



Kx Technology

Fintan Quill
March 2nd 2016



TCO

- Hardware
- Software
- Operational



Know Your Hardware



Hardware - Memory

- 1TB RAM is now “commodity”
- Multi TB RAM already here
- In-Memory Compression
- Transactional Memory



Hardware - Storage

- NVDIMM
- NVME/Flash SSD/HDD
- SAN/NAS/DAS
- Hyper-Converged
- Compression



Hardware - Parallelism

- Multi-Core
- Vector Instructions
- Multi-Machine
- Distributed/Parallel File Systems



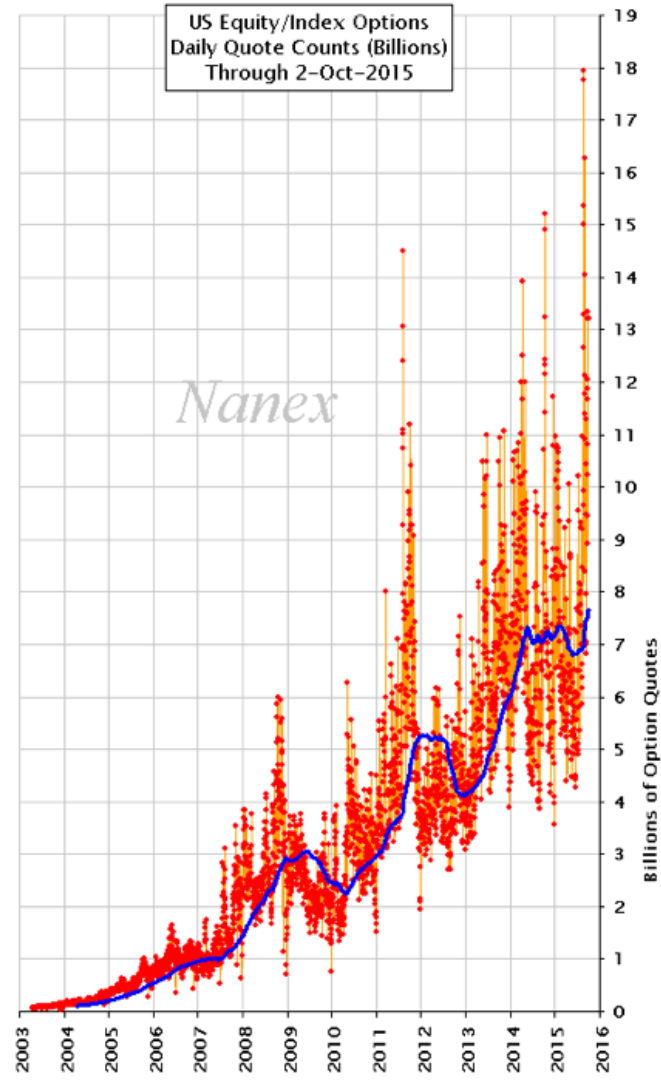
IoT

- Time-Series
 - Structured/Semi-Structured
- Analytics at the Edge
 - Small Footprint
 - ARM/Intel Quark
- Streams
- Micro batches



About Kx

- Offices in North America, Europe & Asia
- Part of First Derivatives Group
- Large user community
- Finance, Energy/Utilities, Oil/Gas, Pharmaceuticals, Software and Telco
- Widely adopted in financial services for over two decades



Streaming, Real-Time and Historical Data



DevOps Borat @DEVOPS_BORAT

18h

Small Data is when is fit in RAM. Big Data is when is crash because is not fit in RAM.

