



it's about time

Streaming Analytics - Change the Game

Kdb+ v4.0

Multithreaded Primitives and Data at Rest Encryption

Faster, More Secure

Kdb+, from Kx, is a high-performance historical time-series columnar database that includes an in-memory compute engine, a real-time streaming processor and an expressive query and programming language called q.

Version 4.0 of kdb+ is a major release that offers new opportunities to improve performance and security. For improved performance it introduces finer-grained parallel processing, with no developer effort required as language primitives now look for and exploit opportunities for parallel processing. For enhanced security it provides Transparent Disk Encryption (TDE) that solves the problem of protecting data at rest, by encrypting database files on the hard drive and consequently also on backup media.

Faster

For decades, 'Moore's Law' delivered each year new hardware on which software ran faster. But increases in processing power now arrive as growing numbers of cores. Getting application programs to exploit multiple processors is a challenge. Effective parallelization requires machine knowledge and specialist software skills. How to parallelize application programs without expensively rewriting them?

Attempts to solve this have focused on optimizing compilers of increasing subtlety, which analyze source code for opportunities to split work between processors – and Vector languages, such as q.

Vector Languages

Vector languages such as q promise easier parallelization. Most of the iteration is implicit in the language primitives, so opportunities to divide work between processors do not need teasing out of control structures in the source code.

Previous versions of kdb+ offered developers the 'low-hanging fruits' of parallelization. Simple tools such as the 'peach' keyword enabled developers to mark operations for division between processors.

At a Glance



Enhancements to multithreaded processing to optimize parallelization opportunities and Transparent Disk Encryption (TDE) for protecting data at rest, by encrypting database files on the hard drives and backup media

The Kx Advantage

- Very high level programming language with most iteration implicit
- Simple programming constructs for explicit parallelization of tasks
- Multi-threading primitives implicitly exploit slave threads
- Implicit multi-threading makes programs run several times faster
- Even a few slave threads cut runtimes significantly
- Transparent Disk Encryption (TDE) protects data at rest and in transit
- Use TDE to encrypt only files that need it
- Move data between environments without decryption



Multithreaded Primitives

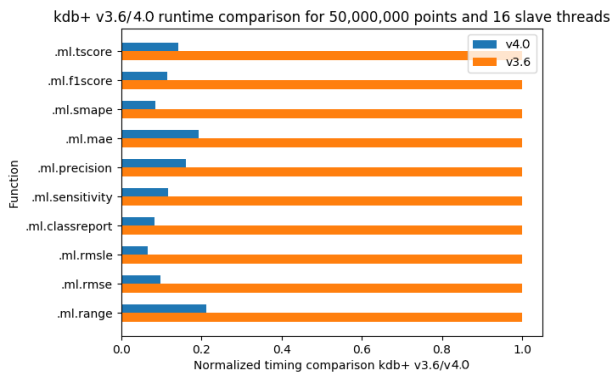
Version 4.0 of kdb+ deepens and intensifies the work of parallelization, without any intervention by the developer.

Q is a vector language, so its operators implicitly iterate through their arguments. For example, if `A` and `B` are columns of a ten-million row table, then `A&B` entails ten million comparisons. That is an opportunity for parallel processing. The new multi-threading primitives spot such opportunities and divide the work across available cores.

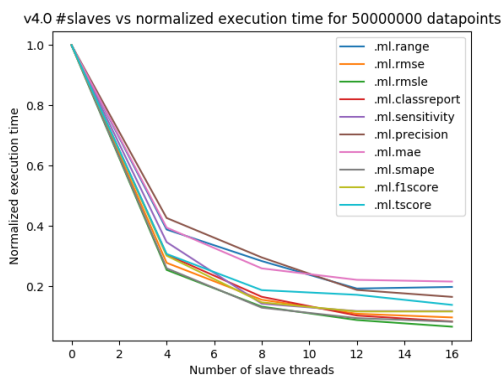
Performance

The effect on the performance of q programs depends heavily on hardware, the programs, and the number of slave threads provided. Here we run functions from the Machine Learning Toolkit on 50-million datapoints, and compare runtimes from V3.6 to V4.0 with 16 slave threads. The V4.0 performances are 5x better than V3.6.

TDE, like file compression, is fully transparent to queries in kdb+; queries require no change to operate on compressed or encrypted data.



Even a few slave threads can improve performance significantly.



Data at Rest Encryption

Securing data gets harder all the time. Storage devices become more portable, remote access proliferates, and attacks grow in frequency and sophistication.

Encryption is a key defense in a hostile environment. Full Disk Encryption (FDE) has been available on multiple operating systems for several years. Unfortunately, FDE often does not satisfy all requirements for Data At Rest Encryption (DARE). Hence there is also demand for Transparent Disk Encryption (TDE). This is now available in kdb+ 4.0.

Transparent Disk Encryption

TDE solves the problem of protecting data at rest, by encrypting database files on the hard drive and consequently also on backup media.

TDE, like file compression, is fully transparent to queries in kdb+; queries require no change to operate on compressed or encrypted data.

TDE vs FDE

- As TDE decrypts the data inside the kdb+ process, rather than at the OS/storage level, data remains encrypted in transit.
- Encryption is selective: encrypt only files that need it.
- Files can be archived or copied across environments without going through a decryption and encryption cycle.
- Kdb+ is multi-platform. As the file format is platform-agnostic, the same encrypted files can be accessed from multiple platforms.

About Kx

Kx is a division of First Derivatives, a global technology provider with more than 20 years of experience working with some of the world's largest finance, technology, automotive, utility, manufacturing and energy institutions. Kx technology, incorporating the kdb+ time-series database, is a leader in high-performance, in-memory computing, streaming analytics and operational intelligence. Kx delivers the best possible performance and flexibility for high-volume, data-intensive analytics and applications across multiple industries. The Group operates from 15 offices across Europe, North America and Asia Pacific, including its headquarters in Newry, and employs more than 2,400 people worldwide. For more information about Kx please visit www.kx.com. For general inquiries, write to info@kx.com. For press inquiries, write to pr@firstderivatives.com.

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