

Managing Disk Storage to Turn Windows NT/2000 Servers Into Top Performers

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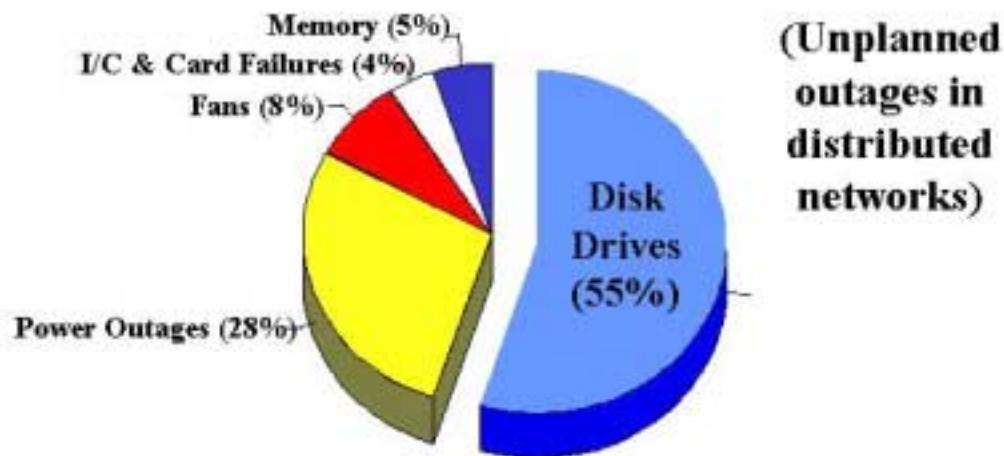
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Introduction

An Atlantic hurricane was bearing down on the coast. But before the first drop of rain hit the beaches, Windows NT file servers at the County of Miami Dade Florida began crashing. It wasn't the hurricane's high winds, flooding or power outages that caused these failures. It was a force far greater and even more unpredictable than weather patterns. It was the County's users. Fearing the worst for their desktops after being hit by a hurricane, users developed the habit of copying their hard drives onto the servers as soon as a hurricane was announced. With dozens of users averaging four to eight Gigabytes of data per desktop being duplicated onto the servers simultaneously, it's no wonder the servers crashed.

While not every IT organization has hurricane warnings to worry about, every Windows NT/2000 server systems administrator should be concerned about server availability and performance due to uncontrolled server disk capacity consumption by the users. Strategic Research Corporation estimates that the majority of unplanned outages in distributed networks are caused by disk drive failures (55%). Included in this percentage are failures caused by exceeded server capacity. With server disk space consumption reaching rates of 70 to 100% annually, and even more for some industries, the likelihood of server performance suffering as a result of overloaded capacity is ever more likely to occur.

Server Downtime Causes



Short of a complete server crash, any one user can seriously compromise server performance and application availability by excessively storing large files onto servers shared by many other users.

One common inefficient and manual practice is to “baby-sit” the capacity levels or use load balancing to control the amount of data on servers. But a better solution is to implement a disk storage resource management framework using a combination of monitoring, reporting, screening, and controlling server content in real time.

IT DEPARTMENTS DEVISE FRAMEWORK FOR USING SRM

Disk space quota management, file reporting, and file blocking provide numerous organizations with the enabling technologies to keep their network storage lean and clean as a shared resource, not to mention the high availability and system performance benefits. These technologies, which can be found in third-party SRM products include the following:

- allocating and monitoring a certain amount of storage space on servers with alert and action thresholds on server volumes; monitoring and reporting on space as the thresholds are reached; and sending alerts, either on screen or via e-mail, to key individuals so they can groom their space;
- real-time monitoring and reporting of the space usage to determine if files need to be deleted or archived or to determine how fast the space is being used, and
- looking for certain unwanted types of files already saved (such as MP3s), and implementing filters to keep them from being saved on corporate servers.

The results of a series of proprietary interviews show that central IT departments at major corporations use their SRM tools in as many as five, step-by-step procedures called the AASET framework for storage management to ensure high server performance and availability. The five steps include audit, allocate, screen, educate, and trend. Each step includes an excerpt from an interview about how a specific organization’s IT department used its SRM tools.

THE “AASET” DISK STORAGE MANAGEMENT FRAMEWORK

Audit

What’s on the servers?

What you don’t know *can* hurt you. Perform regular storage audits to identify space that’s being wasted by outdated, duplicated, orphaned, or non-business related files and take corrective action such as deleting or archiving non-critical files.

