issue / four.three

VOX VERITAS™

THE VOICE OF VERITAS

The Ability to Execute, the Power to Change

What Intelligent Storage Software Means for Your Business

Customer Success Stories:

Lufthansa Systems Infratec and Telia Dedicated Web Hosting Thrive with VERITAS Availability Technology

The VERITAS and IBM Relationship:

Increased Opportunity and Availability for Two Industry Leaders and their Customers

Data Availability for NAS

Powered by VERITAS and Sun

VERITAS, Oracle and Oracle9*i*:

How VERITAS Database Edition™ and VERITAS NetBackup™ Support the New Database

Increasing Availability and Performance

of VERITAS Volume Manager™ Operations with Dynamic Multipathing

VOX VERITAS™

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VERITAS VISION 2001

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CEO Corner

Gary Bloom | Chief Executive Officer and President of VERITAS Software

Dear Customer:

In the last issue of VOX VERITAS, I described how VERITAS Software is aggressively pursuing growth along three main avenues: technological leadership and innovation combined with increased research and development, expanding support for our customers' heterogeneous platforms and increased international operations.

In this issue, you will find examples for successful execution of each of these strategies. You can read about new and enhanced VERITAS technology, increased platform support and recently opened VERITAS locations in Poland and Dubai in the United Arab Emirates. We are significantly increasing our support for IBM's AIX operating environment and the many mutual VERITAS and IBM customers. As you will see in the discussion with the president and the product manager of our IBM Strategic Business Unit in this issue, we are very excited to be working closely with IBM on this, and anticipate several significant announcements over the next few months.

VERITAS solutions create the means not only to rapidly transform data into a competitive asset, but to make it widely accessible as well. They make it possible for you to access heterogeneous storage through one single data availability layer. VERITAS technology in your operation can virtually eliminate downtime, reduce operating costs and enhance productivity. VERITAS Software's solutions also give you the flexibility to respond quickly to changes in markets and technology, as well as benefit from new opportunities.

As we see every day, business conditions can change drastically in a very short time. Effective change management needs to be part of your strategy. With VERITAS' Intelligent Storage Software, you can enable your operation to weather changes in the business climate successfully, fully maintaining your competitive edge.

There is no doubt that the growth of data volumes, and the pressure on IT departments to manage and use the data intelligently, will continue for the foreseeable future. In the next few years, you will see many changes including terabyte disk drives arriving on personal computers and work environments enabling people to do their work anywhere, at any time. Thus the need to have their data and applications available to them in this new work environment will be imperative. With VERITAS technology in your business infrastructure, you will be able to provide the optimal production environment for your users, no matter how their needs expand.

In the recent years, technology has dramatically changed our lives and business. Therefore, we have chosen "Embracing Change" as the theme of this year's VERITAS VISION2001™ worldwide users conference to be held in Dallas in November. We hope you can join us as we demonstrate the power and innovation of VERITAS Software's technology to enable our users to adapt and embrace the changes that have and will continue to happen. You can count on on VERITAS to deliver complete availability, scalability and flexibility for your data, applications and storage, and ensure your platform independence and freedom of choice.

Gary L. Bloom
President and Chief Executive Officer
VERITAS Software

"With VERITAS' Intelligent Storage Software, you can enable your operation to weather changes in the business climate successfully, fully maintaining your competitive edge."

A Conversation with Paul Sallaberry, Executive Vice President, Field Operations, VERITAS Software — Part 1 of 2

The Ability to Execute, the Power to Change

What Intelligent Storage Software Means for Your Business

VERITAS is the world leader in Intelligent Storage Software, delivering heterogeneous interoperability — across servers, storage devices and storage networks. VERITAS simplifies storage complexity, facilitates competitive readiness and enables organizations to efficiently and effectively leverage data to attract and retain customers and respond competitively to business opportunity. If you're in business today, your opportunities, risks and challenges are very different from what they were just a few years ago. Paul Sallaberry explains how the Internet has changed the ways we do business today and explains what Intelligent Storage Software from VERITAS is all about and what it can do for you.

VOX: *Paul, how has business changed with the Internet?*

PAS: The arrival of the Internet has forever altered the role of data in business. The "connected" marketplace creates limitless reach and opportunities — presenting the possibility of cultivating target markets by fostering highly personalized one-to-one customer relationships. This introduces unprecedented competitive pressures and customer demand for realtime response.

In this environment, data is clearly a company's greatest asset and must be intelligently leveraged to ensure survival … track and pursue new markets … anticipate and meet individual customer needs … identify market trends to develop better products and services. The solutions necessary to manage this new age of digital information go beyond the conventions of storage management, which are tactically focused on simply "parking" and protecting data.

> "Today, even the smallest gain in efficiency and ability to deliver higher quality of service to the internal and external customer — matters."

VOX: *And if you can summarize VERITAS' contribution, what would it be?*

PAS: In the digital marketplace, data achieves its maximum strategic value and impact when in motion — allowing it to be rapidly accessed, shared, replicated and manipulated in critical applications at every level of a business enterprise. VERITAS' Intelligent Storage Software keeps data in motion by enabling reliable, unfettered delivery across diverse computing environments, from the desktop to the data center. Broader and more strategic than storage management, VERITAS' solutions empower users to fully leverage data storage, applications and the Internet.

VOX: *How do you see the changes in the business climate affecting companies?*

PAS: Less than 18 months ago we were all caught up in the Internet "frenzy." The push was on to launch new e-businesses. Every organization was in a race to leverage the Web. The opportunities seemed limitless — extend marketing capabilities, keep customers on sites for extended periods of time, turn site visitors into revenue generators — acquire a predictable share of the customer's annual spending and deal directly with the customer. Maximizing the return on IT spending was not a priority. The Net was paved with gold — getting there first was all that mattered.

Enter the economic downturn, and with it, the transition from revolution to evolution of systems infrastructure. Companies are backing off the e-commerce push and putting more emphasis on efficiencies — investing in technologies to help reach customers, deliver better customer service and leverage their underused IT infrastructure. They find new ways to service the customer. They streamline processes so they can respond to customers fast.They are looking to control their inventories — build to demand, not to capacity. And, if they don't know how to do something

well, they outsource it to a consultant partner who does.

VOX: *Does that mean business priorities have changed?*

PAS: Our customers tell us that the priority has shifted from investing in technologies that drive growth to investing in technologies that lower costs. But two things have remained constant: the ever-growing demand for data and the corresponding pressure on the IT infrastructure to keep pace.

In the wake of the Net "boom," IT infrastructures have entered a new race — the race for efficiency. Focus is on mapping business application need and criticality of data to the IT infrastructure investment. Efficiencies are sought across the board — it's all about using IT resources more productively. Companies must do more with less and free scarce human assets from mundane tasks to enable more focus on the application environment and its user community.

We've left an era in which IT investments were prioritized based on "big bang" potential and where incremental improvements were viewed as a waste of time. Today, even the smallest gain in efficiency and ability to deliver higher quality of service to the internal and external customer matters.

VOX: *What role does technological innovation play in these developments?*

PAS: Innovations that open access to information, and the speed at which it can be acquired, perpetuate a never-ending pile-up in the sheer amount of data in the enterprise. Innovation has also changed the way

"Independence — complete freedom of choice in the selection and deployment of the physical IT asset — is the new metric by which effective management of the storage infrastructure will be measured."

in which we do business and pursue recreation. ERP systems, CRM applications, the need for "instant" business intelligence, online video and music — these are just a few examples. IT *is* the center of innovation, and innovation is creating a significant expansion in data volumes and need for continuous efficiency improvements.

In addition, tasks once viewed as dependent on human intervention are now being automated. With automation comes the expectation of expanded access to IT resources and enhanced levels of service in terms of both response time and quality.

VOX: *What should be the role of IT departments in accommodating these changes?*

PAS: The true leverage of IT is found in the environment's ability to respond quickly to opportunity, whatever its form — technology, time-to-market, competitive or economic. Maximizing the return on opportunity mandates that simplicity in the ability to adapt — *absent of risk* — be intrinsic to the IT infrastructure.

The user experience must be unencumbered. Consistency in the ability to access information automatically and transparently — regardless of location or time and at the highest performance — has immediate impact on internal customer productivity and external customer satisfaction and retention.

