# Building a Data Continuance Environment

*Strategies, Systems, and Software from Sun*
*that Deliver Data Continuance*

*An Executive Brief*

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# *Building a Data Continuance Environment* ≡

## *Executive Summary*

A recent survey of IT managers by Gartner Dataquest revealed that more than 60 percent of businesses surveyed did not have a basic plan to mediate the effects of a disaster. At the same time, Gartner estimates that two out of five enterprises that experience a disaster will go out of business in five years.

The need for business continuity planning is obvious. But the process for building the technological infrastructure to deliver business continuity — a "Data Continuance Environment" — is not so clear-cut. For example:

- What is the starting point for businesses that want to ensure fast, seamless resumption of business operations in the event of downtime?

- What are the right storage products and services to create a Data Continuance Environment that delivers continuous application availability and data accessibility?

- Who are the right partners to assist with the planning, design, deployment, integration, training, support, and management of a Data Continuance Environment?

- What is the proof that proposed storage solutions will deliver the promised benefits and grow with future requirements?

This paper presents an overview of issues to consider and steps to take in developing an effective Data Continuance Environment -an environment that extends business continuity beyond the data center to the departmental and workgroup levels and beyond the corporation to include suppliers, business

partners, and customers. It also describes Sun's end-to-end approach to creating a complete data continuance solution, and summarizes Sun's key product and service offerings that help you implement your data continuance solution quickly, correctly, and cost-efficiently.

## *Data Continuance Environment Defined*

A Data Continuance Environment is the technological infrastructure that enables a business to resume business operations in the event of planned, unplanned, or catastrophic system failures. It delivers continuous application availability and data accessibility, and helps enable companies to achieve a broad range of availability options based on specific user requirements. Simply put, it is the technology for delivering business continuity.

### *Data Continuance vs. Business Continuity and Disaster Recovery*

The terms "data continuance," "business continuity," and "disaster recovery" are sometimes used interchangeably, but in fact they are three distinct concepts:

- *Business continuity* is the overarching business objective — a boardroom agenda item. It deals with the company's overall ability to stay up and running, conducting transactions and making money, in the face of unforeseen system failures-regardless of their cause. The focus of business continuity planning is restoring functionality, as opposed to restoring systems.

- *Disaster recovery* is a subset of business continuity. It refers to a specific technical issue, such as restoring a failed system somewhere within the walls of a data center.

- The *Data Continuance Environment* is the means by which the business goal of uninterrupted operations is achieved. It focuses on delivering continuous application availability and secure accessibility of data, with broad range of availability options based on specific user requirements.

**Data Access** · **RAS** · **Data Management** · **Redundancy** · *Data Continuance Environment* · **Recoverability** · **Data Access** · **Remoteness** · **Data Management**
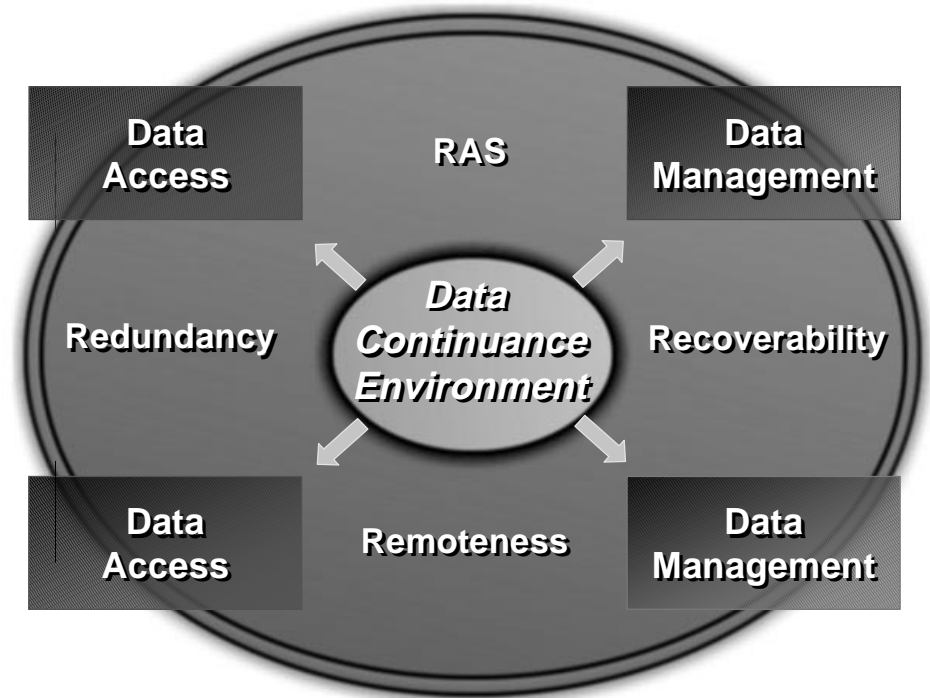
*A Data Continuance Environment is the result of continuous application availability and data accessibility — and delivers the business benefit of business continuity.*

