Technology and Its Discontents

The financial industry’s computing arms race has yielded incredible advances in transaction speeds – with ancillary benefits in risk management and other analytics – but also new questions: How much performance is enough? Is there a point of diminishing returns?

PLUS
The complementary disciplines of valuation and risk management
Social media and reputational risk

Simon Garland
Chief Strategist
Kx Systems
The Engine Keeps Chugging

By Jeffrey Kutler and Janice Fioravante

Even at the depths of market and economic cycles, the pressure to deliver faster, next-generation financial technologies never lets up. Where high-frequency trading, derivatives and risk analytics are concerned, the status quo never seems quite good enough.
Top-tier financial institutions with a history of investing in innovation stayed committed during the downturn, observes Kx Systems chief strategist Simon Garland.
To get a sense of the state of play in financial services technology, Kx Systems might not be the first or most obvious place to start. With headquarters in Palo Alto, California, Kx is in the middle of the Silicon Valley action. But it operates within a well-defined niche – high-performance databases – and, being closely held, it doesn’t get the outside market-research or media attention of an IBM, Oracle or Hewlett-Packard, though all are more or less carried on the same tides that lift or lower the fortunes of key financial industry customers.

Kx, however, has been primarily focused for all of its 17 years on some of the most technologically advanced requirements of the most sophisticated and demanding institutions in the financial world – Goldman Sachs, Morgan Stanley, JPMorgan Chase, Deutsche Bank, Fidelity Investments and more. Having gone its own way in developing a query language that is unique to its kdb+ product series, Kx created a single architecture for querying both real-time and historical databases. The resulting immediacy suits users particularly well at a time when portfolio analysis, compliance and risk management are hard-pressed to keep pace with warp-speed changes in markets and their dynamics.

Kx is one of dozens of financial technology suppliers of varying sizes, profiles and market prominence at the center of what has been characterized as a continual arms race with objectives that often boil down to eliminating time lags and friction in decisions and transactions. Within the field of battle are high-frequency or algorithmic trading, low-latency communications and real-time risk management.

According to Kx chief strategist Simon Garland, who is responsible for technical support and spends most of his time at his base in Switzerland keeping up with the latest performance miracles that new computer chips ruled by Moore’s law make possible, the state of the art is fast and getting faster. And incidentally, Kx’s own results haven’t skipped a beat. The business “carried on at breakneck speed” over the last year, and customers “didn’t wait for the storm to pass. They are keeping their systems going and expanding for more data,” says Garland.

Moore’s law – the promise that semiconductors keep doubling capacity every couple of years – aside, Garland is wary of impending limits.

The underlying technology won’t necessarily be a brake; “we are not having problems keeping pace with technologies like Intel’s,” most recently the Xeon 5600 and 7500 series processors, he notes. But he wonders how long it will be practical to sustain the “collect everything” mentality when it comes to data. There might be wiser or more clever ways to filter data, rather than having to pile on more and more storage to accommodate multiples of current transaction volumes.

“The number of quotes is exploding,” Garland points out. “Do you really need to keep all quotes for every single stock?” He suggests that for just a handful of players, “collecting everything” and insisting on it in real time pays off. But only a handful can pull off an “always be first” strategy; others are in an ultimately unsustainable, “me too” position.

In short, it’s a market of rapid change and robust competition, with some structural rationalization under way – hardly a bad place to be. Even better, as the overall economy shows signs of recovery, the technology sector, and the financial and risk technology segments as well, will benefit to the extent they stayed the course during the downturn and shored up their strategic positions.

Although research and development at the high end, as witnessed by Kx, never faltered, 2009 was slow in areas where Wall Street clamped down on spending, say people in the field. This year, projects that were put on hold are getting green lights. Many of those touch on structured products and derivatives trading and valuation, risk management and analytics in various contexts, which is a boon to vendors in and around those spaces: Calypso Technology, Derivix, FINCAD, Murex, Misys, Sophis, SuperDerivatives and some units of SunGard Data Systems, to name a few.

Carrick Pierce, president of New York-based Derivix, points to the “continuous derivitization” of Wall Street, which his five-year-old company is capitalizing on. Derivix has systems that tap into the trend of investment managers’ move toward equity derivatives, as well as demand for multi-broker execution and risk management capabilities.

