



## Microsoft Deploys EMC SAN for Data Centers and Reduces Costs by 50 Percent

### Overview

**Country or Region:** United States

**Industry:** IT services

### Customer Profile

The Microsoft Information Technology Group provides IT services for all Microsoft business units. Employing 3,500 people, the group supports more than 100,000 customers.

### Business Situation

The group hosted a storage infrastructure that was increasingly costly and time-consuming to manage.

### Solution

The group developed a storage service based on Microsoft® and EMC products. This service provides highly available storage space on demand and assesses charges to customers.

### Benefits

- Reduced storage costs by 50 percent
- Increased disk utilization to 70 percent
- Increased availability to 99.999 percent
- Reduced average customer response time to one day

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Angus Drummond, Microsoft IT Group Manager, Microsoft

The Microsoft Information Technology Group (MSIT) was experiencing a rapid increase in the time and cost required to maintain its data centers. The storage volume was doubling each year and disk utilization was low. In the first quarter of 2004, MSIT worked with EMC to deploy a storage service built on Windows Server® 2003, Microsoft® SQL Server® 2005, and the EMC CLARiiON storage area network. With this storage utility, MSIT has reduced administrative and storage costs while providing its customers with faster and more reliable service. MSIT has cut storage costs by 50 percent and increased disk utilization to 70 percent. It has also increased data availability to 99.999 percent and reduced the time needed to grant storage space to a customer from 12 days to one day. MSIT expects to see more improvements in performance and cost after moving its servers to Windows Server 2008.

## Situation

The Microsoft Information Technology Group (MSIT) provides IT support services to all of the company's business units. One of its responsibilities is hosting and managing the Microsoft data centers in Redmond, Washington; Dublin, Ireland; and Singapore. The group manages more than 8,000 server computers and supports all Microsoft employees and business applications. It is also responsible for obtaining and deploying all the hardware and software tools needed for the data center infrastructure. In addition, MSIT generates billing and disk utilization reports for its customers. According to Angus Drummond, Group Manager at MSIT, "Essentially, we're running a business within Microsoft. We buy storage and sell it to business units in the company."

Until 2005, MSIT serviced a request for storage from a business unit by purchasing a server and one or more disk drives, installing them in a data center, and providing the customer with access to the new storage over the corporate network. The server and disk storage were dedicated to that particular customer. When the customer needed more storage than was available on the hard disks, more disks would be obtained and attached to the server.

There were problems with this approach. Providing a customer with additional hard disks could not be arranged on demand—an average of 12 days was needed to procure and deploy the additional hardware. This would sometimes result in service delays. Also, when the hardware was purchased, the MSIT team had to estimate how much storage the customer was likely to need in the future. In nearly all cases, the team opted to overestimate the amount of disk space it would need for the customer. This was because future storage needs are nearly impossible to estimate, and storage service is much less likely to be interrupted if there is

more than enough disk space available. As a result, disk utilization was low and costs were high. Each hard disk would be, on average, 10 to 40 percent full at any given time. The majority of the disk space in the data center was unused, incurring unnecessary cost to the company in administration time, server cooling, electricity, and data center floor space.

At that time, the size of storage requests that the team serviced had been nearly doubling every year. Given this rate of growth, the team predicted that it would be maintaining more than 100,000 disk drives and tens of thousands of servers within one to three years. "We realized that the one-to-one server-disk relationship was an unacceptably inefficient way to run a data center," says Chris Haslam, Storage Engineer for MSIT. The team needed a solution that would reduce the cost of running the data centers and improve disk utilization.

Also, MSIT sought to improve service delivery by reducing the time needed to make additional storage available to the customer. In addition, MSIT wanted a solution that would improve storage availability. The group's practice of directly attaching several disk drives to one server was not compatible with technologies that automatically replace failed disk drives, so IT personnel had to manually replace them. Because of the large number of disk drives in the data centers, this became a time-consuming and costly process for the group.

## Solution

To solve these business problems, MSIT formed a group called the Storage Utility team to develop and deploy an alternative to the current storage infrastructure. The team first devised some metrics for success:

- Costs and resources would be reduced.

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Microsoft

- Disk utilization would be increased to between 70 and 90 percent.
- The storage service would run with 99.999 percent availability.

The team developed the idea of a storage service. Instead of allocating some of the data center’s hardware for a particular customer’s use, all of the storage capacity was to be managed as a common storage pool. The team would allocate storage from this pool to its customers on an on-demand basis, and it would dynamically increase or decrease the size of the allocated space depending on the needs of the customer. The team would track the amount of storage used by each customer and would charge them accordingly. Business units at all Microsoft locations worldwide would be able to access this common storage pool at any time. Says Haslam, “At my job, I don’t have to go and organize my own phone service. It’s a utility that is provided for me by people who have the specific expertise. We wanted to do the same thing with storage.”

With this system, hundreds of applications run by Microsoft business units throughout the world would access the same groups of storage hardware simultaneously. Therefore, this service required an infrastructure that would track the amount of storage used by each application and determine the amount of money to charge each customer based on the tracking data. The team chose the Resource Monitor included in Microsoft® Cluster Server to provide the tracking and reporting functionality, and MSIT selected Microsoft SQL Server® 2005 database software to provide the database functionality.

The storage usage information generated by the Resource Monitor was written to the SQL Server 2005 database to generate billing and disk utilization reports for the managers and individual server owners. The infrastructure

was designed to run on the Windows Server® 2003 operating system with Service Pack 2. These software products ran on HP servers with Intel and AMD processors, and Dell servers with Intel processors.

