

# Nippon Life Insurance Research Institute builds a powerful simulation engine with grid technology.

## Overview

### ■ Challenge

The NLI Research Institute (NLIRI) sought to reach new markets with its risk management service, but its simulation capabilities—the core of its offering—were not robust enough to meet its customers increasingly demanding standards.

### ■ Why Become an On Demand Business?

NLIRI needed a faster, more flexible simulation capability to give it the kind of world-class responsiveness it would need to compete in the broader marketplace. To preserve its resources and strategic focus, it sought to avoid building a new, larger server infrastructure.

### ■ Solution

NLIRI worked with IBM to build a powerful, first-of-a-kind grid-based risk management solution. By leveraging its underutilized desktop computing resources to create an efficient, virtualized computing platform, NLIRI achieved a 12-fold improvement in simulation run time and acquired world-class analytical capabilities. This strengthens NLIRI in its bid to serve demanding new market segments.

### ■ Key Benefits

- 12-fold increase in simulation performance
- Lower infrastructure TCO through avoidance of additional servers



Based in Tokyo, NLI Research Institute is a think tank with a broad research agenda and a lean staff of just over 100. Its Financial Research Group uses financial theories and computer technology to analyze and evaluate markets and financial products, and provide high-quality data on a timely basis. Its self-described charter: "Bridging the gap between theory and practice."

In 1988, Tokyo-based Nippon Life Insurance Company—one of the world's largest—founded the NLI Research Institute, or NLIRI ([www.nli-research.co.jp](http://www.nli-research.co.jp)) as an independent business unit whose mission was to conduct basic and applied research in the areas of insurance, social development, economics and finance. Each of NLIRI's four subject-specific divisions are bound by the common goal of helping companies understand and adapt to the forces—both global and domestic—that continue to shape Japan's economy and society. Within this capacity, NLIRI places a high priority on providing

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– Shuji Tanaka, Executive Research Fellow, NLIRI

### On Demand Business Benefits

- Vast improvement in responsiveness to customers' time-sensitive data requests.
- 92% reduction in the time required to process a 10,000-scenario Monte Carlo simulation
- 99% reduction in the time needed to run a 100,000-scenario simulation
- Lower TCO for computational infrastructure through the avoidance of additional servers and associated server management costs
- Increased utilization of existing IT assets
- More robust and flexible scheduling of processing workloads

practical, concrete solutions. A prime example is the company's Financial Research Group, whose initial charter was to provide other companies in the Nippon Life Group, with state-of-the-art analytical tools to support their investment decision-making and risk management processes. Over time, steady increases in the speed, complexity and globalization of financial markets, as well as a changing regulatory climate in Japan, have made the Financial Research Group's role both more essential and more challenging. This is especially true in the area of risk management, where an explosion in the number of investment products has likewise made the accurate measurement of underlying risk more important—and more complicated—than ever.

At its most basic, risk management is about measuring underlying risk and then taking steps to minimize exposure to it. In the investment arena, risks are a function of how portfolios of financial instruments perform over different market pricing scenarios. Because price movements are random and unpredictable, the only viable way to measure underlying risk is to "run" a number of scenarios and observe the outcomes that result. Given the complexity of global financial markets, companies like NLIRI need to run a large number of these scenarios, using techniques such as Monte Carlo simulation, to produce a reliable picture of underlying risk. As intuition would suggest, a higher level of accuracy requires a larger number of scenarios. For NLIRI, major changes in the global marketplace—combined with an expansion of its own strategic ambitions—would further elevate the importance of its simulation capabilities.

### Change brings opportunities and challenges

Having successfully provided risk management services to internal units, NLIRI's new agenda called for the penetration of new markets outside of the Nippon Group. Implicit in this plan was the need to meet a higher standard of service quality, with the key metric being accuracy and the time required to turn around risk data requests from customers. At the same time, the industry as a whole was undergoing a significant refinement in its guidelines for risk management. With the recent introduction of an international agreement known as the Basel II Framework, banks were now expected to more closely align their underlying risks with capital reserves. For NLIRI, this presented an opportunity and a challenge. The fact that banks were looking to enhance their risk management capabilities represented a clear opening for NLIRI. But to successfully capitalize on it, NLIRI needed to meet an even higher performance standard. It would be required to run far more

*“With the Basel II framework, we knew we had to develop the capability to do deeper and more complex risk analysis—and that meant a more powerful infrastructure. But we didn't want to buy a supercomputer to do it.”*

– Shuji Tanaka

scenarios to obtain more accurate risk measures, and it would need to do so in a fraction of the time. In short, flexible and robust high-volume processing capability was a must-have.