When Sophis, the Europe-based purveyor of the RISQUE
trading and risk management solution, introduced its version 6.0 late last year, its asset-class coverage included bank loans, equities, fixed-income and rates and currency options. It took “robust technology platforms” – Microsoft Corp.’s .Net and related technology are at the core – to pull off the upgrade and respond to the needs of investment banking clients during challenging times, said Samer Ballouk, Sophis’ global head of product management and business development.

Putting Pieces Together
IBM Corp. has been reinventing and repositioning itself in part through acquisitions, and more than two dozen have involved business intelligence (notably Cognos, a $5 billion deal in 2007) and analytics, packaged together as Information on Demand. As of last summer, IBM had made a $10 billion investment in this part of its business, which included 4,000 consultants in business analytics and optimization, or “information transformation,” said Ambuj Goyal, general manager of information management.

In July 2009, SPSS, a leader in predictive analytics, was acquired. Predictive analysis had been a missing piece in the Information on Demand portfolio, and SPSS in turn became an important cog in the then-new Smart Analytics System. Goyal described it as “end-to-end business analytics capability,” de-
signed to glean predictive intelligence from deluges of data inputs and to overcome the limitations of “intuition and gut-feel decision-making.”

An application of predictive analytics is credit risk scenarios, modeling potential customer defaults in regions and building those probabilities into loan pricing, says Laurence Trigwell, formerly of Cognos and now an IBM financial services industry leader.

Sybase, soon to be an SAP subsidiary, augmented its technology stack in a different way in February 2010 when it acquired Chicago-based Aleri. A rising star in the emerging area of complex event processing (CEP), sometimes known as stream processing because of its ability to handle huge volumes of data in conjunction with high-frequency trading and real-time analytic applications, Aleri complements and enhances Sybase’s traditional database strengths as well as the financial markets architecture labeled Sybase RAP. Neil McGovern, Sybase director of marketing, reported that he expected the RAP sales pipeline to dry up last year, “but the fourth quarter was the biggest ever,” fueled by the importance to clients of real-time risk analytics and growing concerns such as counterparty risk.

In CEP, Sybase now goes head-to-head against companies making high-performance claims of their own, including two Massachusetts-based developers: Progress Software Co., whose Apama division started out in the U.K. and was one of the first to bring CEP into the financial industry; and StreamBase Systems, which now calls itself the “largest pure play” in the field and has a customer list including BlueCrest Capital Management, CME Group, RBC Capital Markets and SunGard.

Oracle Corp., historically considered a Sybase rival in traditional, relational database technology but now, like Sybase, much more diversified (and a competitor in in-line high-performance databases like Kx’s), has built extensive risk management capabilities into the offerings of Oracle Financial Services Software, into which it has rolled several acquisitions since 2006. The Flexcube and Reveleus banking applications, for example, are rooted in former Indian software firm i-flex Solutions.

Upon the February release of upgrades to its unified suite of analytical applications for enterprise performance management, Oracle group vice president and general manager S Ramakrishnan said the resulting integrated view of balance sheet risks and returns “represents a key strategic differentiator for financial services institutions as they implement strategies to manage risk while maximizing shareholder value.”

**High-Tech Tools, High-Speed Results**

R&D labs within those corporate edifices are constantly pushing the pure technology envelope: chips with multiple cores, 64-bit computing, hardware acceleration and parallel processing. The work has made possible such concepts as predictive modeling and real-time risk management—and, to be sure, the trading systems blamed for breakdowns like the sudden stock sell-off of May 6. Then again, says Sybase’s McGovern, programmatic trading kicked back in to reverse the slide.

Budget squeezes and space constraints in data centers don’t impede, and in fact encourage, advances that do more with less, or make better use of existing resources. FPGA, or field programmable gate array, accelerator chips raise throughput levels at Tervela, a New York messaging systems company that did a recent deployment at ICAP Electronic Broking. “Lots of smaller processing is distributed to lots of CPUs [central processing units], so, in the case of re-pricing a basket of collateralized debt obligations or deciding if a CDO is tradable or not, it can now be accomplished through in-line processing before the trade is executed,” explains J. Barry Thompson, Tervela founder and chief technology officer.