Expand



kdb+

- Integrated Database and Programming System
- 32 bit free version
- 64 bit licensed version



Features

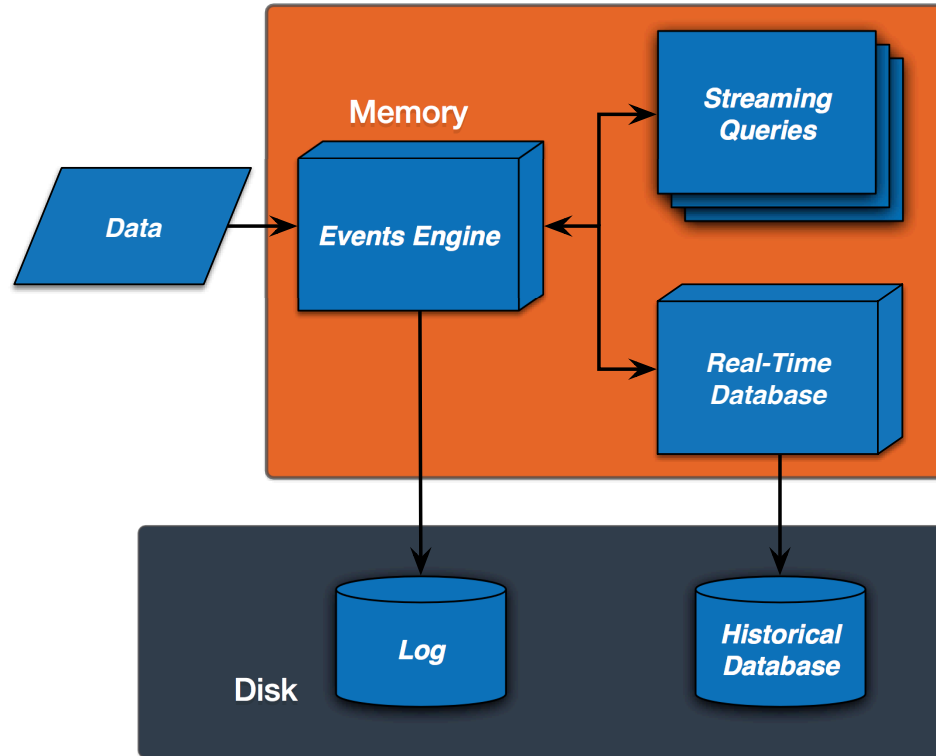
- Standard OS and Hardware
- In-Database Analytics
- Compression
- Parallelism
- Columnar/Relational/Key-Value



APIs

- Language Support: C#, C++, Java, JavaScript, R etc.
- Community Language Support: Python, Scala, NodeJS, PHP, Erlang etc.
- Interfaces: ODBC, JDBC, HTTP & WebSockets

Sample Architecture





q programming language

- SQL (with extensions)
- Vector/Array Operations
- Native Time-Series Support
- Functional Language Features



Sample q query

```
select open: first price, high: max price, low:
min price, close: last price from trade where
date = 2013.05.01, sym = `AAPL
```

open	high	low	close
83.85	85.9	83.28	85.45



Parallelism in q

Serial:

```
calcEvent each eventTypes
```

Parallel:

```
calcEvent peach eventTypes
```



Time-Series Analysis

- Native Temporal Data Types
- High-Precision (ns)
- Temporal Arithmetic
- Asof Join/Bi-Temporal Joins
- Join Time-Series On-The-Fly



Time-Series Analysis cont'd

```
select count i by userAgent,5 xbar time.minute from  
events where date within (.z.D - 7;.z.D),  
eventType=`login
```

```
aj[`time; select time,price from trade where  
date=last date,sym=`MSFT; select time,bid,ask from  
quote where date=last date,sym=`MSFT]
```

q v Hive ETL comparison

q:

```
`product_dtl set ("ISFS"; enlist ",") 0: `input.txt;
```

Hive:

```
create table product_dtl ( product_id: int, product-name:
string, product_price: float, product_category: string)
rows format delimited fields terminated by ',' ;
describe product_dtl;
load data local inpath 'input.txt' into table product_dtl;
Hive -f /home/cloudera/sample.sql
```



STAC Benchmarks



[About STAC](#) [Research](#) [Research Domains](#) [Tools](#) [Events](#)

Search... 