## Business Benefits of a Data Continuance Environment

The Data Continuance Environment delivers the business objective of business continuity. It can help your company avoid financial calamities that could otherwise accompany unforeseen events. Planning for an unexpected outage is one of the most important steps your company can take to protect your mission-critical IT systems. This section helps you quantify the costs of insufficient planning, and, on the other side of the coin, the benefits of an effective Data Continuance Environment.

*The Costs of Inadequate Preparation*

You know that system outages are expensive and disruptive. But have you calculated exactly how much the loss of key business operations actually costs your company on a per-hour or per-minute basis? The breadth of causes — and the magnitude of costs-of interrupted operations may surprise you. Among the actual costs of downtime for typical companies:

- *Lost revenue:* The more dependent businesses become on data-driven, network-based business such as Web commerce, electronic funds transfer (EFT), and online transaction processing, the greater their exposure to lost revenue caused by unexpected business interruptions. For example, when an airline's reservation system went down recently, thousands of travel agents had to book flights manually. Estimated revenue impact from lost reservations (or reservations made with other airlines) amounted to $36,000 per minute.

- *Diminished productivity:* When systems and networks are down, many employees cannot do their jobs properly. Lost productivity results in wasted compensation, lost opportunities, and overtime costs that can be more costly than the lost revenue.

- *Unbudgeted support expenses:* Unexpected downtime means unanticipated bills for repair-including software support, consulting services, user or administrator retraining, and more. In cases where operator error causes a serious problem, the cost of repairing the system can be very significant.

- *Penalties for missed service-level agreements (SLAs):* If systems and networks are not delivering as promised, service-level commitments to customers cannot be met, and often the result is a financial penalty paid back to the customer.

- *Loss of goodwill:* In the era of e-everything, customers are not patient when it comes to downtime. Customers who have to wait for service as a result of system failures are likely to do business elsewhere and remember the incident the next time they consider purchasing.

- *Losses due to unfortunate timing:* The cost of downtime can depend on when the downtime occurs. An unexpected outage during a peak sales period could be devastating, whereas a failure in the middle of the night may have minimal impact. Similarly, unplanned downtime during a large transaction can cause severe complications or even corruption of the transaction data.

- *Lawsuits:* In some cases, system outages can actually result in legal action. For example, downtime of life-critical systems such as emergency communication systems can lead to tragic events. In addition to facing responsibility for the human toll of this type of situation, companies would have to consider the high potential costs of litigation and settlements.

### The Benefits of an Effective Data Continuance Environment

While the cost of even a minute of business interruption can be extremely expensive, the cost of proper planning is not. Moreover, an effective data continuance solution does more than offset the negatives of inadequate planning; it actually helps your business create competitive advantages:

- *Enhanced reputation for customer service*: Service is the primary competitive differentiator in the era of e-business, and when your network services are always available your company's reputation for service is enhanced.

- *Ability to offer SLAs:* While unexpected downtime can cost your business in terms of missed SLAs, high levels of uptime can actually enable you to offer SLAs to gain a competitive advantage.

- *Geographic expansion:* By ensuring multi-site contingencies for delivery of your network services, you mitigate some of the risks and costs of expanding your offerings into new territories.

## Sun's End-to-End Approach to Data Continuance

Business continuity is not delivered by any one product, service, or vendor. It results from a synthesis of strategies, systems, software, and services — all aimed at eliminating business interruption due to system failures. As a supplier of end-to-end products and technologies for open network computing and a leading source of expertise in designing, building, and implementing highly available business systems, Sun recognizes the need to take an all-encompassing approach in developing data continuance solutions.

This section shows how Sun's approach goes beyond traditional "storage-only" solutions to create more complete — and more completely effective — Data Continuance Environments.

