

New York Independent System Operator (NYISO)

Delivering High Availability, Platform Flexibility, and a 50 Percentage Point Gain in Utilization with an Innovative Clustering from Symantec and ServerWare Corporation



To help keep current flowing to nearly 20 million power-hungry New Yorkers, the New York Independent System Operator (NYISO) and ServerWare Corporation, a Symantec business partner, developed an innovative active-active architecture for disaster recovery. It uses Symantec clustering and Solaris 10 Containers to meet recovery targets, boost utilization by a projected 50 percentage points, avoid a \$500,000 expansion, and speed time to market for new services by 80 percent. NYISO is now adapting the solution for its IBM AIX logical partition (LPAR) environment.

High Stakes Power

NYISO (pronounced NICE-oh) serves one of the most influential business regions in the world. Downtime at NYISO's data center could have greater financial impact than at almost any other data center.

Based near Albany, New York, the 400 employees of NYISO, a not-for-profit corporation, manage a wholesale energy market with \$12 billion in annual transactions and almost 11,000 miles of high voltage lines. Together these components provide power to 20 million people throughout New York State—including the center for world finance that is New York City.

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Mike DeSocio,

Supervisor of
Infrastructure Support
New York Independent
System Operator

NYISO employees take pride in the responsibility that comes with their role. By opening up fair market competition among energy sources and providers, says NYISO President and CEO Mark S. Lynch in a letter on the NYISO Web site, they “ensure that New York's energy needs are met reliably and economically.”

A Drive To Increase Efficiency

To support increasing demands, NYISO sought to consolidate five data centers into two, enhance disaster recovery—and increase utilization. It challenged its IT team to deliver an availability architecture that would boost utilization from 10 percent to 50 percent.

The IT team knew that virtualization would be a key tactic. They saw the benefits of storage virtualization when they started using Veritas Storage Foundation from Symantec in 2003.

“At the time we needed to be able to grow file systems faster,” says Mike DeSocio, supervisor of infrastructure support. “We purchased Veritas Storage Foundation to manage a data warehouse environment that we anticipated growing pretty rapidly.

COMPANY PROFILE

The New York Independent System Operator (www.nyiso.com) manages New York's electricity transmission grid—a 10,775-mile network of high-voltage lines that carry electricity throughout the state to 19.2 million New Yorkers. NYISO, a nonprofit corporation with 400 employees, also oversees a \$12 billion wholesale electricity market serving the state.

INDUSTRY

Energy, Power and Gas

SOLUTION

Data Center Automation, Storage Management, Data Protection

The solution enabled NYISO to move a 120-server data center with just one-half hour of downtime.

“From a single pane of glass, Veritas Cluster Server HA/DR can manage clusters and Containers throughout NYISO’s two data centers. Instead of failing over an entire physical server, we can failover the Containers within it.”

Robert Ball

Director of Services and Solutions
ServerWare Corporation

“Making storage changes used to require several hours of downtime, and a month of planning, coordination, and approval because of the impact that downtime has on our market participants. With Storage Foundation we can make allocation changes on the fly, and our administrative preparation beforehand is just a couple hours.” That’s equivalent to a 99 percent improvement.

Taking Backup Off-Host

NYISO also gained efficiency in 2003 by deploying Veritas NetBackup along with Storage Foundation, so the backup process could be moved off-host. “Our Oracle database environment is Solaris-based, but we take a snapshot of the data and use Storage Foundation to import the volumes from a Solaris box to an IBM AIX box. Because of NetBackup’s multiplatform capability, we can back up the volumes with media servers residing on AIX.” DeSocio explains. “Hitachi ShadowImage plays a role in the data transfer.

“The solution allows us to avoid using the CPU and memory in our production database servers for backups. They can remain online.”

NetBackup also enables NYISO to recover servers 50 percent faster. “We use NetBackup to restore a server in four hours instead of the painful, uncertain day or more it took with our prior backup solution,” DeSocio says. “We restore a server about six times a year.”

Driving To Reduce Complexity

Pleased with results from Symantec solutions, the IT team partnered with ServerWare Corporation, a Rochester, New York-based Symantec Gold Business Partner, to develop an innovative disaster recovery architecture that increases virtualization, consolidation, availability, and utilization—while reducing complexity and administration time.

“We wanted to improve use of UNIX resources,” DeSocio remembers. “We had already consolidated 400 UNIX servers to about 55 physical ones. But we still had quite a few logical servers running on these boxes. We wanted to go one step further and reduce that number.”