Simplified management in the face of expanding complexity can be achieved only if interoperability is built in across the application, operating system, storage device and network. Flexibility to install, change or expand capacity and capability with uninterrupted service is the new mandate to cope with increasing demands on data. To be effective, the infrastructure must be a utility, not a constraint. Traditional IT metrics such as capacity, performance and scalability have taken on new meaning, and independence — complete freedom of choice in the selection and deployment of the physical IT asset — is the new metric by which effective management of the storage infrastructure will be measured.

The solution? An IT architecture built on the capability of software, not hardware.

VOX: *This infrastructure is what VERITAS brings to businesses and their IT environments?*

PAS: Yes. With that, VERITAS gives you the ability to execute. The power to change. What does that mean? VERITAS' portfolio of Intelligent Storage Software solutions is built on

> “Whatever the demands on data, VERITAS’ Intelligent Storage Software ensures the availability essential to successful execution in response to market and technology change.”

an architecture facilitating unmatched interoperability among the application, operating system, storage device, and the network. VERITAS’ Virtual Storage Foundation is the only heterogeneous architecture specifically designed to maximize data access and protection, while simplifying storage complexity — delivering the digital freedom critical to competitive response and company success.

VOX: *And how does this allow you to realize the return on opportunity?*

VERITAS’ Intelligent Storage Software solutions empower users to design an availability strategy that meets the requirements of the customer and market opportunity. They allow you to invest in that level of availability that is best positioned that delivers the greatest return on opportunity. These powerful software products cover a broad range of data access and protection, from desktop to data center, across all major server platforms, operating systems, networks and storage systems. Each complements the other, and extends the reach and capabilities of the data availability environment.

VOX: *How does high availability figure into this?*

PAS: The intensity of e-business has established the expectation of system availability 24/forever. Today, downtime is measured in minutes and seconds — not hours or days. There’s no time for backup windows. There is little time for scheduled maintenance, and no time for unscheduled maintenance. Corruption of data cannot be tolerated. That’s why VERITAS’ high availability solutions ensure continuous availability for mission-critical applications. Our market-leading multi-platform solution for high availability ensures quick recovery of applications and data, the scalability to meet performance requirements, and unified management of clusters of database servers.

VOX: *What else does the portfolio include?*

PAS: VERITAS’ data protection solutions provide backup and recovery, scalable from the desktop to the data center. They protect the integrity of corporate data across all platforms and all databases.

VERITAS’ innovative SAN solutions optimize networks dedicated for storage. They manage storage capacity requirements effectively, and maximize application and storage infrastructure performance. At the same time, they realize the access efficiencies of consolidated data.

The VERITAS Intelligent Storage Software portfolio also includes certified solutions experts in VERITAS Consulting. They can design and implement a comprehensive disaster recovery plan to reduce your reliance on key individuals, automate complex and periodic tasks, and minimize decision making during the recovery process.

VOX: *So, we’ve really gone far beyond efficiency increases to change management and on to continued business competitiveness and agility, no matter what platform you use.*

PAS: Right. VERITAS’ Intelligent Storage Software supports all open systems servers across distributed networks. It optimizes server storage for all applications and ensures reliable data access and protection. Management costs go down, because the complexity of the infrastructure is hidden from the user. You can perform storage-related tasks online without application disruption, removing typical storage limitations. As data volumes expand, and utilization rates of existing resources increase, you can quickly provision new storage for unlimited scalability.

Whatever the demands on data, VERITAS’ Intelligent Storage Software ensures the availability essential to successful execution in response to market and technology change.

The conversation with Paul Sallaberry will continue in the next issue of VOX VERITAS.

Successful Data Protection at Lufthansa Systems Ingratec

VERITAS NetBackup Maintains Data Integrity at Leading Service Provider

Photo : Gerd Rebenish / Lufthansa

From a data center of more than 6,300 square meters, Lufthansa Systems Infratec GmbH provides complete IT services for Lufthansa, the German airline, and other airlines all over the world, in addition to travel and logistics companies and service organizations in other industries. Data security and uninterrupted 24-hour service are essential requirements. The company meets them with high availability technology, redundant service delivery and special safe data storage facilities with maximal protection against any interruptions. Data protection via backup plays an enormous role in this.

Even a highly available environment does not completely protect against data loss — a main reason for lost or corrupted data is, for example, human error. To limit the consequences of such data loss events, a business must be able to restore data as completely and quickly as possible. Lufthansa Systems Infratec has to meet extremely stringent service requirements in this regard, because it is not just the computing center for one of the world's largest airlines, but also offers IT services to many other clients who greatly value data security and high availability. Responsibility for data protection at Lufthansa Systems Infratec extends not just to its own, but also to the customers' critical data. At the same time, the service provider needs to operate efficiently to maintain its competitive edge. This means using resources optimally and keeping administrative overhead low.

Rigorous requirements for backups and restores

The IT infrastructure of a services provider such as Lufthansa Systems Infratec needs to be able to respond to all customer requirements. This makes the computing environment very complex, which takes us to one of the main criteria for choosing data storage management applications, including backup and restore: the IT department has to support heterogeneous platforms and applications for steadily growing data volumes, without needing an equivalent increase in administrative resources. Backup technology at Lufthansa Systems Infratec has to satisfy the following requirements:

- Automation of backups and restores
- Support for a heterogeneous environment
- Support for all current applications
- High reliability
- High performance including very fast restores
- Centralized administration
- Effective protection of at least 10 terabytes of data every day
- Scalability

A new data protection infrastructure with VERITAS NetBackup™

After evaluating the popular backup products, Lufthansa Systems Infratec settled on VERITAS NetBackup™, the enterprise backup software. A large amount of the data, protected by project manager Henno Rathmann and his team in the client/server computing area, is produced by SAP systems and other Oracle-based applications running under Sun Solaris, IBM AIX and HP-UX. VERITAS NetBackup can accommodate this heterogeneity. It has optional extensions for SAP and Oracle databases, and additional agents and options for many other applications. It would have no problem supporting new databases and applications if that became necessary.

With its multitiered master/slave architecture, NetBackup is optimal for open systems with high data volumes. Altogether, Lufthansa Systems Infratec deploys eight different environments, each one with its own master server, which controls the planning and execution of all backup jobs. All databases are backed up online every day. Simultaneously with the backups, the system stores an archive log on separate media, with copies made both before and after the online backup. In case the file system housing these offline redo logs fills up to a predetermined

high-water mark either during a backup or in between backups, it automatically launches an additional backup. This prevents a potential crash of database operations with a subsequent freeze. As backup hardware, Lufthansa Systems Infratec uses three StorageTek tape silos and several smaller tape libraries.

Performance, integration, reliability

High performance during backup and fast, complete restores are extremely important to Lufthansa Systems Infratec. VERITAS NetBackup accomplishes this through multiplexing, transferring data streams from up to 32 different sources to tape at the same time. This allows the hardware to reach maximal data throughput. Support for Oracle and SAP is also streamlined to satisfy the need for high availability and maximal performance of these applications. For this purpose, NetBackup was closely integrated with online SAP backup utilities.

Reliable backup is a basic component of doing business at Lufthansa Systems Infratec. However, in case of an actual loss of data or an entire server, rapid full restore and recovery are most important. VERITAS NetBackup has a range of capabilities to support this. For example, it can produce complete or partial restores from a primary backup, and even restore separate applications or complete servers. It can automatically generate copies of primary backups for offsite storage in a data vault, another data center or another building. This improves data protection in case of events such as fires or floods. NetBackup can "demultiplex" tapes so that it can write data on them contiguously.

This function allows saving and restoring of the information hierarchically, according to its relevance. It also makes sure that the most important data is restored first and any impact to business productivity kept at the absolute minimum.

Centralized, automated administration and a move towards fibre channel

Another consideration in favor of choosing VERITAS NetBackup for the experts at Lufthansa Systems Infratec was its simple administration. The more data protection can be automated and centralized, the less intervention by system administrators is necessary. However, backup jobs must have the flexibility to adjust to the individual needs of each application. Given a backup volume of approximately 10 terabytes per day, this is no small order. Lufthansa Systems Infratec solved this problem with VERITAS Global Data Manager™. A single administrator can now manage a multitude of NetBackup storage domains from a central console without any limitations of NetBackup master server functions. System managers can implement the same data storage management strategy consistently throughout their data center and can add new storage domains without incurring additional overhead.

