



STAC Update

Tick Analytics

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STAC-M3

- Performance benchmarks for enterprise tick analytics
 - Language/DBMS neutral
 - Developed by banks and hedge funds
- Workload:
 - Synthetic data modeled on NYSE TAQ
 - Simulates concurrent access with varying number of users
 - Mix of I/O- and compute-intensive operations
- Many years of comparison points on diverse architectures

www.STACresearch.com/m3

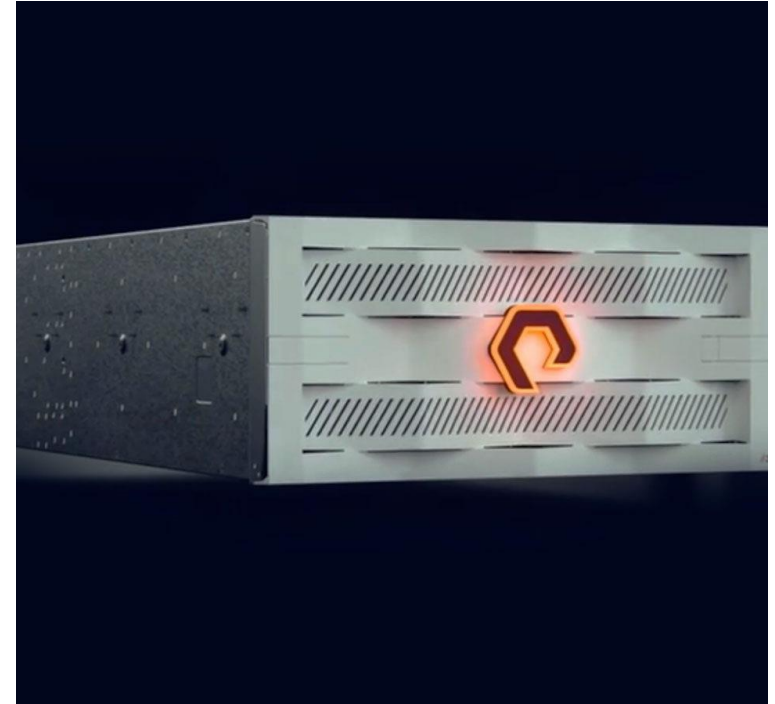
STAC Packs

- Wide range of implementations
 - Databases: kdb+, shakti, eXtremeDB
 - Clustered file systems, parallel file systems, NFS, flash arrays, NVME over Fabric, direct-attached SSD, NAND and post-NAND Flash (e.g. Optane)
 - Single database server, database cluster (bare metal and cloud)
- Analytics STAC Track subscribers can access STAC Pack source code
 - Understand how to develop for a given database
 - Run tests: Mark your own stacks to market
 - Discover code optimizations

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STAC-M3 / kdb+ / Pure Storage FlashBlade//S500

- Ran baseline (Antuco) & scale (Kanaga) benchmarks
- 8 database servers accessing Pure Storage FlashBlade//500 with NFSv3
- STAC-M3 Pack for kdb+: Compatibility Rev I



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STAC-M3 / kdb+ / Pure Storage FlashBlade//500

- Stack:
 - Database:
 - kdb+ 4.0 running in distributed mode
 - Database Server nodes:
 - 8 x Dell PowerEdge R740xd, each with:
 - RHEL 8.6
 - 2 x Intel® Xeon® Platinum 8260 CPU @ 2.40GHz
 - 256GiB memory (8 x 32GiB DDR4 DIMMS @ 2933MT/s)
 - ConnectX-5 Ex dual-port adapter
 - Storage:
 - 1 x Pure Storage FlashBlade//S500, with:
 - Purity//FB 4.1.5
 - 10 x PureStorage FlashBlades with 2 x 24TB flash modules per blade (266 TiB total)
 - 8 x 100GbE network Interfaces (connected)
 - Network:
 - Arista Switch DCS-7050QX-32-R



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Versus a cluster with 3 x NAS

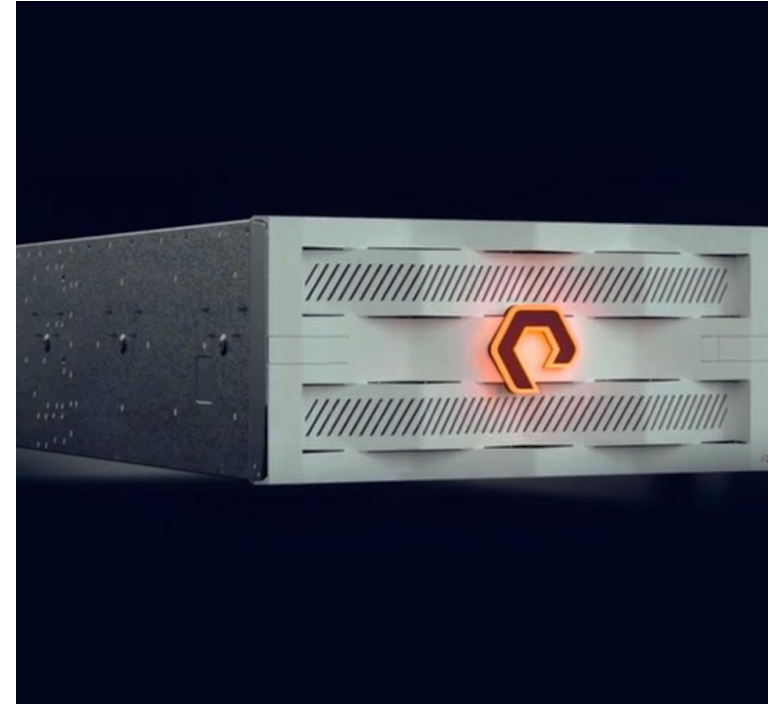
- Comparison SUT (KDB220506):
 - Same number of database servers
 - 3 network attached flash storage nodes
 - Compatibility Rev H of the STAC Pack
- This Pure Storage-based solution had:
 - 13 of 17 Antuco mean-response time benchmarks, including:
 - 7x speedup in 10-user theoretical P&L
 - (STAC-M3.β1.10T.THEOPL.TIME)
 - 5.8x speedup in 10-user market snapshot
 - (STAC-M3.β1.10T.MKTSNAP.TIME)
 - 17 of 24 Kanaga mean-response time benchmarks, including:
 - 1.3 – 1.5x speedup in 50-user 12-day VWAB
 - (STAC-M3.β1.50T.YR{1,2,3,4,5}VWAB-12D-HO.TIME)
 - 1.2 – 1.4x speedup in 1-user year high bid
 - (STAC-M3.β1.1T.{2,3,4,5}YRHIBID.TIME)



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Versus a cloud solution with 40 storage instances

- Comparison SUT (KDB210507):
 - 15 database VM instances
 - 40 VM storage instances
 - Compatibility Rev E of the STAC Pack in:
- This Pure Storage-based solution had:
 - 9 of 17 Antuco mean-response time benchmarks, including:
 - 11x speedup in 10-user market snapshot
 - (STAC-M3.β1.10T.MKTSNAP.TIME)
 - 8.4x speedup in 10-user volume curve
 - (STAC-M3.β1.10T.VOLCURV.TIME)
 - 12 of 24 Kanaga mean-response time benchmarks, including:
 - 4.4 – 5.3x speedup in 10-user market snapshots (STAC-M3.β1.10T.YR{2,3,4,5}-MKTSNAP.TIME)



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