Items involving Kx Systems

SUT ID: KDB141211

STAC-M3

Kx Systems kdb+ 3.2 with Intel SSD DC P3700 on Lenovo System x3850 X6

Post date: Thursday, January 22, 2015 - 08:31

[Read more >](#)

SUT ID: KDB140603

STAC-M3

STAC-M3 / kdb+ 3.1 with HGST FlashMAX II on IBM x3750 M4

Post date: Thursday, June 26, 2014 - 23:27

[Read more >](#)

SUT ID: KDB140522

STAC-M3

STAC-M3 Kx Systems kdb+ 3.1 with Intel SSD DC P3700 on IBM

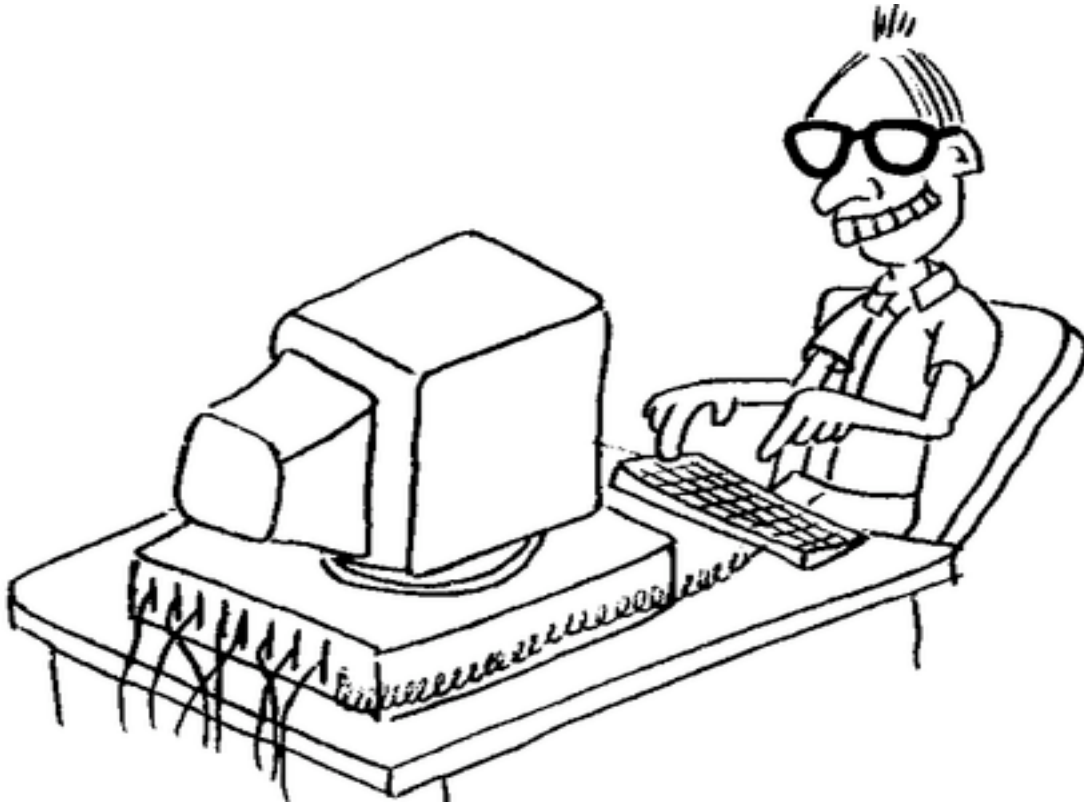
Kx Systems

Search reports related to this vendor... 

Filter by :

☐ Domain

Demo



Summary

- Big Fast Data
 - Scalability
 - High Throughput/Low Latency
- IoT
 - Time-Series
 - Small Footprint
- Lower TCO
 - Efficient Software
 - Less Hardware

Resources – Wiki Page



Navigation

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[Contrib](#)

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[Discussion](#)

Read

[View source](#)

[View history](#)

Main Page

Welcome to the Kx wiki. See [About](#) for an overview of the wiki and how to edit the pages.

It is a good idea to familiarise yourself with how the [search](#) function works. The default operation when inputting search strings and pressing enter is to run the "Go" function as opposed to the "Search" function.