To consolidate all enterprise data storage, accelerate operations and centralize data management even more, Lufthansa Systems Infratec is now changing over to fibre channel technology. This restructuring is no problem for the backup software. NetBackup is fully SCSI- and fibre channel-compatible, and was one of the first data protection solutions to support storage area networks.

OverView

Lufthansa Systems Infratec GmbH

The Customer

Lufthansa Systems Infratec GmbH, founded on January 1, 2001, is the result of a restructuring of Lufthansa's core information technology business. As a leading e-business systems integrator with approximately 1,000 employees, Lufthansa Systems Infratec develops customized IT infrastructure solutions worldwide in all industries. Lufthansa Systems Infratec offers a complete range of IT services including modular operations, application services and outsourcing. Its main competence is in the integration of e-business and wireless mobile applications. Lufthansa Systems Infratec runs one of the most advanced and capable data centers in Europe and has extensive experience in the areas of network and communications, server and middleware technology, and desktop support.

Business Requirements

- Protection for a daily data volume of 10 terabytes
- Support for all common UNIX derivatives, Windows NT clients, Oracle and SAP databases
- Simple administration
- Fast backups and restores

The Solution

VERITAS NetBackup™ meets all of Lufthansa Systems Infratec's requirements with its multitiered architecture, vast compatibility and powerful capabilities for rapid data backup and restore. Lufthansa Systems Infratec uses VERITAS Global Data Manager™ for increasingly centralized and automated, low-overhead management of backup operations.

VERITAS™

A Conversation with Kevin Reinis, Vice President, and Eric Burgener, Director, Product Strategy, both at the IBM Strategic Business Unit, VERITAS Software

The VERITAS and IBM Relationship

Increased Opportunity and Availability for Two Industry Leaders And Their Customers

In 2000, VERITAS and IBM concluded a joint development and marketing agreement. The agreement calls for close cooperation in many areas of product development. This includes VERITAS' bringing its products over to AIX, IBM's UNIX-based operating system. To understand better what the efforts of the VERITAS IBM Strategic Business Unit (SBU) are all about, VOX talked to **Kevin Reinis**, Vice President of the SBU, and **Eric Burgener**, Director, Product Strategy.

Kevin Reinis has spent 16 years in the data storage industry. For 14 of these years, he was at IBM, most recently serving as IBM's Director of Business Line Management for the Storage Systems Division. In that role, Reinis was responsible for all aspects of IBM's Desktop and Entry Server hard disk drive business, including P&L management, sales, business partnerships, product marketing and product life cycle management. When he left IBM, he was the Vice President and General Manager, PowerVault Storage, at Dell Computer Corporation before joining VERITAS.

Eric Burgener has had a 14-year career in the high-tech industry, focusing on product marketing and product management in clustering and storage management. Between 1996 and 1999, he worked in availability product management at VERITAS. As the director of product strategy for the IBM Strategic Business Unit at VERITAS, Eric is responsible for all product management and marketing responsibilities associated with VERITAS' IBM business.

Fulfilling the business needs of IBM and VERITAS customers

A conversation with Kevin Reinis, Vice President, IBM Strategic Business Unit, VERITAS Software

VOX: *Kevin, why did VERITAS create the IBM Strategic Business Unit to work with IBM?*

KR: For VERITAS and IBM to work closely together makes sense from both a business and a customer service aspect. Both companies and their customers stand to benefit. Right now, we are taking all of the availability technology assets of VERITAS and mapping them to the needs of IBM customers. That means bringing each of VERITAS' products to the IBM platform AIX. Initially, the IBM SBU will engage very strongly in the IBM server market, one area that we have not focused very strongly on yet. It is important to note that VERITAS is dealing with all of IBM, not just with the AIX group.

VOX: *How does this effort align with VERITAS' growth perspectives?*

KR: VERITAS' strategy calls for expansion across platforms, through technological innovation and in worldwide geographic regions. As we work with IBM, the avenue of geographic expansion becomes wide open. IBM has a large market share for AIX in Asia — for example, in China and Korea. VERITAS will be able to have a much stronger international presence, to the benefit of customers in these areas.

A certain advantage we have is that this is really the last major platform that VERITAS is supporting. All of the others are already well established in terms of VERITAS products and custom options and agents. The IBM SBU can use the existing infrastructure VERITAS has and fully leverage it. As a platform team, our objective and our main expertise is infrastructure enablement. Our platform specialists will assist the sales organization and customers, with the full experience of VERITAS supporting them.

VOX: *Can you tell us more about how customers will benefit from this collaboration between VERITAS and IBM?*

KR: In many ways, this is the culmination of our heterogeneous customer strategy. We know that this is what the users want. Our field representatives have told us for many years that customers want to access VERITAS technology in the AIX space. What customers look for is a framework for their storage management that is able to lower their total cost of ownership. They don't want to have to retrain their system administrators for backup, for example. They want to keep their administrative overhead low. We can help them do that.

Customers don't want to change away from a hardware or software solution that works well for them. There are customers who like IBM hardware and VERITAS software, and want to keep using both. With our open systems approach, they will be able to use their existing investments without any platform restrictions.

VOX: *I understand there are several different groups within the IBM SBU. Can you tell us what they do?*

KR: The IBM Strategic Business Unit (SBU) is a relatively small team. It may grow as time goes on, but since we can use VERITAS' resources and delivery infrastructure, we don't need to build an additional organization.

There are three main groups in the SBU. One of them concentrates on platforms, strategy and marketing. They try to understand and learn all they can about IBM's various market segments, working closely together with other groups in VERITAS to develop the business intelligence that is needed be successful. They also work with our field organization to make use of their experience.

A second group, platform support operations, are AIX experts who support the field operations. These people are developing a relationship with IBM Global Services, with the goal of providing fully heterogeneous, platform-independent services to customers. IBM Global Services is the largest systems integrator and service provider in the world today.

The third group in the SBU does strategic account management. They talk to the many different IBM product groups and establish working relationships there.

VOX: *Can you give us a brief overview of the agreement between VERITAS and IBM?*

KR: It is important to note that VERITAS and IBM signed a joint development agreement, not an OEM agreement. In the agreement, VERITAS and IBM agreed to work together at the engineering level to port VERITAS products to AIX and optimize them for use in this environment. This will require kernel changes to AIX, which IBM is making. IBM will assist VERITAS in marketing VERITAS' storage solutions once they become available, but all fulfillment will be through VERITAS and its authorized distributors. The joint development agreement is also backed by cooperative support agreements that will give our customers enterprise-quality support for VERITAS storage solutions running on IBM platforms.

VOX: *IBM is one of the world's most powerful and best-known corporations. How much does working with VERITAS mean to IBM?*

KR: IBM is eager for us to enter its market, because we can add significant value to its offerings, and help IBM grow beyond its traditional areas of strength.

Corporate leadership on both sides is very strongly engaged in this endeavor. There have been a series of meetings at very senior levels. For example, Gary Bloom, our CEO, and I met with Bill Zeitler, who runs all of IBM's technology group outside of their platforms. We can help IBM and its customers with intelligent availability technology that span all of its platforms and solutions. Of course, we have a strong value proposition for DB2 as well. Some products for DB2 support are already available. Eric will talk more about that.

What it comes down to is that IBM and VERITAS are giving each other access, and increased support for their customers, that they did not have before. Success will be the result of a balanced, collegial relationship between all parties.

Bringing VERITAS' intelligent storage software to a new platform

Eric Burgener, Director, Product Strategy, IBM Strategic Business Unit, VERITAS Software, answered VOX's questions

VOX: *Eric, there are several VERITAS data protection and availability products already available for the IBM AIX platform now. Can you tell us what some of them are, and why VERITAS started making them available first?*

EB: Over the last ten years, it's been clear that AIX is one of the top commercial UNIX server environments, and much of the data that requires backing up would be stored under it. VERITAS NetBackup™ has been available for AIX since 1991, and we have continued to keep up with new AIX releases, particularly as AIX has moved to a top-three ranking in terms of importance in UNIX servers.