To provide the level of availability, access speed, resource sharing, and ready expandability mandated by the team, the solution would need a state-of-the-art storage area network (SAN). The team turned to EMC to provide this technology along with expertise in shared storage infrastructures. According to John Carelli, Account Manager at EMC, “We had worked with the Storage Utility team for several years, selling shared storage hardware to host shared and dedicated applications. Because of this relationship and the quality of our technology, the Storage Utility team decided to go with us for these purchases.” At the team’s request, EMC provided a trial CLARiiON SAN unit in September 2003. For the next 12 weeks, the team ran a series of performance and availability tests on the trial unit. When the tests were completed with results at or above expectations, the EMC CLARiiON technology was chosen to be one of the foundations of the new service.

From September 2003 to January 2004, the team tested and planned the service using a lab on the Microsoft campus. EMC helped the team deploy more than 12 CLARiiON SAN systems in the data centers in configurations that were outlined in the architecture documents developed by MSIT. Several existing HP StorageWorks Enterprise Virtual Array systems were also incorporated into the storage service architecture for compatibility with some storage hardware technologies. Microsoft Operations Manager 2005 was used to help the team monitor all aspects of the service infrastructure.

Next, the team marketed its plans for the new service directly to Microsoft business units

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through seminars. Says Drummond, “This was not a top-down push within Microsoft. We went out and sold our storage service model, convincing our customers that they would get better service from it. Taking advantage of EMC’s experience and reputation helped us sell this to business owners.” One of the selling points of the new system was a Web browser-based interface for ordering storage services, accessing information about service charges, and providing customer feedback. The response from these seminars encouraged the team to proceed with deployment.

The storage service was launched January 1, 2004. This new utility model has proven so successful that over the ensuing years, the team has expanded the service architecture by adding many more EMC CLARiiON systems. The utility currently supports approximately 6 petabytes of total capacity. The storage service is now an integral part of Microsoft IT operations.

MSIT is in the process of migrating all of its servers to Windows Server 2008. By the end of 2008, the group expects the majority of its servers to be running the new operating system. Says Haslam, “MSIT is one of the first early adopters of Microsoft software. We migrated the storage service to Windows Server 2008 because we want to find bugs in our products before our external customers do.” The team is also working with EMC to design and deploy the next version of the storage service during the second quarter of 2008.

### Benefits

Since its launch, the storage service has met each of the Storage Utility team’s metrics for success. It has reduced the cost of ownership of the data centers, increased disk utilization, improved availability, and reduced customer response time.

### Reduced Storage Costs by 50 Percent

In the new EMC CLARiiON SAN-based solution, each storage system contains the business and application data of many customers. At any given time, many applications concurrently access a shared storage system through an attached server. Because of this shared infrastructure, the costs of the hard disk are distributed across customers running the applications. This significantly reduces the total cost of ownership for MSIT.

Also, the Resource Monitor makes it possible for one IT technician to manage approximately 1 petabyte of data. MSIT devotes only six IT technicians to maintaining all of the storage hardware in the data centers, which would not have been possible before deploying the storage utility service.

### Increased Disk Utilization to 70 Percent

Unlike the one-to-one server-disk relationship of the previous storage infrastructure, the SAN-based storage service manages all hard disks as one storage unit and dynamically distributes the storage allocations of many customers on each hard disk. Consequently, more of each hard disk is filled with storage data at any given time. In addition, MSIT no longer devotes resources to maintaining thousands of hard disks that are less than half full.

### Improved Availability to 99.999 Percent

With the addition of highly available EMC CLARiiON SAN technology, a customer’s storage is now located on redundant hard disks and accessible by more than one server. The SAN-based storage infrastructure incorporates global hot spare disk functionality, where the storage capacity of a failed or failing hard disk is automatically replaced by another one. Therefore, hard disk failures are less likely to cause customers to lose access to their stored data. The Storage Utility team has also made the strategic leap

## For More Information

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to disk-based recovery for many key applications through the addition of EMC CLARiiON systems with lower-cost disk media. Combining EMC CLARiiON storage with automatic server connectivity failover and disk-based recovery helps ensure that MSIT customers have access to their business data and applications when they need them.

### **Reduced Average Customer Response Time to One Day**

At Microsoft, deploying new storage capacity can be a time-consuming process. Before MSIT can buy technology to add to its storage infrastructure, order documentation has to be filled out and purchase orders have to be drafted. The hardware shipping process alone can take several days. Before the storage service was available, it took an average of 12 days to procure storage technology. Because of the efficiency of reallocating storage using SAN technology and the storage usage tracking capabilities of Microsoft Cluster Server and SQL Server 2005, it now takes only one day to fulfill storage orders of up to 3 terabytes.

According to Drummond, "Our move to utility computing has offered great benefits. Due to the success of our storage utility, we are planning upgrades to the storage service and new types of IT services in the future."

## Microsoft Server Product Portfolio

For more information about the Microsoft server product portfolio, go to: [www.microsoft.com/servers/default.mspix](http://www.microsoft.com/servers/default.mspix)

### Software and Services

- Microsoft Server Product Portfolio
  - Windows Server 2008 Standard
  - Windows Server 2003 Standard Edition
  - Microsoft Operations Manager 2005
  - Microsoft SQL Server 2005
- Technologies
  - Microsoft Cluster Server

### Hardware

- Brocade SilkWorm 12000 fabric switch
- Cisco MDS 9000 Fabric Switch
- Dell server computers with Intel processors
- EMC CLARiiON storage area network systems
- HP server computers with Intel and AMD processors
- HP StorageWorks 8000 Enterprise Virtual Array systems