Levyx Key-Value Storage Layer Bridges Gap

Software

Spark

Cassandra

mongoDB

kafka

APACHE HBASE

Levyx

Agnostic storage layer designed to optimize data-focused SW and latest HW

Hardware

NVMs

Flash SSDs

Multi-core Processors

Helium:

Leverage Multi-core/Multi-Channel Flash Parallelism to boost performance/ reduce latency. Reduce layers of abstraction/overhead

| Application-analytics platform |
| Database |
| Database Storage Engine |
| OS File System |
| OS Volume Manager |
| OS Device Driver |
| Disk Controller F/W |
| Disk Drive |

| Application-Analytics platform |
| Database |
| Levyx Helium Software |
| OS device driver |
| Flash controller F/W |
| Flash Chips |

Levyx Products
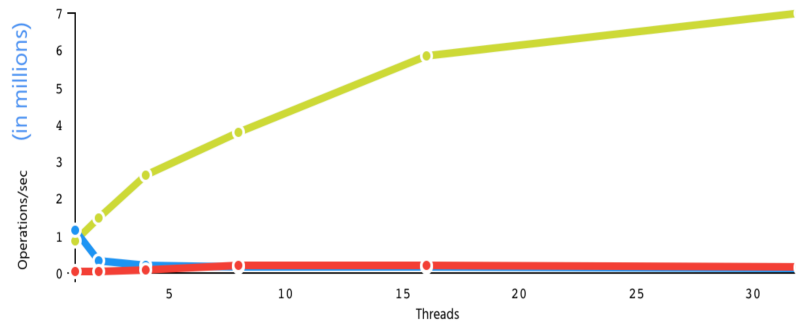
- Helium: Pluggable DB Storage Engine
  - World's Fastest Key Value store for Big Data Analytics and Operational Databases
  - Greater than In-Memory Speeds with Scale-in SSD Persistence
  - Native APIs plus wrappers for RocksDB and Memcached

- Xenon: Distributed Storage and Query Engines
  - Scales out Helium via distributed architecture
  - Query and Aggregation offload/acceleration using JITC

- LevyxSpark Connector: Apache Spark + Xenon
  - Storage Optimized and Accelerated Open Source Spark for real-time/hi IO performance applications
  - Integrated with Spark Catalyst to provide SQL query pushdown (join, groupby, filter, etc) and acceleration to machine code speeds
  - Node consolidation with combined memory-flash storage layer

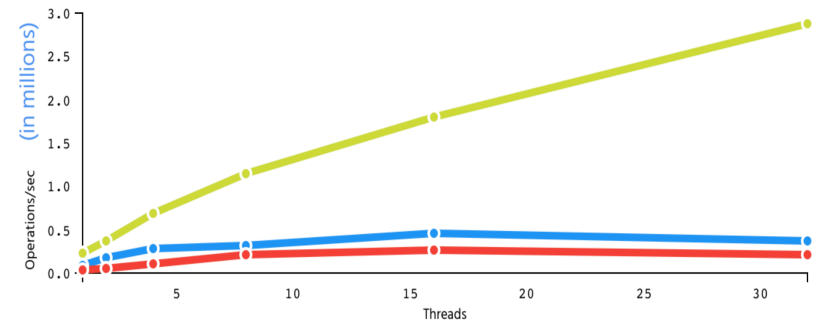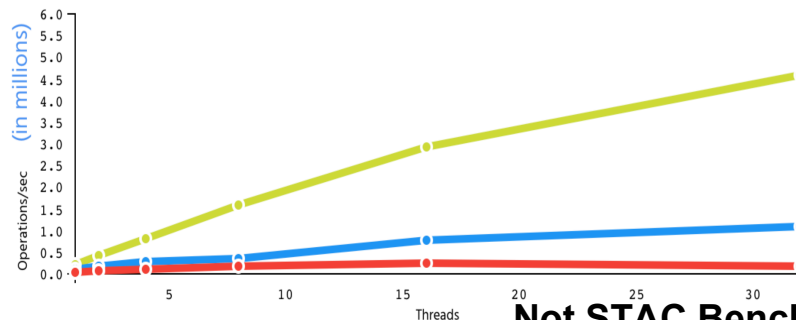# Helium vs leading Open Source KV Stores
http://www.levyx.com/content/helium-demo

Lexyx Performance scales with # of Cores
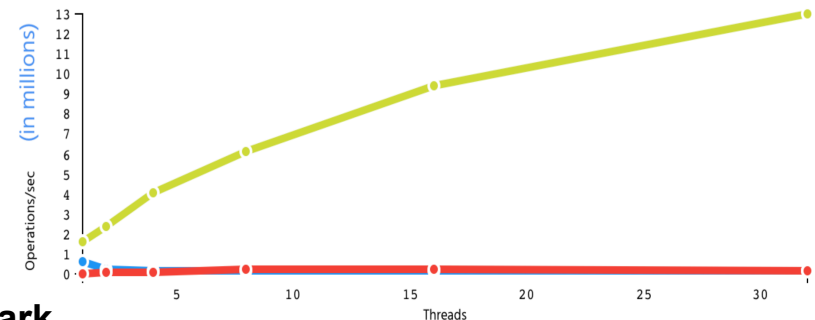
Not STAC Benchmark

Helium Accelerated Memcached (Open Source)

Faster : Standard 90:10 (get:set) Helium-Memcached is at least 10x better in TPS on cloud and on-prem.