According to Dataquest's server market share report for the fiscal year 2000, Sun, HP and IBM occupy the top three spots. In fiscal year 2000, IBM grew its server revenue by 21%. In the fourth quarter of the year, its growth over the same quarter in the year before amounted to 38%, as reported by IDC. Given that IBM has a major new platform launch coming up in the last quarter of 2001, we expect them to continue to do very well this year.

VERITAS NetBackup *for AIX* supports all major databases and messaging products today. That includes Oracle, DB2, SQL Server, Sybase, Informix and others, plus ERP systems from SAP and Peoplesoft and messaging applications such as Exchange and Lotus Notes. Optional NetBackup products, such as Vault Extension, are also supported under AIX, and we expect to add NetBackup Advanced Reporter™ support for NetBackup *for AIX* in the first quarter of 2002.

VOX: *Is VERITAS developing specific solutions or product options for IBM customers?*

EB: Yes. We have already announced several of these products. They include, for example, a DB2 Agent for VERITAS Cluster Server™ for Sun Solaris. VERITAS NetBackup runs on the latest pSeries platform products under the latest version of AIX, 5.1. VERITAS supports the IBM Enterprise Storage Server — ESS, also known as "Shark" — in VERITAS Foundation Suite™ and Foundation Suite/HA configurations for Sun environments. We are currently working on a VERITAS Database Edition™ *for DB2* under SPARC/Solaris. It will be available before the end of the year. There are many other core VERITAS products that will be available under AIX 5 in the first half of 2002. We will make the announcements about them before the end of 2001.

The AIX server market has a dollar volume of approximately $5.4 billion and grew at 21% last year. This is a very significant business opportunity for VERITAS. Collaboration efforts with all of IBM's business units, including the pSeries, xSeries, Storage Systems Group (disk and tape), Data Management Systems (DB2) and IBM Global Services, is building momentum now and will continue to expand with the release of VERITAS storage management solutions for AIX 5 later this year.

VOX: *How is VERITAS supporting DB2, IBM's database application?*

EB: We have shipped some supported products, and are working on several others. We support online backup of DB2 databases through our DB2 Agent for VERITAS NetBackup on Solaris, AIX and other platforms NetBackup runs under. In May of this year, we announced support for highly available DB2 configurations, using the DB2 Agent for VERITAS Cluster Server. We are now preparing a new release of VERITAS Database Edition *for DB2* under Solaris, planned for the fourth quarter of 2001. A version of Database Edition *for DB2* under AIX 5 is scheduled to be released in 2002.

VOX: *We have talked a lot about UNIX. What about Windows?*

EB: As you probably know, IBM is very active in the Windows world through their xSeries server division — formerly called "Netfinity." VERITAS Backup Exec™ is the leading backup product worldwide for Windows-based workgroup and midsize environments. Based on Gartner Group research VERITAS owns 45.1% of the Windows NT and Windows 2000 backup market, making it the leading provider. The closest competitor, Computer Associates, holds 27.6%. And 80% of those 45.1% are installations of Backup Exec. This is a natural coming together for both companies; we already have many common customers.

VERITAS NetBackup is the industry-preferred product for data backup in enterprise Windows environments. Customers can use it as a backup server in the data center or, with our NetBackup BusinesServer™ edition, in decentralized configurations. Expect to see joint solutions or initiatives around our backup solutions, which will involve several divisions of IBM that provide storage media on tape or disk or on appliances.

The inclusion of VERITAS Volume Manager™ technology in Windows 2000 opens additional storage management opportunities for VERITAS in direct attached storage, network attached storage and storage area networks. We are engaging with a number of IBM groups to pursue these opportunities.

Windows laptop and desktop network-based backup is another area of shared interest. Our NetBackup Professional can play a large role here. We also have backup and restore management technology that runs on IBM xSeries systems, supporting Microsoft SQL Server and Microsoft Exchange. We will leverage the recent joint initiatives between VERITAS and Microsoft in the Exchange and SQL Server areas to broaden the VERITAS solutions portfolio for the xSeries market. For Microsoft Exchange, we have agents to run with both NetBackup and Backup Exec and specific data migration solutions such as VERITAS NetBackup Storage Migrator™ *for Microsoft Exchange*.

We are also engaging with some divisions of IBM, including the xSeries group, in discussions surrounding software solutions based on VERITAS Storage Replicator™. Also, again working with several IBM groups, we are pursuing pretested configurations. You will see announcements on these in the next few months.

VOX: *Are there any other interesting products in the pipeline?*

EB: Beyond Windows- and UNIX-based environments, both companies see Linux as a growing platform with a user community in need of high-quality availability technology. We will be announcing Linux initiatives in the next few months.

One more thing. I can't give you any more specifics on this today, but there will be a major announcement at **VERITAS VISION2001™** in November. If you're attending, you will hear about it there. If not, watch our Web site for news.

Continued on page 14

By Jeff Drescher, Director, Microsoft Business Alliance, VERITAS Software

Increased VERITAS Support for Microsoft Windows Enterprise Environments

On July 23, 2001, VERITAS announced two news items that amount to a significant strengthening of the partner relationship of VERITAS and Microsoft. The first was about a strategic initiative to bring data availability technology to users of Microsoft SQL Server, the relational database management and analysis system. The second announcement concerned the fact that VERITAS NetBackup™ was chosen to protect Microsoft TerraServer, the large online image database service.

VERITAS availability technology good news for Microsoft SQL Server users

In a new strategic initiative, VERITAS Software and Microsoft Corporation will deliver tiered data protection solutions to customers of the Microsoft SQL Server relational database management and analysis system. VERITAS Software will work in conjunction with Microsoft to develop cooperative sales opportunities, service efforts and customer support programs intended to further enhance the performance and availability of SQL Server 2000.

Through the initiative, Microsoft will continue to take advantage of VERITAS' storage software expertise, broadening the position of SQL Server in the marketplace on Windows 2000. Both companies will work to develop and market a solution for their mutual SQL Server customers that streamlines the process to implement and maintain Microsoft's database solution.

"It certainly makes the statement that the data in your SQL database is protected in an enterprise-class way," said Bill North, research director at IDC, as reported by Reuters. He agreed that the VERITAS-Microsoft partnership will make the management of storage used for SQL databases easier and more straightforward. "This is all good news."

Through joint development, consulting and support, the companies will bring VERITAS Software enterprise technologies to SQL Server environments. This increased collaboration augments the recent release of Windows 2000. VERITAS Volume Manager™, VERITAS Backup Exec™ and VERITAS NetBackup Storage Migrator™ technologies are included in the Microsoft Windows 2000 operating system to extend its enterprise capabilities.

Three areas of focus to reach the right level of data availability

Customers have been looking for the highest possible performance, protection and reliability for their critical SQL data. To help them reach the availability goals for their business needs, VERITAS will focus on delivering three distinct classes of products:

- **Backup** – for Windows 2000 Server and SQL Server 2000, this includes VERITAS Backup Exec or VERITAS NetBackup
- **Online data management and editions** – includes VERITAS Volume Manager and VERITAS SANPoint Direct™
- **High availability** – includes VERITAS replication software, which will become available later this year

All these VERITAS products are supported on all versions of Microsoft Windows 2000 Server. Their use is included in targeted deployment guides that are produced as part of the initiative. VERITAS and Microsoft will continue to work together to create enhancements for SQL environments.

VERITAS NetBackup protects Microsoft TerraServer data

Further strengthening the relationship between the two companies, Microsoft chose VERITAS NetBackup™ DataCenter to deliver data protection for Microsoft TerraServer. Microsoft TerraServer is one of the world's largest databases, and the largest online atlas of high-resolution satellite imagery and aerial photography. It gives free public access to a vast data store of maps and aerial photographs of the United States. TerraServer data is stored in a three-terabyte database running Microsoft SQL Server 2000 Enterprise Edition. Microsoft operates

TerraServer as a research project, designed to demonstrate the scalability of SQL Server 2000 and Windows 2000 Datacenter Server.