## Attacking All Root Causes of Downtime

Sun believes the Data Continuance Environment must take into account-and take action against-all causes of downtime in order to minimize business interruption. By bringing a structured approach to analyzing the root causes of downtime, Sun is better able to develop products, services, and technologies that fully address the full spectrum of issues. For example, many businesses consider only unplanned downtime in their analysis of outages. However, planned downtime — for system maintenance or reconfiguration — can also be disruptive.

## Extending the Data Continuance Environment Beyond the Data Center

Sun's data continuance solutions recognize that data center infrastructure is only one element that needs to be addressed. Given the increasingly decentralized nature of enterprise IT infrastructures, the Data Continuance Environment must extend to the IT resources of all key departments and even workgroups, taking into account the systems deployed at the edge of the enterprise network as well as the systems in the data center.

Moreover, an effective Data Continuance Environment must also extend beyond the traditional borders of the enterprise to key suppliers, business partners, and customer organizations whose own systems are part of the complete service-delivery network. The days of enterprise "islands of data" are over; contingency planning must take into account the recovery of the entire supply chain network.

## Leveraging Practices, Products, and Partners

Sun also recognizes that a vast array of tools, technologies, practices, and third-party partner capabilities make up the spectrum of available data continuance solutions. No single vendor provides a "silver bullet" for business continuity; it is important to investigate and evaluate the full range of industry best practices, products and services, and best-of-breed third-party solutions in creating an effective Data Continuance Environment.

## Sun's Storage Solutions for Building a Data Continuance Environment

Sun helps enable you to leverage the proven reliability of Sun StorEdge™ products and solutions and the expertise of Sun's award-winning service and support organization in designing, deploying, testing, and continuously refining your Data Continuance Environment. This section describes the built-in availability features of key Sun server, storage, and system software products, then describes specific product and service offerings that are part of a complete business continuity solution.

## Built-In High-Availability Features: Hardware and System Software

Delivering products that provide extremely high levels of service-level availability has been a key area of focus at Sun for many years. At the server level, Sun's strategy for maximizing availability has been to develop reliability, availability, and serviceability (RAS) features initially for high-end systems, such as the Sun Enterprise™ 10000 server and the new Sun Fire™ 15K server, then migrate the best of those features to lower-end servers. In addition, Sun servers, from the Enterprise 1 to the Sun Fire 15K server, run the same Solaris™ Operating Environment on the SPARC™ processor architecture, so there is no operating environment transition and no application recompiling required to move from one server to the next. Thus, you can achieve your availability goals in a single server.

The Sun StorEdge line of disk arrays, tape libraries, and storage networking architectures extends Sun's RAS capabilities to the storage arena. For example, the recently introduced Sun StorEdge 9900 Series systems combine sophisticated RAS functionality with a revolutionary Fibre Channel (FC) switched non-blocking architecture to provide truly non-disruptive performance and availability. This innovative architecture provides higher levels of resiliency, bandwidth throughput, and I/O throughput than the older monolithic fixed bus architectures still used by other storage vendors.

Sun is also a leader at both data mirroring techniques to provide fast, reliable replication of data, and clustering solutions that can dramatically increase uptime for groups of servers and the network services they deliver to end users.

*Storage Software Management Architecture and Solution Suites*

- The Storage ONE (Open Net Environment) software strategy: Modeling after the industry's leading services architecture, Sun™ ONE, Storage ONE is the industry's first automated and integrated storage software management architecture. Now you can manage the service, not the storage.

- Sun StorEdge™ Software Suites: Sun is now offering four integrated, industry-leading software suites designed to satisfy the demand for multi-vendor storage management solutions that meet specific needs for availability, utilization, performance, and resource management.

*Data Continuance, Data Protection, Backup, and Recovery Solutions*

Sun offers a comprehensive set of data continuance solutions and services that are optimized for Sun and open, heterogeneous environments, including:

- Sun StorEdge™ Availability and Utilization Suites, which provide an integrated solution that combines point-in-time copy, data replication, storage migration/archiving and other capabilities to help eliminate planned and unplanned disruptions

- Sun StorEdge 9900 series arrays and backup software, which deliver extreme levels of data availability and integrity in high-end data centers where heterogeneity (including mainframe connectivity) and storage consolidation are required

- Sun StorEdge 3900 series high-performance storage systems, optimized for clustered enterprise environments for higher levels of efficiency and productivity through dynamic and seamless scalability.