The team from NYISO and ServerWare focused on using Solaris 10 containers which enabled multiple applications to be consolidated on one system. At that point Robert Ball, Director of Services and Solutions for ServerWare Corp, utilizing his experience as a primary architect and extensive experience in clustering, recommended that the Solaris 10 Containers be managed using Veritas™ Cluster Server software.

Centralizing Management

“From a single pane of glass, Veritas Cluster Server HA/DR can manage clusters and Containers throughout NYISO’s two data centers,” Ball explains. “Instead of failing over an entire physical server, we can failover the Containers within it.”

The solution uses the partitions of Solaris 10 Containers to keep applications separate. Veritas Cluster Server enables an administrator to stop and start the Containers or applications and move them to a different system as needed.

“Without Veritas Cluster Server, it wouldn’t be practical to move applications from Container to Container,” Ball says. “It’s possible, but it’s a long, manual process involving much expertise.

“With Veritas Cluster Server, NYISO gains considerable flexibility. They can set performance thresholds, for instance, and if they need more CPU resources, they can easily move an application to a new system. They can move it for performance reasons, failure reasons, or maintenance reasons. And they have this flexibility without having to buy new servers, or extend their SAN.”

The Veritas Cluster Server/Solaris 10 Container solution powers NYISO’s high availability Oracle environment, which houses back-end data supporting energy market transactions. Physically, the solution consists of two Sun Fire V890 servers in a two node “active-active” cluster in the Guilderland data center, just outside Albany, and two other Sun Fire V890 servers in a two node “active-active” cluster 30 miles away at NYISO’s East Greenbush data center. Fibre connects the two data centers.

All data is stored on Hitachi TagmaStore Universal Storage Platforms (USPs), and is replicated between data centers using Hitachi ShadowImage and TrueCopy software.

Simplified To One Server

Logically, the NYISO solution has unique features. “By using Veritas Cluster Server, we’re able to build only one virtual server and actually migrate it from machine to machine,” DeSocio says. “What this does for us is minimize our configuration effort. A server in the Guilderland data center will have the exact same configuration as a server in the East Greenbush data center because we’re actually moving that virtual server from one data center to the other.”

Saving \$500,000 With Increased Utilization

One benefit is higher utilization. “We had hot and cold data centers before, now we’re running a hot-hot scenario,” DeSocio says. “Veritas Cluster Server and Storage Foundation let us orchestrate the two centers to have a non-essential database running on idle hardware. As a result, we use our disaster recovery data center for testing and development. If we need to initiate a production failover, Cluster Server determines machine work load, and if the destination machine doesn’t have enough capacity, Cluster Server can shut down the non-essential database.”

Before deployment, NYISO had 10 percent utilization, mainly due to using stand-alone systems for development and testing. The new solution has boosted this figure to 35 percent. “We’re forecasting 60 percent utilization when we’re done,” DeSocio says. “That’s a 50 percentage point increase from where we started.”

“The increased utilization has enabled us to cancel plans for adding a new database on the AIX platform, saving us \$500,000.”

Each system now has five Containers and might end up with as many as 20. “We’ll be monitoring CPU, memory and I/O usage—because these are databases—and then adding Containers to each system as appropriate,” DeSocio says.

Sixfold faster time to market

About three times a year, NYISO needs to roll out a new application in its Oracle environment. “Before this solution,” Ball comments, “the IT team would get the sizing of the new application request, then put up a test or buy a box that’s too big or too small. Now they can deploy the new application, check out the sizing specs, and in the worst case scenario add a new node to the cluster.”

DeSocio confirms the improvement: “With the Symantec/ServerWare solution, our build time for new applications is sixfold faster. We deploy new services in a week or two instead of 12 to 20 weeks. We can serve our market much more quickly.”

60 percent less management

Administration for the Oracle environment is also simplified. “In traditional clustering, you’d have to provision and patch four Containers, install Oracle on four Containers and get the binaries and patches in sync,” DeSocio says.

“Now we do all that on just one Container instead of four. We move the Container from machine to machine, or site to site. The result is about 60 percent lower management overhead for Oracle servers. Instead of the drudgery of provisioning, our team can focus on more valuable tasks.”

Solution components work together to enable flexibility: Within each Veritas Cluster Server cluster, each zone (Container) is on shared storage so there is only one set of physical files. Whatever node they are attached to becomes the live zone, making that specific database environment available. The other cluster has near real-time copies of the physical files through Hitachi TrueCopy replication. Veritas Cluster Server allows only one node throughout the entire global cluster (both sites) to attach a specific zone’s physical files and go live. When a zone goes live, that zone’s files are replicated to the other site through bi-directional replication. In this way, a specific database environment is available from one (and only one) node at any given time and is independent of all other database environments.