Business Development Bank of Canada (BDC), Montreal

This is a government chartered lending bank for small businesses and medium-sized businesses. It has more than 80 branches across Canada.

This organization migrated its more than 150 servers from Novell NetWare to Windows NT even though it was bringing Gbytes of unused historical files and junk files, such as .mp3’s. Employees had been saving everything without realizing what they had. BDC had to first identify what was on its servers, remove those non-business files, and then ask employees to look at their files to determine what they needed to keep.

From the Network Support Manager at Business Development Bank of Canada

“We performed an **AUDIT** of each server using HTML-based reports to show management who the biggest users are, and what types of files take up the most space. The three most useful reports include: files older than a specific number of days, files sorted by size, and files by type. These reports help us to identify what we can delete right away. For example, on a first pass, a systems administrator freed up about four Gbytes of space by deleting two users’ .mp3’s. Since the file reports have browser-enabled file links, a systems administrator can click on a file link to view the file, to move the file, or to delete the file.

We immediately telephoned the top users and asked them to look through their files and remove what they didn’t need. Most of these employees weren’t aware of the many files they had accumulated and how much space they were taking up. They willing and quickly paired down their space. Likewise, we’ve also asked each employee to clean up his or her file space.”

Allocate

How much space is reasonably required to perform job function?

Users will generally consume space infinitely unless multi-tiered space utilization thresholds are configured to control spiraling disk consumption and raise user awareness.

Ford Motor Corp.

Ford is more than the world’s largest global manufacturer of automobiles. It’s also the world’s second largest corporation with more than 400,000 employees connecting to customers every day.

The Ford Process Leadership Group sets the corporate direction for both hardware and software. This central information technology group test drives different vendors’ products to see which products should be used throughout Ford. Once a product is selected for a specific function, this group provides the local systems administrators with sample guidelines for installing the product.

From a Staff Member from Ford Process Leadership Group, Ford Systems Integration Center

“Many of our local Windows NT administrators, especially in Europe, had been asking for a disk quota management, file reporting, and file blocking product to control storage growth and enable high performance and availability. They kept saying they were running out of disk space and had to keep buying more disks. They cited the problem of employees using as much space as they could get their hands on.

To make it easy for the system administrators, we provided some recommended default templates for setting quotas. One template is set up to enforce employee hard quotas, and the other template is for monitoring quotas, but not enforcing them. Each systems administrator can modify the templates to carry out the best way to monitor space usage on their servers.

The hard quota template includes a 300-Mbyte space **ALLOCATION**, enforced with a quota on home directories with a 50-Mbyte temporary buffer zone. The template also offers two levels of employee notification: Employees get an e-mail message when they hit 90 percent of their quota, and another message when they hit 100 percent. The messages explain how much quota they have left and what to do to free up space. The temporary buffer zone allows them enough space to store anything they are working on so their work won’t be disrupted.”

Tyco Healthcare's Mallinckrodt

This is a \$2.3 billion-a-year manufacturer and global marketer of specialty medical products for respiratory management systems, imaging devices, and bulk and dosage pharmaceuticals.

This company adheres to strict policies about protecting the quality of its products, as well as the quality of its data. It wants to make sure that its computer networks provide enough safe storage for each employee's company documents. Telling an employee they can't have more space defeats the purpose of the network.

From the Technical Analyst at Tyco Healthcare's Mallinckrodt

“When we moved to Windows NT from Novell NetWare, we stayed in the lurch for several months while we looked at the best way to control storage space. One disk quota management product proved too difficult for daily use. After searching some more, we bought a product that easily automates the entire quota management process, as well as provides file reporting, and file blocking. It even sends warning alerts, reports on space usage, and provides extra protection to keep the server free from non-business related files types, such as .mp3 and .avi.

We implemented a storage resource management solution on four Microsoft Cluster servers. The main cluster has two Compaq ProLiant; each one connects via Fibre Channel to a total of 200-Gbytes of RAID storage. Each employee's directory has a hard quota.

On a similar cluster, we put a monitored quota on each department's folder, as well as on our Exchange e-mail database and log file directories. The product enables us to run a variety of reports so we can see which departments are using space faster than others are. Based on this data, we can plan and project our storage requirements.

With NetWare, we gave everyone a quota of 50 Mbytes of compressed space. When we first set quotas with the new product, we decided to give everyone about 80 Mbytes to compensate for the compressed space with NetWare.