- The Sun StorEdge 6900 series arrays, offering the industry's first integrated storage virtualization capabilities, are optimized for server and storage consolidation.

- Data mirroring capabilities through Sun disk arrays and software — server-based clustering through Sun Cluster 3.0 software for extremely high levels of data availability and protection.

- Sun StorEdge tape libraries provide high capacity and performance for data backup and archival applications for workgroup, mid-range, and data center environments.

- Solstice Backup™ software and VERITAS NetBackup software provide high levels of data protection for backup, recovery, and archival applications in networked environments.

## Customer Care Solutions

At Sun, storage is a practice focused on quality and complete reliability. Our customer care and service initiatives provide comprehensive product support that helps you develop a business continuity plan with confidence and implement it quickly and correctly.

### Consulting Services

Sun Professional Services consultants understand the process of creating and implementing a comprehensive business continuity plan. Our consultants offer the expertise and experience to devise a solution tailored to the particular continuity requirements of your business, and work with leading business continuity specialists and system integrators to develop an end-to-end solution. Our wide range of services includes:

- Storage-area network architecture and implementation
- Proof-of-concept services
- Backup and restore services
- Storage performance analysis and tuning
- Storage consolidation
- Data migration

### Education and Training Services

Sun professionals offer a full storage curriculum to build your staff's confidence in working with Sun StorEdge disk arrays and software products, helping to minimize system downtime and maximize the operational value of your storage products.

## *Support Services*

Sun's offers comprehensive support services that give you security, as well as complete support solutions for your entire Sun storage environment. Examples include:

- *Proactive Systems* Support: We help you keep your storage systems up and running at all times with the Sun StorEdge Healthcheck program and SunSpectrum™ services. You have the freedom of multiple levels of hardware and software support, from assisted self-support to complete mission-critical coverage.

- *Sun Remote Services (SRS):* The SRS solution provides continuous remote monitoring and management of infrastructure components, including operating system, server, and storage. You get the support you need — sometimes even before you know you need it.

- *Storage Centers:* Three new Storage Centers have opened in regions worldwide to streamline the design and implementation of storage solutions. The centers bring together the hardware, software, staff, and expertise needed to architect, test, and develop support for specific storage and storage area network (SAN) solutions.

## *The Sun Advantage*

Many companies offer business continuity solutions and planning services today. Sun's solutions stand apart because:

- Sun's complete data continuance solutions do not begin and end with storage. While storage solutions such as data replication and multi-site archival are often components of an effective Data Continuance Environment, Sun's approach takes into account the critical role of systems, software, storage, networks, IT skills, security procedures, partners, and business practices in delivering a Data Continuance Environment that meets your specific objectives.

- Sun's approach recognizes that there are multiple causes of downtime beyond natural catastrophes and unforeseen events, and focuses on preventing all sources of planned and unplanned downtime. This approach helps you avoid outages that would otherwise have interrupted business operations.

- Distributed computing, Sun's core competency, is an excellent foundation for business continuity solutions because it harnesses the network to create new alternatives for replication, mirroring, and other forms of data protection.

- Sun's data continuance solutions are available for every business type, every industry, and every level — from the high-end data center to the departmental level to the workgroup.

- Sun consultants have the experience and expertise to assist with every facet of building a complete Data Continuance Environment solution, from planning and design through architecture, implementation, deployment, and ongoing support.

- Sun's automated and integrated storage software management architecture provides resource management services that assist the business decision to build a Data Continuance Environment and strengthen readiness, preparedness, and IT training skill sets.

- Sun's data continuance solutions consider the customer's whole environment, incorporating both Sun and third-party products and considering online, nearline, and offline devices deployed by the business operations to provide best-of-breed solutions.

## *Checklist: 8 Planning Elements for Building a Complete Data Continuance Environment*

While there will be considerable variation from one business to the next in the specifics of formulating an effective business plan for building a Data Continuance Environment, there are certain elements that each plan should contain or at least consider. Sun has identified eight critical elements:

1. *Awareness campaign*: Executive buy-in of the need for business continuity planning is the single most important element. Making the CEO aware of incidents within and outside the company that demonstrate the urgency of devising a plan will help with risk recognition and benefits of planning. Inventorying and showing actual incidents and their aftermath, relating the experiences of other regional enterprises that have experienced disasters, or pointing out the need to comply with new regulations will help draw executive-level mindshare to the issue.