Cheaper : Single Helium-Memcached scales with cores/SSD vs. stock memcached (needs multiple nodes, large amounts of RAM)

Simpler: Plug and Play with existing Memcached applications. Rapid Automatic recovery from persisted SSD simplifies operations.

Small: 100 byte x 100 Million total objects

Configuration	TPS stock memcached	TPS Levyx memcached
100% set	359 K	1.5 Million
90% get, 10% set	322 K	7.36 Million

Large: 1K x 10 Million total objects

Configuration	TPS stock memcached	TPS Levyx memcached
100% set	276 K	1.32 Million
90% get, 10% set	192 K	2.5 Million

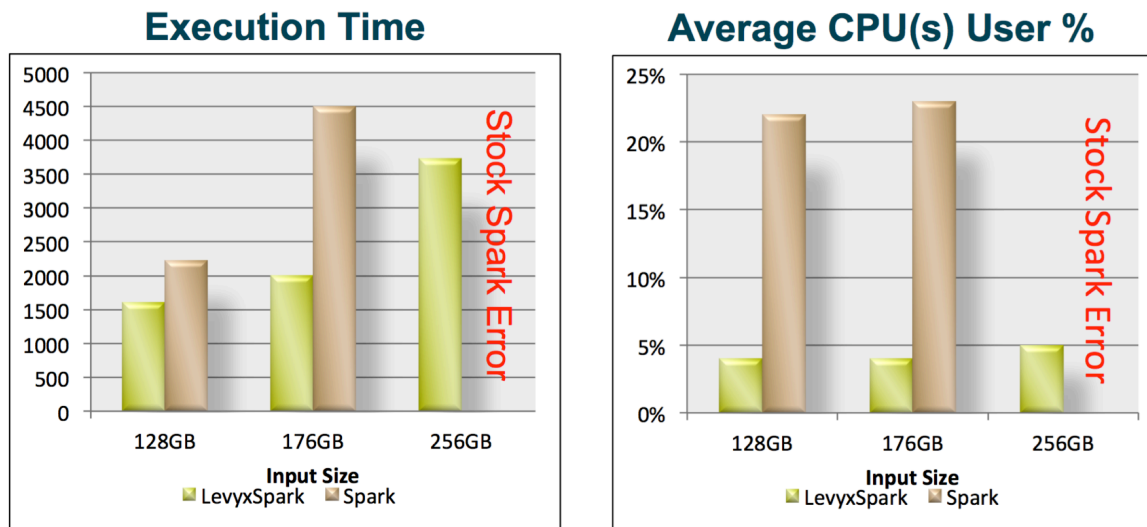Helium/SN150 (100B Payload)

PUT — SEQ. GET — RAND. GET — DEL
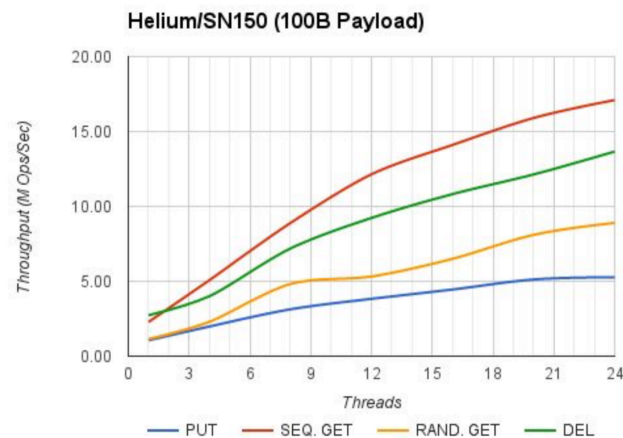
Not STAC Benchmark

Levyx Spark Connector Benefits on IBM Power 8

- https://www-304.ibm.com/events/tools/edge/2016ems/REST/presentations/PT/PDF/Edge2016_2442.pdf

Not STAC Benchmark

Levyx-Spark Connector Benefit Summary

- **Faster**:

  – Higher Performance on IO intensive and/or larger data sets and workloads

  – Persistent RDD/DataFrame option (reduce disk operations-spillovers, ser-des)

- **Cheaper**:

  – Fewer nodes (Freed up CPU Utilization, 10:1 cost advantage of Flash vs RAM)

  – Storage-Class Memory architecture

- **Simpler**:

  – Persistence Option for RDD/DataFrames – simplify multi-tenant/multi-user operations

  – Simpler networks/less shuffling, reduce Spark context switching/scaling/ GC/crash issues

Thank You

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