Wiki Pages:

- [Show Me](#): gets you started and shows the performance and language of kdb+
- [Tutorials](#): tutorials on using kdb+
- [Reference](#): an online kdb+ reference
- [Cookbooks](#): a collection of how-to guides on kdb+
- [Articles](#): a collection of articles and useful links
- [Contrib](#): guides to the contrib area of the code repository

Other Links:

- [Code repository](#): the Kx community subversion repository
- [Kdb+ utilities](#): a versioned mirror of the [kx.com/q](#) [🔗](#) directory
- [Kx Home](#): [🔗](#) Kx website

Resources – Kx Community

kx community

HOME

ABOUT

JOBS

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EVENTS

CONTACT

Welcome!

Here is where you will find shared tips, tricks & best practices for kdb+ and q. Subscribe here for the Kx Community newsletter.

Email Address:

Your email address

kdb+ Meetups

Milan Meetup
kdb+: All that you need to know and more
7 May 2015

Seattle Meetup
kdb+ at Zillow
7 May 2015

Milan Meetup
kdb+: All that you need to know and more
7 May 2015

Copenhagen Meetup
kdb+: All that you need to know and more

Time to: Name. That. Function!

May 5, 2015

Expert kdb+ programmer Aaron Davies needs a name for his new function. [Read more...](#)

Arthur talks

April 28, 2015

Arthur Whitney is a serial creator of high performance programming languages, and the author of kdb+. He visited New York City last week from his home in California and gave a couple of talks: one at the Center for Data Science at NYU and another at a user group meeting held at Morgan Stanley. [Read more...](#)

Be multilingual with Babel for kdb+

April 21, 2015

Wouldn't it be useful if all of the different databases in your environment were simply and seamlessly accessible from kdb+ without the hassle of configuring ODBC? It's a problem that inspired Charlie Skelton, guided by generous feedback from our users, to come up with Babel for kdb+. [Read more...](#)

Scripting queries in the Ivy analytic platform

April 14, 2015

The folks at Bedarra Research Labs in Ottawa recently added some stuff to their web site. Highlights include great scripting query examples in Ivy, their interactive analytics platform that leverages kdb+ and the q programming language. [Read more...](#)

[Download kdb+](#)

Recent articles

- Time to: Name. That. Function!
- Arthur talks
- Be multilingual with Babel for kdb+
- Scripting queries in the Ivy analytic platform
- Kx Community page on GitHub
- Sports stats & kdb+, a perfect match

Twitter @kxsystems

Kx Systems @kxsystems 4 May

In NYC and interested in kdb+/q? @FintanQuill is speaking tomorrow night at #NYCSQL Database Month: bit.ly/1GVBo37

[Expand](#)

Kx Systems @kxsystems 4 May

Really???




"It was just a dumb thing. Then we put a chip in it. Now it's a smart thing." [twitter.com/mims/status/59...](#)

[Expand](#)

KX SYSTEMS


Kx Systems, Inc. is a subsidiary of First Derivatives Plc.

Resources – Forum & Google Group

 aideen@kx.com


Groups


NEW TOPIC



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My groups

Home

Starred

▼ Favorites

Click on a group's star icon to add it to your favorites

▼ Recently viewed

Kdb+ Personal De...


[Privacy](#) - [Terms of Service](#)

Kdb+ Personal Developers Shared publicly

30 of 1372 topics (99+ unread) ★


Manage · About ▾

A moderated group for q and kdb+ questions from users of the 32bit edition of kdb+. As this is a public forum please do not publish proprietary code. Licensed users of kdb+ should use the k4 listbox.

**Function overloading with variable number of arguments** (3)


By Yan Yan - 3 posts - 26 views

4:35 AM

**2 `p# columns** (4)


By Yan Yan - 4 posts - 19 views

Apr 7

**new kdb+ book, Nick Psaris' Q Tips** (9)


By Simon Garland - 9 posts - 156 views

Apr 6

**Why is .Q.dpft making `p#sym the 2nd col?** (2)


By Yan Yan - 2 posts - 16 views

Apr 6

**running kdb from c compiling issues** (8)

By Varun Tomar - 8 posts - 29 views

Apr 4

**reading output of `ls`** (3)

By effbiae - 3 posts - 16 views

Apr 4

Resources – Github



Kx user contributions on GitHub

[Documentation](#)[Kx Community](#)[Free kdb+](#)

▶ [Subscribe here](#) to the Kx Community newsletter.