The myriad images continuously available through TerraServer, and Microsoft's ability to showcase the collection as a demonstration of the scalability of SQL Server, rely on flawless data availability. VERITAS NetBackup DataCenter supports TerraServer with scalability features that include tape striping and a special shared-memory technique that dramatically accelerates backup performance. In addition to offering availability and scalability, it also augments the performance and manageability of Microsoft Windows 2000 Datacenter Server and SQL Server 2000 Enterprise Edition. "The backup and reliability capabilities for TerraServer's imagery and maps are essential for our operation," said Tom Barclay, Group Program Manager for TerraServer, Microsoft Corp. "We rely on VERITAS NetBackup because it increases system availability while simplifying the complexity of database backup."

> "As a leading provider of storage software for Windows, VERITAS understands our operating environment and the needs of our SQL Server customers. Because of our work with VERITAS, customers will experience an improvement in the performance and availability of their strategic business applications."
>
> Steve Ballmer
> Chief Executive Officer
> Microsoft Corp.

VERITAS NetBackup enables administrators to perform all aspects of media management, including library sharing and individual tape drive sharing. With NetBackup, any organization can centrally manage all aspects of backup and recovery for SQL Server databases from intuitive, graphical user interfaces, allowing consistent backup policies to be set across the enterprise.

At TerraServer, VERITAS NetBackup DataCenter replaces software from a competing independent software vendor, which had previously backed up the environment running on Windows NT.

To **read more**, please visit the Solutions pages of the VERITAS Windows Business Unit at **http://www.veritas.com/solutions/listing/SolutionListEA.jhtml?categoryId=2052&_requestid=2309**.

Initiatives — Continued from page 12

VOX: *Will the IBM Strategic Business Unit be represented at any IBM-sponsored events or other events that IBM customers attend?*

EB: Yes. To date, the IBM Strategic Business Unit has represented VERITAS at the DB2 International Users Group, where we announced the DB2 Agent, and the SHARE IBM Users Group — that's where we showed VERITAS NetBackup *for AIX*. We have plans to attend additional IBM shows in the future to support our collaborative efforts to provide enterprise storage solutions to joint customers.

VOX: *VERITAS has its Integration Lab in Mountain View, and IBM's Storage Systems Group (SSG) operates its Open Systems Lab almost next door, in San Jose. Is there any collaboration between the two?*

EB: Yes. For example, through the joint efforts of these two facilities, we were able to qualify the IBM Enterprise Storage Server for use with VERITAS Foundation Suite and VERITAS Foundation Suite HA, which includes all the VERITAS Database Edition products, on Sun platforms. We expect to work together with the Storage System Group's Open Systems Lab to continue to qualify SSG products with VERITAS Intelligent Storage Management software on different platforms.

VOX: *Are VERITAS and IBM approaching the market with any joint offerings?*

EB: Many of our products will be jointly qualified on IBM hardware and software, and IBM is making changes in its software, such as AIX 5, to better support VERITAS technology. It's important to note, however, that all fulfillment for VERITAS products under AIX 5 or other IBM platforms will be through VERITAS and its authorized distributors. IBM is not entering into an OEM relationship for any VERITAS products.

By Kevin Mikalsen, Product Marketing Manager, VERITAS Software

New Version 8.6 of VERITAS Backup Exec™ Enhances Backup and Recovery of Windows NT and Windows 2000 Environments

Overview of New and Enhanced Features

VERITAS announced version 8.6 of VERITAS Backup Exec™ for Microsoft Windows NT and Windows 2000 operating systems on June 18 of this year at Microsoft TechEd in Atlanta, Georgia. This new version adds sophisticated backup and recovery functions for new online and database applications running in Windows NT and Windows 2000 business environments, and new tools to improve the performance and management of backup operations.

New: Intelligent Image Option

A new VERITAS Backup Exec Intelligent Image Option reduces server CPU utilization and the time it takes to back up and restore data. It accomplishes this by first mapping the files to physical block locations and then copying the disk volume to tape or disk storage. This option supports full, differential or incremental backups and enables the restoration of individual files or the entire disk volume. See also page 27 to learn more about Intelligent Image Option.

New: Agent for Microsoft SharePoint Portal Server

The new version of VERITAS Backup Exec is the first complete software solution that integrates online data protection and recovery for Microsoft SharePoint Portal Server, a flexible portal that allows companies to easily find, share and publish information. The VERITAS Backup Exec Agent for Microsoft SharePoint Portal Server uses the native backup API, which ensures reliable protection of the application.

Enhanced: Agent for Lotus Domino and Lotus Notes

Companies using Lotus Domino R5 server software can benefit from improvements to the optional Lotus Domino agent for VERITAS Backup Exec. This agent uses the Lotus backup API for online data protection of Lotus Domino R5 messaging and database servers, which use either Archive or Circular Logging. Using the Archive Log, Administrators can easily recover Lotus Domino server data and the Transaction Log to a specific point in time. Additional support includes protection of R4 databases and servers.

New: Backup to disk

Backup Exec now exploits the fast access times made possible by disk technology with the capability to back up to hard drives, network attached storage (NAS) and RAID systems. This new feature complements traditional tape drive backups. A built-in software compression feature optimizes disk storage capacity, making backup to disk ideal for data staging operations performed in conjunction with regular, daily backups.

New: Backup via network interface card (NIC)

You can now isolate and redirect backup traffic to a subnetwork by identifying a specific NIC to route it through. This reduces LAN traffic on the primary network and enhances the reliability of backups with a much lower likelihood of dropped packets.

New: Web-based ExecView

ExecView now has a new graphical user interface. You can monitor VERITAS Backup Exec *for Windows NT and Windows 2000* and Backup Exec *for NetWare* server activity via a Web console from any PC with a Web browser.

Enhanced: Intelligent Disaster Recovery Option

You can easily create bootable CD-RW disks from within the Intelligent Disaster Recovery preparation wizard. This option uses embedded CD-RW technology from VERITAS MyCD™.

New: Support for Citrix Metaframe

On both Windows NT and Windows 2000 platforms, you can back up and restore data via Citrix Metaframe v1.8.

New: Support for Oracle 9*i*

Backup Exec 8.6 protects Oracle 9*i* databases on Windows NT and Windows 2000 Servers.

"Version 8.6 of VERITAS Backup Exec *for Windows NT and Windows 2000* re-emphasizes Backup Exec's worldwide leadership for Windows NT and Windows 2000 data protection. VERITAS Backup Exec provides robust protection for users of Microsoft and Lotus products — which is especially important in an expanding global market with diverse data protection needs for Windows NT and Windows 2000 messaging, collaboration and database applications."

John Maxwell
Vice President, Product Marketing
VERITAS Software

New: Version 8.6 certified for Microsoft Windows 2000 Datacenter

The VERITAS Backup Exec *for Windows NT and Windows 2000* Advanced Server Edition completely protects Windows 2000 Datacenter Server. VERITAS data protection solutions are the only ones to carry certification for Windows 2000 Server, Windows 2000 Advanced Server and Windows 2000 Datacenter Server.

Enhanced: Advanced Device and Media Manager

You can now manage mixed tape drive technology in a single tape library.

Enhanced: E-enabled CD browser and installer

The redesigned, easier-to-use interface is Web-enabled. Users can link directly to product information and documentation, online registration, support tech-notes and product information.

Enhanced: Network Storage Executive

VERITAS Backup Exec Network Storage Executive™ is updated with all the new features of Backup Exec version 8.6 for more centralized and error-free backup operation. You can now perform restores of individual Exchange Server mail messages. You can move protected resources between master server storage domains. In addition, you can copy policies for use with other master server storage domains. Users of previous versions of Backup Exec can go through a rolling upgrade without productivity loss.

Enhanced: VERITAS Backup Exec Small Business Server Edition, version 8.6

All new and enhanced features of VERITAS Backup Exec version 8.6 are part of the cost-effective Small Business Server Edition of the product.

VERITAS ON THE MOVE

VERITAS Moves into New Global Headquarters in Historic Silicon Valley Location

VERITAS recently began moving employees and functions from five distributed facilities into its newly built headquarters at 350 Ellis Street in Mountain View, California. The 425,000-square-foot complex on 20 acres will house research and development units, executive and marketing offices, and other teams. VERITAS expects to fully occupy the site by early 2002. The new campus consists of three large buildings and a central courtyard. Two four-story buildings are dedicated to office and research and development space. The third one will be a one-story Commons Building and feature a health club, a cafeteria, a store and other amenities, all open to the public.