NLIRI realized that its existing system, running on a pair of Sun Microsystems servers, fell short, due largely to less-than-optimal capacity management and utilization. For instance, to even run a modest 10,000 scenarios required 10 hours, while the more likely emerging requirement of 100,000 scenarios took nearly 100 hours—performance that would be unacceptable to potential customers. While the need for more processing horsepower was clear, the traditional approach of simply adding servers to the existing solution was deemed too expensive both in terms of upfront capital costs and ongoing systems management requirements. Instead, NLIRI looked to capitalize on the untapped computing capacity it already had in its powerful desktops, which held the promise of more power and flexibility as well as lower total cost of ownership. But while eager to embrace an innovative, cost-effective solution, NLIRI needed to know it would deliver the security, reliability and manageability that would be required for a growing base of external users.

With this vision in mind, NLIRI engaged IBM Japan, Ltd. to jointly develop an innovative risk management system that uses grid computing technology to join 50 existing department PCs into a powerful, virtualized engine for running Monte Carlo simulations. Parallel processing is the system's biggest strength. The flow begins when simulation requests are submitted to the grid engine via the front end server. Using a grid middleware platform specially developed by the IBM T.J. Watson Research Center, the system can disassemble simulation requests, distribute calculation jobs according to resource availability and process them in parallel. Core functions like security, job scheduling and maintaining the integrity of results are managed by a customized processing engine known as the Financial Grid Manager, which was also developed by the IBM Tokyo Research Lab. Unlike the old system, the grid solution provides a high degree of flexibility and control over the scheduling of these parallel workloads, eliminating what had been a major bottleneck to the rapid delivery of time-sensitive market information to clients.

#### Breaking the bottleneck

The first of its kind in Japan, NLIRI's grid-based solution enables the company to meet—and surpass—the rigorous requirements of the financial services marketplace. The key source of its increased competitiveness is a drastic improvement in simulation processing time enabled by the virtualization of its computing resources. For instance, the time required to process a 10,000-scenario fell by 92%, to just 44 minutes, while the time needed to run 100,000 scenarios fell by nearly 99%, to 70 minutes. By vastly reducing the turnaround time for complex data requests, the grid system produced a quantum leap in NLIRI's overall responsiveness and endowed the company with world-class

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## Key Components

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### *Custom Solutions*

- IBM Financial Grid Manager application

### *Services*

- IBM T.J. Watson Research Center
- IBM Tokyo Research Lab
- IBM Japan Grid Computing Customer Center

*“As a research institution it is in our culture to embrace innovative solutions to complex problems. The fact that IBM shared that value with us was a big factor in why we chose them.”*

– Shuji Tanaka

analytical capabilities. Equally impressive was the cost-efficient means by which it acquired them. By avoiding the need to invest in a new, larger server infrastructure, NLIRI minimized its TCO and kept its resources focused on what matters most—creating and disseminating knowledge.

With the success of the risk management initiative, NLIRI has expanded its work with IBM to develop a range of new grid-based financial applications. Working with IBM's Tokyo Research Laboratory and the IBM Japan Grid Computing Customer Center, NLIRI is now creating new grid-based applications that will support a planned expansion into the rapidly growing market for variable annuity products—one whose computational complexity matches that of risk management. Shuji Tanaka, executive research fellow at

NLIRI, sees grid computing—and the NLIRI's collaboration with IBM—as opening up a whole new set of financial market opportunities. “As the thought leader in grid computing, we saw IBM as the kind of innovator that would help us put our vision into practice,” says Tanaka. “The grid solution that came out of our work together has made our calculations faster and made us more nimble and efficient as an organization.”

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