▶ [Email us](#) if you would like to list your Kx-related GitHub code.

exxeleron

/enterprise-components

exxeleron enterprise components
for kdb+, a brand of DEVnet

CharlesSkelton

/studio

studio for kdb+

geocar

/qnode

kdb+ client for NodeJS

psaris

/qtips

Nick Psaris' Q Tips code

yang-guo

threads, qml, conn, timer, qp

exxeleron

/qPython

DEVnet's interprocess
communication between Python
and kdb+

enInt

/pyq

Python interface to the Q
language

AffinitySystems

/qprof

q code profiler

AquaQAnalytics

/mongo

AquaQ Analytics' C shared lib along
with associated q functions to allow
push/pull access to mongoDB from
within kdb+

zholos

/qml

math library for kdb+

openfin

/fin-hypergrid/q

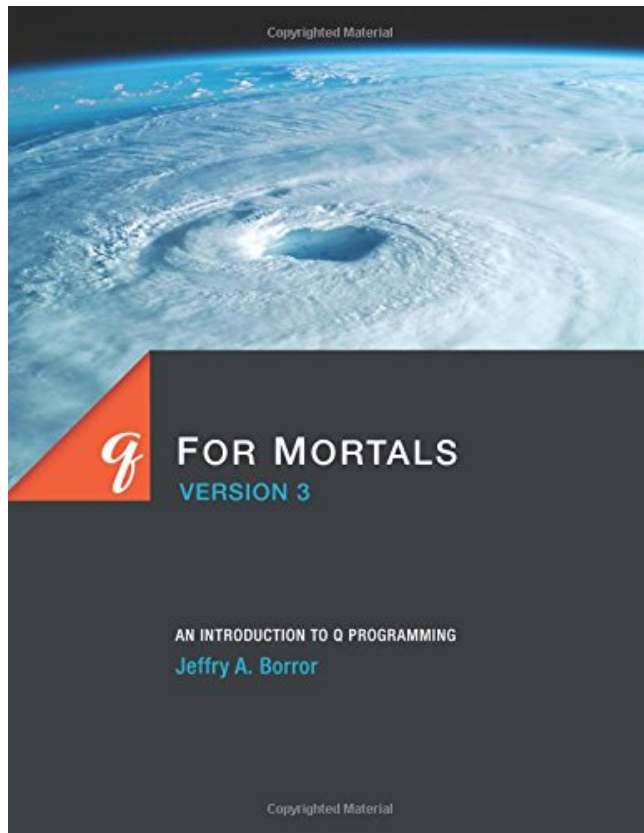
OpenFin q subsection

geocar

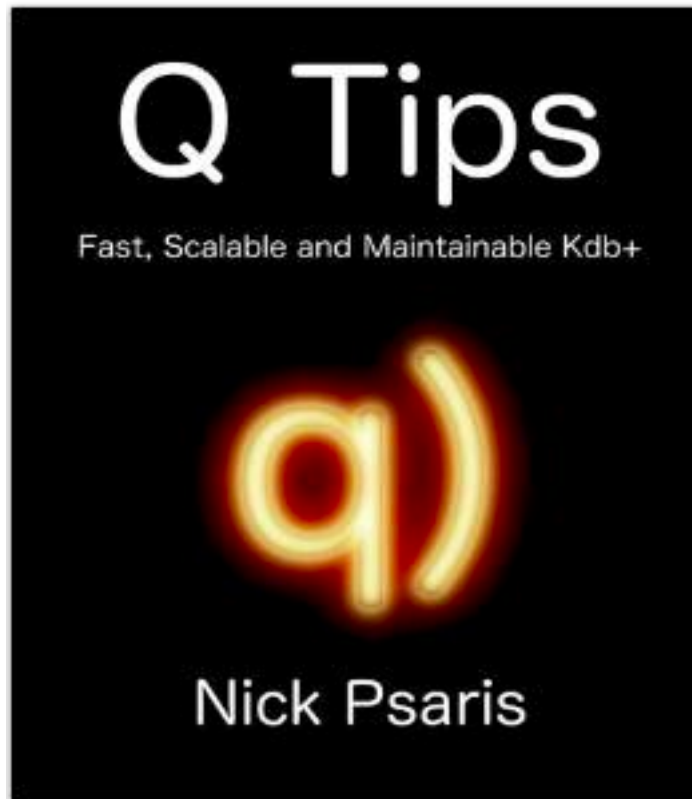
/qphp

kdb+ client for PHP

Resources – Q For Mortals



Resources – Q Tips



Resources – Free 32-bit download



Try it for free.

Software

Products

Benchmarks

Documentation

Support

Purchase

Free Version

FAQ

Kx offers a free 32-bit version of kdb+, with all the functionality of the 64-bit version. Free 32-bit kdb+ can be used for commercial, non-commercial, and educational use.

For getting-started resources go [here](#).

DOWNLOAD KDB+ SOFTWARE LICENSE AGREEMENT

CAREFULLY READ THE FOLLOWING TERMS AND CONDITIONS. BY DOWNLOADING THE KDB+ SOFTWARE, YOU ARE AGREEING TO BE BOUND BY THESE TERMS AND CONDITIONS. IF YOU DO NOT AGREE TO THESE TERMS AND CONDITIONS, DO NOT DOWNLOAD THE SOFTWARE.

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I AGREE - PROCEED TO DOWNLOAD

COMMUNITY

The Kx universe.

Join the worldwide community of dedicated kdb+/q users sharing code and tips and tricks.

[GO +](#)

Resources – Kx Community Meetups

Kx Meetups

Find out what's happening in Kx Meetup groups around the world and start meeting up with the ones near you.



Groups
55

Members
2,086

Interested
33

Cities
54

Countries
34

Related topics: [kdb+](#) · [Identity](#) · [Big Data Analytics](#) · [Math](#) · [Financial Engineering](#) · [Big Data](#) · [Data Analytics](#) · [Quantitative Analysis](#) · [machine-to-machine](#) · [Data Science](#)