2. *Informal business impact analysis* (BIA): To assess the actual risk to be mitigated by the business continuity plan, planners should interview line-of-business managers and determine the specific impact on business processes of system downtime or lost/unavailable data for various time periods. Both direct costs such as lost revenue and productivity, and indirect costs such as reputation and goodwill should be taken into account. These findings can then be used to secure needed funding and personnel commitments.

3. *Strategy and plan design*: Your company's internal business continuity planners should work together with a selected third-party vendor (a business continuity consulting service provider) to select the most appropriate strategy and create a custom plan that matches management objectives for service-level uptime with technological and staff capabilities. The plan design should consider issues such as:
   • Inventory of IT infrastructure
   • Vulnerability assessment
   • Data, networks, and communications assessment
   • Functional requirements definition: staff, budgets, facilities, backup, first response tactics, etc.
   • Advanced resource requirements definition: data systems replication methods, networks, communications, etc.

4. *Plan development:* This step involves formalizing the specifics of the plan and detailing tactics such as:
   • Project organization and planning
   • Employee awareness and notification
   • Policies and procedures
   • Recovery testing methodology and monitoring program

5. *Plan implementation:* In this step the plan is actually deployed according to plan to meet all identified objectives.

6. *Testing:* The business continuity plan is tested through unannounced "spot check" system outages, dress rehearsals of complete site failures, or other tactics to ensure that all facets of the plan are working properly.

7. *Refinement and improvement:* Based on the test results, your company works with third-party business continuity planners/consultants to enhance the performance of the recovery solution.

8. *Annual review:* A proper business continuity plan is a process, not a destination. It requires constant updating, refinement and enhancement, coupled with a formalized annual review of goals, strategies, requirement, and tactics.

Sun Professional Services experts and Sun's systems integration partners can work with you at every phase of architecting, implementing, and managing a customized business continuity plan and aligning it with your customized business continuity plan for building a Data Continuance Environment.

# Customer Examples

## Priceline.com

Pioneering a unique type of e-commerce using a simple yet compelling concept of "Name Your Own Price", Priceline.com places consumers in a position of power regarding setting the price for a particular service or product. The service is unique; it's fast; it's reliable; and it's built on a redundant database architecture powered by Sun.

As its business boomed, priceline.com understood it needed to scale its back-end systems for capacity and performance, and increase reliability. To achieve that, a migration to a new server, storage, and operating environment would be necessary. After careful evaluation, a decision was made to move to Sun server and storage hardware and the Solaris operating environment. This migration took place in 1999 and since that time, priceline.com has continued to evolve the Sun environment to meet its performance, capacity and backup/recovery challenges. According to priceline.com CIO Ron Rose, one of the key goals was "to be able to sustain a double failure and be back up in worst case in 30 minutes."

Priceline.com built a highly redundant SAN infrastructure based on Sun technology, adding significant resiliency and recovery capabilities to its previous infrastructure. With the Sun SAN technology, there's no physical reconfiguration of servers or storage necessary to recover, even between buildings. It's simply a matter of releasing a disk array from the SAN, re-zoning the Sun StorEdge Fibre Channel switches SAN, and bringing the Sun StorEdge array up on a different Sun server. "We can do that in 15 minutes now as opposed to 16 hours," said Rose. "If you carry that a bit further, we estimate that an hour of downtime can cause us as much as $250,000 per hour in

revenue. If you do the math — $250,000 times even just 8 hours of downtime versus 15 minutes — a SAN becomes very cost effective, very quickly," emphasizes Rose.

Rose added that the unique quatiary redundancy of the new architecture has enabled priceline.com to achieve extreme levels of availability. "We like to say that we have redundancy in everything including our redundancy," he said. "It's a very unique database architecture. In fact, the former COO of Oracle said it was one of the best high availability database architectures he had ever seen."

Rose added, "Obviously mean time to repair from a major failure is paramount, and the Sun technology has drastically improved our disaster recovery capabilities... In short, the Sun SAN technology has allowed us to design an architecture approaching 5 nines availability with both proactive prevention techniques as well as simplified reconfiguration and manageability for streamlined recovery."

## Shaw Cable

Shaw Communications Inc. is a Canadian broadband service provider with 2.8 million cable, Internet, and satellite subscribers, delivering high-quality entertainment, information and communication services via a variety of distribution technologies. In the fall of 1999, Shaw approached Sun with two concepts: first, building an architecture that would allow Shaw to offer its business customers ISP services based on broadband cable; and second, to build a scalable, high-availability ISP architecture to support high-speed Internet access for its residential customers.