The location of VERITAS' headquarters is widely regarded as one of the founding sites of Silicon Valley, formerly occupied by companies such as Intel, Fairchild Semiconductors and Rheem Semiconductors. Rheem Semiconductors owned and occupied the site beginning in 1958. Later, Raytheon acquired and operated it from 1961 to 1997. The rich history of the site will be commemorated by a public display with a timeline of the property's occupancy.

The city of Mountain View praised the new location because 40 percent of it has been set aside for open space. This widely exceeds the 15 percent required by the city. In addition, the campus is close to the Middlefield station of the Valley Transit Authority (VTA), allowing employees and visitors to use public transit. VERITAS Software is providing its employees with Eco Passes, with which they can enjoy free rides on VTA Bus and Light Rail, seven days a week. VERITAS Software joins more than 120 other leading companies in the Valley participating in VTA's Eco Pass program.

"The opening of VERITAS Software's new headquarters is symbolic of the company's commitment to expansion and growth. The new campus will serve the company well in the coming decades as we plan to grow to become a $5 billion company."

— Gary Bloom
President and CEO
VERITAS Software

By Daniel Charlu, Senior Product Manager, Appliance Software Division, VERITAS Software

Data Availability for NAS Powered by VERITAS and Sun

VERITAS Software and Sun Microsystems Inc. have collaborated to bring network attached storage (NAS) into the mainstream through the storage industry's first "open," enterprise-class data availability appliance for NAS to leverage existing industry-standard components. Together, they have also changed the delivery paradigm for NAS by harnessing the broad and efficient delivery and support capabilities of authorized channel partners. The result is immediate access to a NAS solution that minimizes risk, allows for rapid deployment and protects investments in people, processes and products.

Potential and limitations of traditional network attached storage

NAS appliances have emerged as a simple and effective solution that helps companies manage explosive data growth. NAS appliances attach directly to a local area network and are optimized for a single purpose: to provide file services over the network. NAS appliances simplify storage management by consolidating storage on a single network-accessible system and allow easy-to-use methods for online management, clustering and backup. These appliances also let users access and share files from anywhere on the network, using industry-standard NFS and CIFS protocols — without compromising security or data integrity. System managers can place NAS appliances quickly and cost-effectively at strategic points on the network, allowing online allocation of storage resources to meet changing needs.

Although NAS appliances offer many advantages, most suffer from limitations imposed by proprietary hardware and software. In turn, these NAS appliances limit options in important dimensions such as storage capacity, availability and data protection. These limitations can add significantly to the total cost of ownership. VERITAS and Sun have teamed up to change the delivery paradigm by providing a turnkey enterprise-class data availability NAS appliance solution.

An innovative software approach to NAS

Data availability for NAS powered by VERITAS and Sun combines VERITAS ServPoint™ Appliance Software *for NAS* with Sun Enterprise servers and Sun StorEdge T3 arrays to create easy-to-use, industry-standard appliances — scaling from the workgroup to the data center. The appliances are pre-tested, delivered and supported through mutual channel partners, resulting in reduced risk, rapid deployment and increased customer satisfaction. Three configurations are available:

- Workgroup
- Department
- Data Center

Each configuration is available in a standard or high availability version. For high availability and additional scalability, users can cluster from two to 32 nodes. These choices significantly reduce risks associated with NAS implementations, but offer the flexibility to add processing power, network bandwidth and storage capacity to meet growing demands.

Using the graphical user interface of VERITAS ServPoint, storage management is easy. You can schedule or initiate PointIntimeCopy™ (PIC), assign shares, reconfigure storage or replace disks online. You can back up your appliance with NDMP or VERITAS NetBackup™, the industry's leading backup software. For IT organizations with Solaris expertise, configuring NAS servers in-house is a fast process. Depending on the amount of storage, VERITAS ServPoint typically installs on a Sun server in less than 30 minutes from a single CD. If you need a higher level of availability, the Cluster Wizard in VERITAS ServPoint lets you cluster for high availability in minutes.

In short, VERITAS and Sun have transformed NAS infrastructure from a traditional storage repository, offering basic file services in UNIX and Microsoft Windows NT environments, to an enterprise-class solution with value-added capabilities such as scalability, high availability and data protection.

What does the new NAS infrastructure mean for your business?

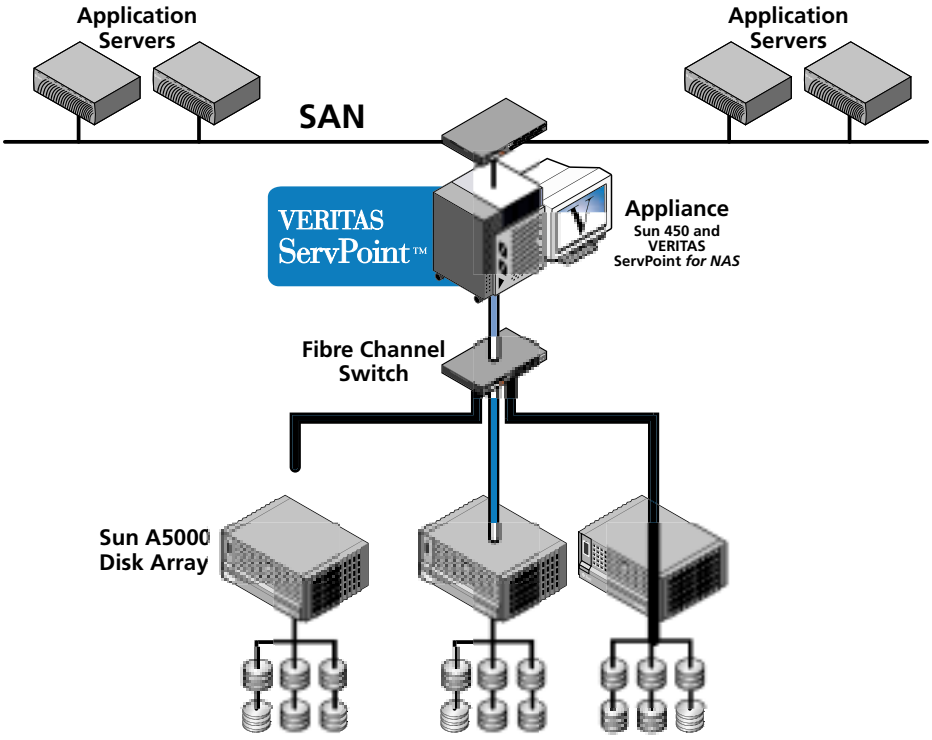
There are a number of ways your operation can benefit from the results of this collaboration:

- Scalability and flexibility with three configurations: Workgroup, Department and Data Center
- Reduced risk as the result of a collaborative effort by VERITAS and Sun, backed by a cooperative support model through mutual channel partners
- Availability and reliability, leveraging the advanced features of VERITAS' ServPoint Appliance software for NAS and Sun Enterprise servers and Sun StorEdge T3 arrays
- Cost-effectiveness and efficient resource management with a user-friendly GUI and a low learning curve
- Rapid deployment and easy installations with fully pretested NAS configurations
- Turnkey solution supported by authorized VERITAS/Sun channel partners as your single point of contact for fulfillment, integration and support

Who is likely to benefit most from this availability appliance?

The data availability appliances for NAS powered by VERITAS and Sun are ideal for businesses wanting to better manage, consolidate and share storage or files from anywhere on the network. If you struggle with the explosive growth in storage and the high cost of managing this growth, you may want to consider these NAS appliances as a way to cost-effectively address these issues. The NAS appliances can meet the requirement for simple networked storage in many operations. Here are a few examples of industries that could see dramatic and immediate benefits in availability, scalability and cost control:

- Oil and gas companies using seismic interpretation applications
- Computer-assisted design or engineering companies
- Web companies delivering Web services to many users
- Utility companies with automated customer interfaces
- Automotive and aerospace enterprises developing new products
- Biotechnology companies needing to store and share huge amounts of data
- Service providers that need to deliver increased file services and performance while keeping storage costs low



By Rob O'Brien, Product Marketing Manager, VERITAS Software

A New Era for Oracle Database Backup

Announcing VERITAS NetBackup™ *for Oracle* Support for Oracle9*i*

VERITAS recently announced new VERITAS NetBackup™ for Oracle support for the Oracle9i database. VERITAS has been working with Oracle Corporation to make sure that NetBackup for Oracle leverages all of the new and relevant backup and recovery features being delivered with Oracle9i. Due to the close working relationship between VERITAS and Oracle, the two products are tightly integrated. There is virtually no learning curve for Oracle9i RMAN users. NetBackup for Oracle can manage the backup and recovery operations, automate the backup process and perform most of the work that the Oracle DBA performs manually. The result to you is lower overall cost of ownership, increased IT staff productivity and reduced training costs.