FPGAs in Netezza Corp.’s data appliance work with IBM’s Cognos and SPSS “to process hundreds of terabytes on up to petabytes of data and still get the kinds of performance institutions want and need, reducing query times,” says Phil Francisco, vice president of product management at Marlborough, Massachusetts-based Netezza. “A report that would take 17 or 18 hours to run is done in a few minutes.”

Such technologies lend themselves to large-scale parallelism; there are hundreds if not thousands of cores in GPUs—graphical processing units—in a single server, notes Richard Tibbetts, StreamBase’s chief technology officer. GPUs are good for computation-intensive applications such as Monte Carlo simulations.

“Where companies need to crunch amazing amounts of data, these computations can be done with lightning speed, but the
downside is they’re more difficult to program and they’re not as mature.”

Parallel processing, accomplished through multiple cores, has been critical to Kx Systems. In April 2009, Intel’s Xeon 5500 processor brought a doubling in in-memory, on-disk database speed from the previous generation. Garland, who is enthusiastic about Intel’s innovations on affordable “commodity” chips, said then that because kdb+ was designed for parallelism from the beginning, Kx can “make use of all the cores available. Other legacy applications can never be really fast unless they go back and re-write a significant part of their code to take advantage of newer multi-core architectures.”

By taking advantage of up to 32 cores, Garland said, “data that took 25 hours to calculate is whittled down to 25 minutes. When you get the numbers sooner, you have more time for what-if scenarios.”

(By September 2009, Kx announced with its kdb+ version 2.6 that it could accurately deliver time stamps in nanoseconds, down to nine decimal places, far surpassing those in then-standard milliseconds, or three decimal places. “This is similar to our leading the market to 64 bits years ago, at a time when this was not seen as essential – now it has become the market standard,” said Garland.)

Competitive Advantage

Benchmarking on the 5500 server at a grid computing lab in Boston, SunGard’s Ambit Risk and Performance solution, which covers market, credit and operational risks as well as economic capital and asset and liability management, achieved a 30% increase in computational performance on a 96-core grid. “Running risk simulations 30% faster without the need for code changes can lead to a competitive advantage,” said Paresh Pattani, director in Intel Corp.’s software and services group. Andrew Chang, CTO for SunGard’s Ambit, said he was highly pleased with the results, which show how risk professionals can get increasingly faster results from their ever more complex stochastic modeling.

This April, Intel held a “fasterCity” event in London to herald its Xeon 5600 and 7500, the latter “an enterprise-level chip that opens a host of new possibilities,” said Garland. Algorithmics, ITRS Group, Orc Software and Thomson Reuters were said to be among those working to optimize products on the faster processors. From Xeon 5500 to 5600, Swedish financial markets technology firm Cinnober reduced “round-trip latency from door to door via the matching engine from 286 to 148 microseconds,” said co-founder and CTO Peter Lenti.

ITRS, whose predictive analysis and enterprise management technology helps maximize system performance and connectivity for financial market participants, has, like others, thrived on the demand for real-time reliability. But “there will be a point when the advances are not as fast,” Misha Kipnis, chief technology officer, concedes. Again, this has less to do with Moore’s law than with the complexities of market structure, the fact that there is no single, seamless end-to-network, but rather a multiplicity of connections with varying speeds and capacities along the way. That represents as much a business opportunity as does pure speed, and it won’t go away soon.

Kevin Covington, managing director of ITRS, adds, “High-frequency trading and low latency are important, but that’s not the only dimension. Our strategy addresses a whole raft of other dimensions that customers see as critical and that we have to plan for.”

Kx’s Garland urges reason about real-time, suggesting that not everything needs to be done on the fly, and that a suitability or cost-benefit analysis can improve efficiency in some cases. Pre-trade risk analysis differs from an end-of-day enterprise-wide risk assessment, and so should the data aggregation.

“Real-time everything,” which might be necessary for some forms of trading, carries a cost and may not be ideal for all risk monitoring. On the other hand, Garland adds, it helps to be flexible: “When things look volatile, buckets of data every 20 minutes may not be good enough; you may want to go to every 20 seconds for a while.”