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## Universities Put “Blue Gene” Machines In Cloud, To Help Hedge Funds Trade

Shane Kite

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Two hedge funds – a start-up and another based on Long Island – are set to tap high-performance computing

systems owned by Stony Brook University through a “cloud” of networks that connect firms to available processing capacity at the school.

Separately, FINA Technologies, a Cambridge, Mass.-based hedge fund technology supplier spun out of Gene Network Sciences, is renting cycles on Rensselaer Polytechnic Institute’s IBM Blue Gene supercomputer located in North Greenbush, N.Y. FINA will use one of academia’s largest supercomputing centers to redeploy software originally used to analyze gene sequences for optimal drug therapies to divine money-making opportunities in the capital markets.

The start-up fund working with Stony Brook “will use a mixture of ordinary and high-performance computing to design trading strategies,” according to James Glimm, distinguished professor and chair of the department of applied mathematics and statistics at Stony Brook.

This may involve using cycles on New York Blue, a massively parallel IBM Blue Gene machine housed at Brookhaven National Laboratory, located in Upton, N.Y., and owned by Stony Brook. Stony Brook has created what it calls “a university research cloud,” in which hedge funds can contract to use supercomputing power from Blue and other of the school’s processing resources.

Another fund, which Glimm would only describe as Long Island-based, is working with Stony Brook to develop a trading system that aims to spot price and risk anomalies in the market – gaps where money can be made – by combing massive amounts of market data. The work involves “developing software to power a trading system, drawn in part from high-performance computing, meant to solve a mixture of large and small data analysis problems,” he said.

Because of non-disclosure agreements, Glimm would not provide further details, except to say he and the university “are working with other hedge funds on a variety of software projects.”

But he said the work will draw from a big baseline data crunch, powered by the school’s supercomputer.

“New York Blue will be used for a large calculation to provide what you might call a ‘Bayesian prior’ of the stock market,” Glimm said. “It gives you sort of a universal view of everything. This is where you need huge amounts of data and processing.”

A Bayesian prior is basically aimed at estimating the likelihood of an event – a prediction, essentially – based on analysis of historical and incoming, new data.

“When you get to the trading part after analyzing the data to determine ‘that’s my world view,’ what you do about it tomorrow using these findings is probably a smaller problem, which wouldn’t go on Blue,” he said.

Stony Brook is one of several intellectual ground zeros for quantitative finance. The Long Island institution is home to Nobel prize-winners such as C.N. Yang (Physics, 1957) and Robert J. Aumann (Economics, 2005); famous mathematicians such as Glimm and Dennis Sullivan -- and alma mater of arguably the most successful hedge fund manager in history: Renaissance Technologies’ founder James Simons. One of Simons’ several notable achievements: Renaissance’s Medallion fund’s 45-percent average annual returns since 1988.

Stony Brook’s program works thusly: Firms can use Blue for free for “proof of concept” trials, in which hypothetical data or dummy code is used. Blue can also be used free if firms agree to share intellectual property that gets developed with the university.

Firms must pay for cycles when they want to run proprietary work. The companies pay a portion of Blue’s utility bill plus a small surcharge – what Michael Ridley, director of New York State’s high-performance computing (HPC) program says amounts to “fractions of a penny” – for computing cycles consumed. “It’s a lot cheaper than [Amazon’s] EC2,” Ridley claims.

New York Blue is considered “the centerpiece” of the New York Center for Computational Sciences, a cooperative initiative between Stony Brook and Brookhaven meant to foster area innovation via collaboration between the state’s national labs, universities and industry. It is part of a larger program run by the New York State Foundation for Science Technology and Innovation (NYSTAR), where Ridley is HPC director.

New York Blue can perform over 100 trillion calculations per second. The 18-rack IBM Blue Gene/L system is the 58th fastest supercomputer in the world, as ranked by Top500, which rates these machines. Stony Brook’s cloud includes a smaller, two-rack Blue Gene/P system as well.

Firms access these supercomputers via secure connections over the Web known as virtual private networks (VPNs). Datasets are transferred either with what Ridley calls “better than the bank” encryption or via private courier if the data is too much to be streamed over the Internet.

Security is tight: Brookhaven is a Department of Energy lab dealing with nuclear materials, classified research and matters of national security. Its multiple levels of safeguards must meet Department of Defense standards. This includes armed guards.

Renaissance’s Simons is a longtime Stony Brook supporter and former chair of the university’s math department. This is where he co-wrote pioneering research used in string theory. He donated \$25 million to the school’s math and physics departments in 2006. The former code-breaker followed in 2008 by giving \$60 million to fund Stony Brook’s research programs as well as to fund a center for the study of geometry and physics.

NYSTAR’s other HPC program offers companies cycles at Rensselaer Polytechnic Institute’s IBM BlueGene/L supercomputer, currently ranked 70th among top supercomputers.

RPI is known for its research in computer science and nanotechnology, and for launching in 1980 the nation’s first wholly university-sponsored technology incubator which, RPI says, has helped 250 companies commercialize their ideas. Both RPI’s machine and New York Blue were started up in 2007, purchased with state and federal funds and IBM discounts.

FINA Technologies is renting cycles on RPI’s machine to power the same patented system FINA’s biotech parent uses to uncover best-course drug treatments for patients with cancer, diabetes or Alzheimer’s disease.

Called Reverse Engineering/Forward Simulation (REFS), in its medical application the software performs billions of calculations to pinpoint the most important genetic or genomic markers and identify the most positive responses of a given disease to a particular drug therapy.

When GNS determined REFS’ method of scouring the genome could be applied to sussing profits in the financial market – essentially another system that, like the genome, has loads of components and interactions with varying degrees of correlation to analyze – FINA was spun-off in 2008 to isolate factors that would generate alpha – outsized returns.

*This story first appeared in [Securities Industry News](#).*

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