What's new in VERITAS NetBackup *for Oracle* support for Oracle9*i*

VERITAS has been aggressive in providing new Oracle9*i* support to its customers across all product lines. VERITAS NetBackup *for Oracle* is no exception, providing this support to our customers starting in July 2001.

Here is a list of some of the new Oracle9*i* functionality that NetBackup *for Oracle* leverages:

- Support of backup and recovery checkpoint restart using Oracle RMAN (Recovery Manager)
- Support of block media recovery using RMAN
- Policy-based automated backup and recovery
- Stored one-time backup configuration setup
- Support of all new Oracle RMAN commands

Increased scalability and reliability

Oracle9*i* is a major release of the Oracle database, with many backup- and recovery-related improvements. Since NetBackup *for Oracle* makes full use of them, you should expect notable backup and recovery performance improvements using the NetBackup *for Oracle* Agent running on Oracle9*i*.

VERITAS NetBackup™ *for Oracle*

Platforms supported by VERITAS NetBackup *for Oracle*

VERITAS NetBackup 3.4.1 now supports Oracle9*i* on the following operating systems:

Solaris (all with Oracle9*i* (32-bit))
- Solaris 2.6 (32-bit)
- Solaris 7 (32-bit)
- Solaris 7 (64-bit)
- Solaris 8 (32-bit)
- Solaris 8 (64-bit)

HP-UX (all with Oracle9*i* (64-bit))
- HP-UX 11.0 (64-bit)
- HP-UX 11i (64-bit)

Future NetBackup *for Oracle* platform support for Oracle9*i* includes:

- IBM AIX
- Linux
- Tru64
- Windows 2000
- Additional Solaris coverage
- Additional HP-UX coverage

Planned platforms support for NetBackup Advanced BLI Agent

By November 2001, we plan for NetBackup Advanced BLI to support Oracle9*i* on the following operating systems:

Solaris support
- Solaris 2.6
- Solaris 7
- Solaris 8

HP-UX support
- HP-UX 11.0
- HP-UX 11i

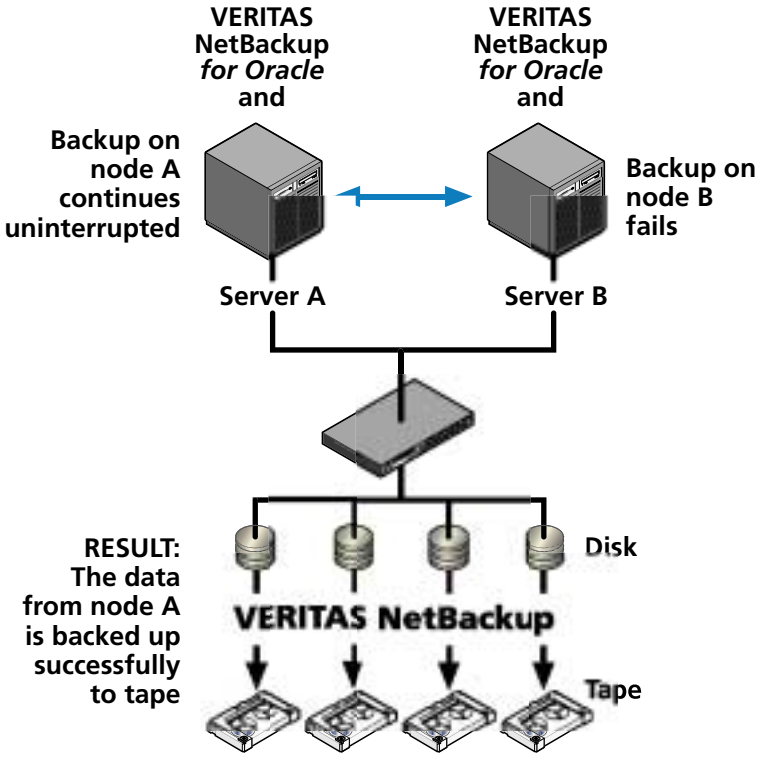
Oracle Corporation has stated that Oracle9*i* is the first database to offer unlimited scalability and reliability through Real Application Clusters (RAC). Before Oracle9*i*, the more the database grew, the more unreliable it became. With Oracle9*i*, you have a database that actually increases its reliability along with its size.

Oracle9*i* can perform a hot failover in less than 30 seconds from a failure using Oracle9*i* RAC in conjunction with Oracle Data Guard and new online maintenance features. The result is that the required management effort is reduced by as much as 40 % because of the self-tuning and self-managing features in Oracle9*i*.

NetBackup *for Oracle* and Oracle9*i* Real Application Clusters

In joint testing at Oracle's Redwood Shores, Calif., headquarters, the VERITAS NetBackup for Oracle Agent was installed on two Oracle9*i* servers in a RAC configuration. Backups were started on both Oracle9*i* servers with NetBackup. Then one of the Oracle9*i* servers was deliberately disabled, causing the backup to fail on that server. However, the backup running on the other Oracle9*i* server continued processing without interruption and completed successfully. This demonstrated that NetBackup *for Oracle* can protect Oracle9*i* databases in a RAC environment. It also showed that NetBackup can exploit the power of a multimode Oracle9*i* RAC environment. During the testing, we observed substantial linear backup and recovery performance improvements.

Here is an illustration of this test:



NetBackup for Oracle and Checkpoint/Restart

NetBackup *for Oracle* now supports the backup and recovery Checkpoint/Restart functionality that comes with Oracle9*i*, called "Resumable Backup and Restore" by Oracle Corporation. This allows a NetBackup *for Oracle* user to resume a failed backup from the point of failure. For example, if a backup fails after it has completed backing up 80% of the Oracle9*i* data files, the NetBackup *for Oracle* user can resume the backup from the last successfully backed up data file. The result is that the user will now have to back up only the remaining 20% of the data.

Before NetBackup *for Oracle* and Checkpoint/Restart, you could not restart the backup from the point where the backup failed. Instead, you had to restart the Oracle backup from the beginning. The benefit of this new feature is that NetBackup *for Oracle* backups can be completed more efficiently in a shorter period of time in the event of failure. Oracle9*i* database performance can improve, because the machine will not be used as frequently for backups. This is very important — database backup windows are rapidly decreasing and corporate IT resources must be used more efficiently.

Continued on page 23

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If you have any comments and feedback on the content of VOX VERITAS, please e-mail it to the editor, Chris Lemoine, at clemoine@veritas.com. Thank you very much for your help!

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- ❑ Picked it up somewhere in the office
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How would you rate the current length of VOX?

- ❑ Too short
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In what format would you prefer to receive VOX? (Please rank 1–4, with 1 being first choice, 2 being second choice, etc.)

- ❑ In print, like it is now
- ❑ Download it in .pdf format from the VERITAS Web site
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How frequently do you want to receive VOX?

- ❑ Every 2 months
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Are there certain sections that you look for or read regularly?

- ❑ Yes
- ❑ No

If so, which sections? _____

What suggestions would you offer to improve VOX? _____

If there's a section that you think could be deleted without losing any value, what would it be? _____

SECTION 2 – Please indicate the information you would most like to see in VOX:

	Very Interested	Somewhat Interested	Not Interested
New VERITAS products and product updates	❑	❑	❑
Technological directions of VERITAS	❑	❑	❑
Information about platforms and operating systems supported	❑	❑	❑
VERITAS recommendations for planning your data availability systems and growth	❑	❑	❑
Financial and investment information about VERITAS	❑	❑	❑
VERITAS services, such as training and consulting	❑	❑	❑
Articles about customers' experiences, challenges, and successes	❑	❑	❑
Technical "how to" information about using VERITAS products	❑	❑	❑
Upcoming VERITAS and industry trade shows and other events	❑	❑	❑
Info about VERITAS' partnerships with other solutions providers	❑	❑	❑

SECTION 3 - Please Tell Us a Little About Yourself

Your name: _____ Your company/organization: _____

Your E-Mail Address: _____ What country do you primarily work in? _____

How long have you been using VERITAS products? ❑ Less than 1 year ❑ 1-2 years ❑ 3-5 years ❑ 6-10 years ❑ Over 10 years ❑ Don't use

Is your relationship to VERITAS that of: ❑ Customer ❑ Analyst ❑ Consultant ❑ Vendor partner ❑ Potential future customer ❑ Reseller or distributor

What is your primary job title?