SOLUTION AT A GLANCE

Business Drivers

- Enhance disaster recovery and reduce complexity
- Enhance efficiency by increasing utilization
- Consolidate and simplify a multiplatform, multisite infrastructure
- Reduce go-to-market time for new applications
- Ensure disaster recovery in under 4 hours

Technology Challenges

- Meet 4 hour recovery time objective (RTO)
- Simplify management using Solaris 10 Containers
- Consolidate 5 data centers into 2
- Increase utilization with active-active clustering and active-active data centers
- Protect investment in existing multiplatform/multivendor infrastructure
- Take backup offline to reduce demand on CPU

Solution

Symantec high availability clustering and virtualization with multiplatform data protection

Symantec Products

- Veritas Storage Foundation™ for Oracle HA, including
 - Veritas Cluster Server 5.0 HA/DR
 - Agents for Hitachi TrueCopy and Oracle Database
- Veritas Storage Foundation 5.0 for AIX
- Veritas NetBackup™ for AIX
 - Options: Advanced Client
 - Agents: Oracle

Technology Environment

- Applications: Custom market application, ABB Network Manager
- Databases: Oracle 10g R2
- Server platform: 14 Sun Fire V890 running Solaris 10, 120 Sun Fire V100 and V480, 150 HP AlphaServer GS1280 running Tru64 UNIX, 2 IBM System p5 590 running IBM AIX 5.3
- Storage: 10 Hitachi TagmaStore Universal Storage Platform (USP)
- Replication: Hitachi ShadowImage and TrueCopy
- Tape Libraries: 2 Sun StorageTek 9310, Sun StorageTek SL8500

Symantec Services

- Symantec Business Critical Support Services

Symantec Partners

- ServerWare Corporation (www.serverwarecorp.com)

High availability

Since February, 2007, when the new architecture was deployed, NYISO has achieved 99.9 percent availability. “We’ve had no unplanned downtime,” DeSocio notes. “Should we need it, it would be as fast as a site failover.”

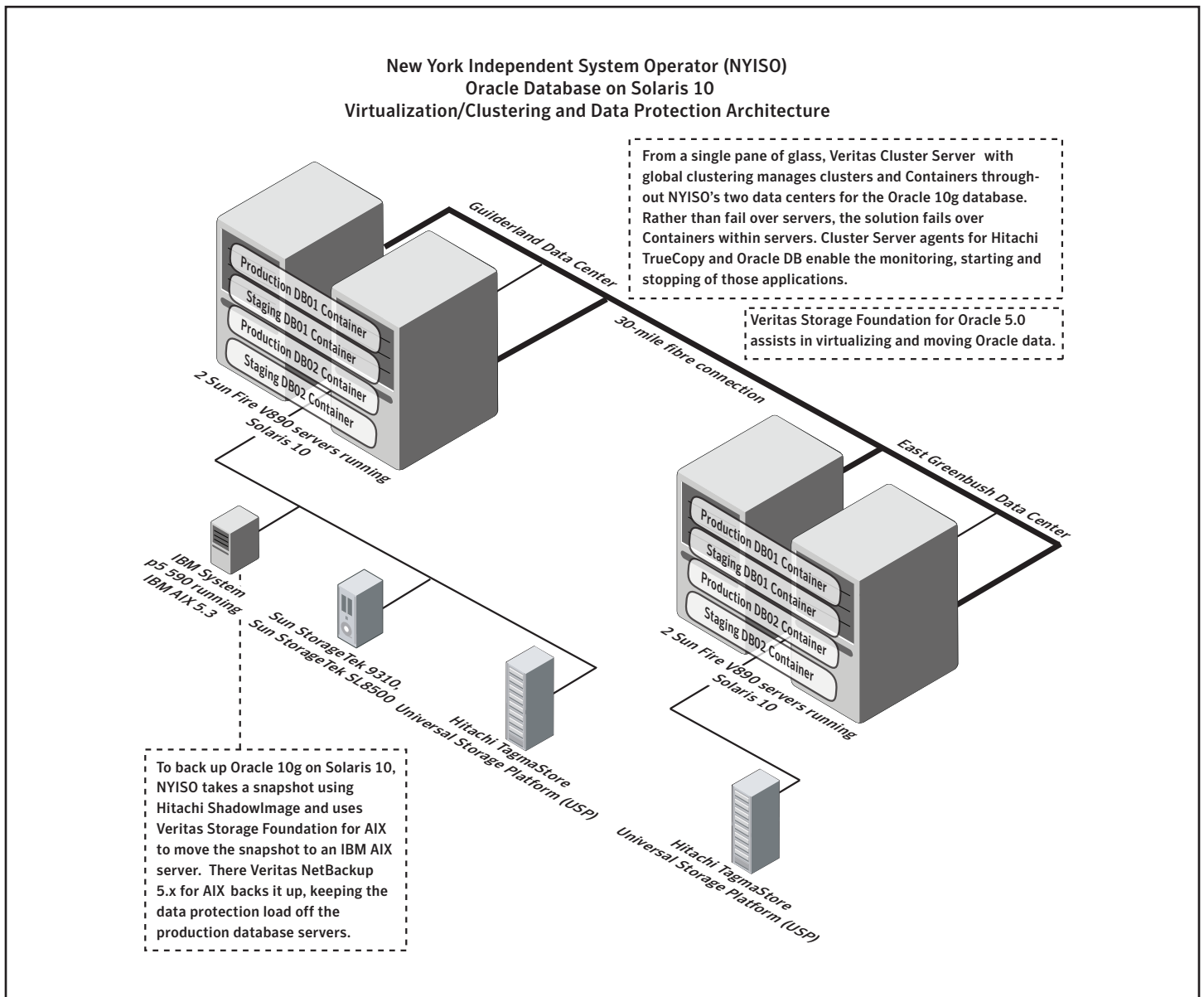
NYISO’s recovery point objective (RPO) has improved 67 percent to 10 minutes instead of 30. The recovery time objective (RTO) is set at 4 hours, the same as before the solution, however the team has been able to achieve a 30-minute recovery time.