When employees reach 90 percent of their quota, they get an e-mail message saying they need to free up space. When they reach 100 percent of quota, both the employee and the help desk get an e-mail message. The product allows us to designate some additional space in case an employee is at 100 percent of quota and tries to save a document. We give an extra 10 Mbytes. Once employees free up space, we reset their quota.

Since we already know which employees have reached their quotas, we can run a report with to see how they are using their disk space. This report prepares us for their call asking for more space. Sometimes the report can alert us to an employee who is having difficulty managing their space. For example, some of our new computer users need help with how to set up their file folders on both the server and on the desktop.”

Screen

Which file types have an inherent business need, and which types don't?

Scores of Internet files have no business purpose residing on corporate servers and could jeopardize the security and/or stability of the environment through potential virus exposure or software compatibility issues. Select which file types are unauthorized to write to servers and block them in real time.

blocked file types include .avi, .mp3, .rm, .wav, .exe (Office executables), as well as any game files. If employees try to save a blocked file type, then we get an e-mail alert saying why they can't save the file. Also, we block Office 97 executables to avoid potential licensing issues. Our file blocking product enables us to exempt those individuals who need to get access to a blocked file types."

Educate

Give users the tools and awareness needed for self-cleanup. Users are generally cooperative about file cleanup if they have the awareness and the tools needed to take their own corrective action to storage problems. Automated Web-based storage reports e-mailed to file owners give them the ability to quickly and easily identify problem storage areas (such as duplicated and stale files), and take their own immediate corrective action.

Tyco Healthcare's Mallinckrodt

From the Technical Analyst at Tyco Healthcare's Mallinckrodt

"Keeping our servers free of inappropriate material from the Web or brought in by employees from home has become critical to protecting our data and maintaining system performance. A proxy server keeps employees from getting to popular Web sites. In addition to the proxy server, file blocking, included in our disk quota management product, provides a double layer of protection to keep our servers clean and running.

After auditing our cluster to see if we had any unnecessary files, such as Real Player videos or music files, we were surprised at all the junk we brought from the NetWare servers to the Windows NT cluster. We deleted about 6 Gbytes of stuff that didn't belong on the cluster.

Next, we used file **SCREENING** to set file type filters, blocking certain types of documents from being stored on the network. The

Blue Cross Blue Shield of Florida

As Florida's largest healthcare coverage company, Blue Cross Blue Shield of Florida provides caring solutions and affordable choices to more than 2.7 million customers. The company's comprehensive product and service offerings ranging from include individual and group health insurance to workers' compensation.

From the Local Area Network Administrator at Blue Cross Blue Shield of Florida

"We have 30 Compaq ProLiant, Windows NT file servers being used by about 12,000 employees. A few servers have as many as 1,500 users. These servers reside in various departments throughout the company. Our average file server has about 80 Gbytes of external RAID storage. Employees get disk space on their departmental server, as well as on a public server.

Two years ago we put in a disk space quota management policy. It would enable us to control network storage growth, and to predict more

accurately the amount of anticipated storage for each department. We elected a product that provided the underpinnings for, not only quota management, but also disk space reporting.

Being proactive about quota management requires empowering employees to take the time to groom their file space. To accomplish this, we needed to sell quota management to employees.

Our internal information technology (IT) marketing group developed a campaign to let all employees know what we were going to do, why we were doing it, and how it would benefit them in the long run. First the IT marketing group sent an e-mail message to everyone explaining how quota management would help them determine their current rate of space consumption, maximize their space on the network, and articulate their need for additional space.

Meanwhile, the IT marketing group prepared a training pamphlet describing how the products works; how to respond to quotas alerts; how to determine when to remove documents; and whom to contact if they needed more storage space.

We took three months to roll out the product to all the departments. During this time, we went around to each department fielding employees' questions. We wanted everyone to feel comfortable in case he or she got an alert saying they were getting close to their quota.

Establishing the amount of quota to give everyone didn't require much effort. Reports summarized how much space each employee had used. We took an average of consumption among all users, added an additional amount, and came up with 50 Mbytes for each user. To this end, employees would have a 50-Mbyte quota on their department server and a 50-Mbyte quota on the public server. Of course, we knew we'd have to increase the quota for some employees.

The product we selected provided several ways for us to set quotas. We decided to assign quotas at the root of the drive. This type of quota would pertain to all of the files an individual stored on the file server, regardless of what directories the files were stored in. A user identification feature enabled us automatically to assign a 50-Mbyte quota for everyone at the root directory on each server.