After considering several vendors, Shaw selected Sun as the solution provider for its Internet data center. Overall, Shaw weighed a number of factors in its decision to build its data center infrastructure on Sun hardware and software, all with the assistance of Sun Professional Services:

• Architectural thought leadership of Sun Professional Services in working with Service Providers in designing architectures and building infrastructures for Internet data centers based on service-level requirements

• Proven best practices methodology such as project lifecycle management based on the SunTone[SM] Architecture Methodology for deploying world-class data centers

- Modular, scalable storage technologies as corroborated by Sun StorEdge T3 disk arrays, Sun StorEdge FC Network switches and Sun StorEdge Instant Image software, supplemented by proven architectural storage experience of Sun consultants

- A strong collaborative working relationship with the Sun account team

- The ability of Sun consultants to meet aggressive time-to-market objectives and work closely with Shaw IT personnel to train them on data center operations

Sun consultants architected and built a storage environment powered by Sun StorEdge T3 disk arrays connected to the server infrastructure via Sun StorEdge Network FC 16-Port switches, with a capacity to handle 74 terabytes (TB) of data for e-mail, news and Web data. The storage solution can be easily expanded to add more storage capability, which was critical to address in the design process. A clustered storage environment using Sun Cluster 3.0 allows Shaw to fail over storage functions when making system changes, all without incurring downtime.

By developing its own data center, Shaw now has greater control over the spectrum of services, and moreover the service reliability it provides to its cable modem subscribers. As the leader in market share for broadband services in Canada, Shaw aspires to continue its rapid subscriber growth without relying on external Service Providers to provision critical Internet services to its customers. This will allow Shaw to achieve its overall strategic vision to transition from a cable television company to a leading communications Service Provider.

## *J.P. Morgan*

J.P. Morgan is a leading global financial services firm that offers solutions to the complex financial needs of governments, corporations, institutions, individuals, and privately held firms. One of the many fields in which J.P. Morgan excels is the market for the financial instruments known as swaps and derivatives. To maintain its leading edge in this competitive market, J.P. Morgan recently developed a visionary, integrated application suite, called Odyssey, which supports a crucial line of business for the bank.

"J.P. Morgan has a strategy of building disaster resilience into all essential IT services; it's a key element in our ethos of providing a high quality of service to clients," says David Laffin, a J.P. Morgan Vice President, and the technical architect of Odyssey. "J.P. Morgan wanted a rock-solid platform for its Odyssey system."

Sun Professional Services worked with the J.P. Morgan team to devise a ground-breaking contingency solution for Odyssey, involving mirrored disks and a 15 kilometer fibre link between J.P. Morgan's two London data centers. Sun Professional Services carried out a feasibility study, which proved that it was an ideal solution in terms of high availability and resilience.

The fact that Sun Professional Services supplied the platform tried and tested, and truly application ready, allowed the J.P. Morgan business application development team to concentrate on the Odyssey application suite. This was a key benefit, given the vital importance of Odyssey to the business. "Because Sun Professional Services supplied a truly application ready platform for Odyssey, we were free to focus on the business issues and the testing and perfecting of our Odyssey application," says David Laffin. "If we had tried to build the necessary resilience into the application through software engineering, it would have taken several man-years of effort and distracted us from the application itself. Sun Professional Services completed the project in a fraction of the time to schedule and within budget."

Mark Coughlan, J.P. Morgan's European Head of Technology, comments: "Odyssey is a visionary system, unrivalled by our competitors, which ensures that we will maintain our leading position in the competitive market for global swaps and derivatives, which is one of the most important lines of business for J.P. Morgan. We needed a solid, disaster resilient platform for this critical system and we simply could not afford to let anything go wrong. It has been a hugely successful implementation for us, and Sun Professional Services played a key role in that success."

## *For More Information*

For details about any of the products, services, and programs mentioned in this paper, please visit http://www.sun.com/storage.

## *About Sun Microsystems, Inc.*

Since its inception in 1982, a singular vision —"The Network Is The Computer™" — has propelled Sun Microsystems, Inc. (Nasdaq: SUNW) to its position as a leading provider of high quality hardware, software, and services for establishing enterprise-wide intranets and expanding the power of the Internet. With more than US$18 Billion in annual revenues, Sun can be found in more than 170 countries and on the World Wide Web at http://www.sun.com.

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