Moving the data center

The Symantec/ServerWare solution went live in February, 2007, and one month later the team moved a data center, including 130 physical servers and 300 terabytes of data. “With the new solution, our only actual downtime was a half hour when we broke the data copy between data centers. Otherwise, even when one machine was on the truck, the other machine was still in the data center running. We beat the objective we had for the move, which was that no system should be without redundancy for more than four hours.”

Migrating the concept to LPAR

Pleased with results, NYISO is exploring how to adapt the solution and Veritas Cluster Server HA/DR to its IBM AIX logical partition (LPAR) environment, where it hosts market information and accounting systems. “We’ll end up with more of a traditional cluster environment there,” DeSocio says. “We won’t get as good a management benefit as we do with Solaris 10 Containers. But we should still see enhanced flexibility and reduced administration.”



“We’re forecasting 60 percent utilization when we’re done. That’s a 50 percentage point increase from where we started.”

Mike DeSocio

Supervisor of Infrastructure Support
New York Independent System Operator

BUSINESS VALUE AND TECHNICAL BENEFITS

Business Continuity/Disaster Recovery

- 99.9% availability achieved
- 67% faster recovery point objective (RPO) achieved (10 mins. instead of 30)
- 4 hr. recovery time objective (RTO) SLA met with 30 min. RTO achieved
- Consolidated 5 data centers into 2 with 30 mins. total downtime
- 50% faster server restoration (4 hrs. vs. 8 hrs+ with prior solution)

Operational Efficiency/Cost Savings

- Sixfold faster time to market for new applications, 12 weeks reduced to 2
- Projected 50 percentage point increase in utilization, from 10% to 60%
- \$500,000 in equipment costs for additional database avoided through increased utilization
- 60% reduction in clustering management, maintaining 1 server instead of 4
- 86% consolidation of servers supported (400 UNIX servers to about 55)
- 99% faster storage allocation changes (3-4 hour downtime vs. changes on the fly)

Compliments to ServerWare

“This was a joint solution between NYISO and ServerWare,” Ball says. “We always knew it could be done. Solaris 10 can’t do this on its own. But by taking Veritas Cluster Server and overlaying it with the Solaris 10 Containers, it’s achievable.”

“ServerWare has been instrumental in the architecture and design of this cluster solution.” DeSocio says. “They contributed Symantec knowledge. We contributed Solaris Container knowledge.”

The solution includes available support from Symantec Business Critical Services. “We have not had to use Symantec support,” DeSocio says, “but it’s a relief to know it’s there.”

Gaining platform flexibility

The most important overall solution benefit, DeSocio says, is flexibility. “At NYISO, we’re standardizing. If the platform we choose isn’t right, the Symantec solution reduces our risk. It lets us mount our database on AIX, Solaris, or some other platform. Our decision makers can choose the vendor and platform we want—we’re not locked in. That keeps prices down. And it helps us adapt—and stay available.”

Meanwhile, somewhere in a business or home in New York State, a switch is thrown, and power flows.