We also set up the product initially to provide two warning levels to employees. When employees reached 90 percent of their quota, they received an on-screen, pop-up message, and at 100 percent, an e-mail message. Most employees said that preferred to receive e-mail message first. In fact, they asked to receive more notifications, starting with a lower percent of quota. This procedure would give them plenty of time to look at their file space and decide what they had to delete and how much additional space they needed. The product makes it easy to change the frequency of the alerts and the type of alert. In fact, we can provide up to five alerts. We decided to provide an e-mail message at 80 percent, a pop-up message at 90 percent, and an e-mail message at 100 percent."

Valassis Communications

With 1999 revenues of a \$795 million, this company pioneered the marketing of full-color promotional booklets distributed every Sunday in 100s of newspapers throughout the country. Each year, this company prints billions of its flagship inserts at three state-of-the-art printing

plants, advertising more than 3,000 various packaged goods ranging from pet food to personal healthcare products.

From Senior Business Analyst at Valassis Communications

“To get control of all of our Windows NT storage, we decided to carry out disk quota management, file reporting, and file blocking. Unfortunately, we selected an inferior product that caused our servers to crash or to reboot themselves automatically, or that filled the event log with numerous errors. We set up the product to e-mail us with specific reports. We got e-mails, but no reports. It just wasn't a product we could run around the clock on our servers. Things got so bad that we negotiated with the vendor and got our money back.

Well, we didn't give up on quota management, file reporting, and file blocking. Instead, we researched the trade publications for product reviews about quota management software. This time we ran the new product for several weeks before we rolled it out to all servers. The product's stability was a given.

Right now, we're using the product to see what our overall space consists of. The goal is to clean up what doesn't belong on the network and to help employees understand why they need to be more proactive about grooming their disk space. After all, storage has to be managed and used as a shared resource, not as someone's exclusive repository.

By running file reports by different files types on each server, I've been able easily to locate many of the files, such as .mp3's and .avi's, that don't belong on the server. The HTML-based reports enable me to click on a file link and view the file, and then click on the file link again to delete the file. I've currently freed up about 3 Gbytes space on the corporate server. Without these reports, I would've spent about two weeks looking through every folder for these non-business file types.

Helping employees to groom their file space has become another important task for us. I can get a report showing me an employee's files that are older a year or that haven't been accessed in a year. Likewise, looking through every folder for old files would've taken me an additional few weeks. Now, I give specific employees a subset of the report containing files that pertain to that employee and request that the employee determine what files to delete. In some cases, the report gives us a chance to sit down with an employee and to see how they are managing their files. Perhaps, they need help setting up folders and naming files so they can easily locate files.”

Trend

Intelligently plan capacity expansion of growth of legitimate business data. Even with efficient storage management controls in place, legitimate storage growth is inherent. Knowing the storage growth rate helps IT managers plan for and justify future storage growth capacity requirements.

Business Development Bank of Canada, Montreal

From the Network Support Manager at the Business Development Bank of Canada

“We’re generating reports for each server by file date, and then sub-categorized by user and department. For example, these reports show us which departments have historical files they need to keep. These reports can help us to **TREND** storage usage and justify the need for online archival storage.

We also plan to put these nicely formatted reports on our IT support team’s Web site. Both the director and vice president of IT support will have access to the browser-based reports to see the status of all the network storage.”

Mayo Clinic’s Research Department, Rochester, Minnesota

Mayo Clinic's Research Department comprises about 3,900 professionals, including staff doctors, scientists, and other health professionals, in 53 departments. These professionals work on \$240 million in annual funded projects that cover every aspect of medicine – from designing infectious-free transplant organs to preventing rheumatoid arthritis. Researchers have developed patented software tools for navigating around 3D images.

From the Windows NT Network Administrator at Mayo Clinic’s Research Department

“When it came to planning for additional SAN disk space, we collected data based on how much space researchers and departments had consumed of their quota. We compared this data with storage projections from management committees and arrived at the amount of storage for the next few years. We also got the approval to add a tape library to our storage area network..

The Research Dept.’s SAN is still evolving. Quota management and file reporting has alerted us to the need for file migration, which is being done manually now.”

CONCLUSION

The vignettes presented here clearly indicate that by using enterprise SRM tools consisting of disk quota management, file reporting, and file blocking, IT departments can easily tighten the reins on the amount of storage space employees are using, maintaining maximized system performance and high availability while empowering employees to groom their own file space.