Resources – FD Lecture Series



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Kx Lecture Series

Edition 27

An Introduction to Neural Networks with kdb+

Edition 26

An Introduction to Graphical Interfaces for kdb+ using C#

Edition 25

Time series simplification in kdb+: A method for dynamically shrinking big data

Edition 24

Parse Trees and Functional Forms

Edition 23

A Natural Query Interface for Distributed Systems

Edition 22

kdb+ and WebSockets

Edition 21

Building Real Time Tick Subscribers

Edition 20

Data Recovery for kdb+tick

Edition 19

kdb+tick Profiling for Throughput Optimization

Edition 18

Surveillance Techniques to Effectively Monitor Algo and High Frequency Trading

Edition 17

Temporal Data: A kdb+ Framework for Corporate Actions

Edition 16

Intraday Writedown Solutions

Edition 15

kdb+ Query Scaling

Edition 14

kdb+ and FIX Messaging

Edition 13

Machine learning techniques are increasingly being used to advance the ability of computers to solve new problems. In this edition of q for Gods, James Neill explores the implementation of feedforward networks using kdb+ and how these can be trained using back-propagation.



q for Gods Whitepaper Series (Edition 27)

An Introduction to Neural Networks with kdb+

September 2015

Authors:

James Neill, who joined First Derivatives in 2013, works as a kdb+ consultant for one of the world's largest investment banks developing a range of applications. James has also been involved in the design of training courses in data science and machine learning as part of the First Derivatives training programme.

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Appendix

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- [Kx Community](#)
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- [Kx Github](#)
- [Q For Mortals](#)
- [Q Tips](#)
- [STAC benchmarks](#)
- [Free version](#)
- [Kx Meetups](#)
- [FD Lecture Series](#)

Image Sources

- navalarchitecture.tumblr.com
- discardingimages.tumblr.com
- xkcd.com
- despair.com