❑ CEO, COO, CFO, CMO ❑ CIO, CTO ❑ IT director, IT manager ❑ IT/IT staff: systems administrator, database administrator, backup coordinator, data storage coordinator ❑ IS/IT staff – other ❑ Department director or manager (not IS/IT) ❑ Technical or professional staff (not IS/IT) ❑ None of the above

Which types of VERITAS products do you currently use? (check all that apply)

❑ Backup ❑ File system or volume management ❑ Clustering ❑ Replication ❑ Application-specific solutions (editions) ❑ Storage area networking ❑ Microsoft Exchange solutions ❑ Desktop and mobile solutions ❑ Appliance software ❑ Other

Thank you very much for your responses. If you included your name and e-mail address, your name will be entered into a drawing for a special VERITAS thank-you gift. Stay tuned for future editions of VOX VERITAS.

Continued from page 20

NetBackup *for Oracle* and Block Media Recovery using Oracle9*i* RMAN

NetBackup *for Oracle* now supports the Block Media Recovery functionality that is available with Oracle9i RMAN. Oracle9*i* Block Media Recovery allows corrupted Oracle data files to remain online during the recovery of damaged data blocks. With NetBackup *for Oracle*, you can restore individual data blocks from the backup tape while the database is kept online. The main value of this is that the Oracle database can continue to accept and process user transactions. NetBackup *for Oracle* only restores and recovers the individual data blocks that are needed to recover the Oracle database, and not the entire Oracle data file or tablespace that was affected. As a result, Oracle database recovery times decrease significantly.

If you do not use NetBackup *for Oracle* and the Oracle9*i* Block Media Recovery feature and even a single block of any Oracle data file or tablespace is corrupt, recovery takes much more effort. In that case, before you can restore and recover the Oracle database, you must first restore a backup of the entire data file and apply all of the appropriate Oracle redo logs generated for that file after the backup was created.

Coming soon: NetBackup Advanced Block Level Incremental Agent and Oracle9*i*

VERITAS NetBackup Advanced Block Level Incremental (BLI) Agent will offer enhanced functionality for incremental backups and restores for Oracle9*i* databases. The VERITAS Advanced BLI Agent does not require an entire scan of the Oracle9*i* database during the backup process, improving database performance and shortening the backup window.

The NetBackup Advanced BLI Agent allows you to back up and restore your database files using BLI Storage Checkpoint technology. NetBackup Advanced BLI backs up all of the changed data blocks as needed. The Oracle tables remain online during the backup. You need to use NetBackup Advanced BLI Agent to ensure that all changed blocks are backed up.

Improved Oracle9*i* performance with NetBackup Advanced BLI

NetBackup Advanced BLI reduces the backup window and takes the overhead off the Oracle9*i* database server. NetBackup Advanced BLI uses the Oracle9*i* RMAN Proxy Copy feature. Proxy Copy allows NetBackup Advanced BLI to back up the specified files and gives the media management software control over the data transfer between the storage devices and the Oracle data files on disk. The result is that NetBackup, not Oracle RMAN, decides how and when to move the data. This procedure transfers most of the backup overhead to the NetBackup media server, taking most of the I/O workload away from the Oracle production database. The reduced CPU use on the production Oracle database during backups results in a quicker and more efficient backup.

NetBackup Advanced BLI can recover an Oracle9*i* database to a specific point in time. NetBackup Advanced BLI, using the VERITAS File System™ Storage Checkpoint feature that is part of VERITAS Database Edition™ *for Oracle*, creates a stable point-in-time view of the file system that is used for recovering the Oracle database.

Close VERITAS/Oracle collaboration and product enhancements to continue

As a member of the Oracle Backup Solution Partner Program, VERITAS Software uses the APIs provided and supported by Oracle Corporation for the Oracle database. Oracle Corporation uses VERITAS NetBackup for its own internal backups, proving that the integration is not only tested but also proved in the most demanding Oracle environments.

VERITAS Software does not plan on stopping here. We are providing ongoing input and assistance to Oracle Corporation during the Oracle10*i* development process. VERITAS is committed to enhancing all of its products; NetBackup *for Oracle* and NetBackup Advanced BLI Agent support are no exceptions. Look for upgrades of these products as your and other customers' needs change.

By Matt Miller, Product Marketing Manager, VERITAS Software, and
Kevin Closson, Senior Staff Software Engineer, VERITAS Software

VERITAS Database Edition™ 3.0 for Oracle Harnesses the Power of Oracle9i Oracle Disk Manager

VERITAS Database Edition™ for Oracle 3.0 leverages the new Oracle Disk Manager (ODM) API — developed jointly by VERITAS and Oracle — to deliver improved manageability and performance for the Oracle9i environment. ODM supplies major enhancements for file system I/O, file management and file identification. VERITAS Database Edition for Oracle integrates with ODM and adds robust, online logical volume management for new levels of efficiency in Oracle database administration and optimized deployment of existing IT resources.

The massive growth of data and Internet applications as the basis of IT infrastructure now positions relational databases as mission-critical applications for large enterprise businesses. According to Meta Group, by 2003, 80% of all data will reside in databases. At the center of the database market is Oracle, with a commanding 33.8% market share in the year 2000.

The database administrator (DBA) faces the challenging complexities of implementing, managing and maintaining the significant and continuing growth of these databases. DBAs must not only keep up with the rapidly evolving technical advances of the database itself, but also be cognizant of the other components of the IT infrastructure: networks, servers, storage and operating systems. This is a demanding task, even for the most skilled DBA.

When Oracle released the Oracle9*i* database in June 2001, a major focus was on making the database easier to manage. One of the essential components of this focus was the development of the Oracle Disk Manager (ODM). ODM provides DBAs with a tool for easier disk management and, at the same time, improves system performance. This article discusses ODM and shows how VERITAS is working with Oracle to increase manageability and improve performance of Oracle's newest database environment.

Background on ODM

Prior to January 1999, Oracle and VERITAS completed their specification for an optimal I/O interface for the Oracle Server and named this new interface the Oracle Disk Manager. In January 1999, Oracle and VERITAS signed an agreement to implement ODM by extending VERITAS File System™ with new, specialized OS internals and user libraries.

Oracle9*i* is the first database release to use the ODM disk management API. The first commercial software built to support ODM is VERITAS Database Edition™ 3.0 *for Oracle*, released in September 2001.[1]

ODM Overview

DBAs face constant challenges in managing database storage, particularly if they manage databases on multiple platforms. In order to effectively tune I/O performance and manage disk space, they need platform-specific expertise to be familiar with issues such as supported I/O types and port-specific differences. Tuning an Oracle instance for optimal I/O performance in such an environment is complex.

ODM offers a simpler environment for managing and tuning Oracle databases by rendering all platform-specific I/O-related calls and settings unnecessary. Oracle automatically detects if ODM is present and uses it without any prior setup. All I/O operations are supported on both file system files and raw partitions. Because file system files are inherently easier to manage, they are expected to be the natural choice for Oracle9*i* databases. ODM also supports mixed file types (raw partition and file system files), which benefits existing databases and supports migration from raw partitions to file system files.

In an Oracle environment, the Oracle server generates a very complex array of I/O system calls, including scattered reads, single-block reads, direct reads, direct writes, single-block asynchronous writes and large

[1] Gartner Group, "2000 Database Management Systems Software Market Share"

asynchronous writes. To perform these reads and writes, a large variety of system calls are used, which increases CPU overhead and reduces performance of the Oracle application.

With ODM, a single I/O system call is used to perform all the basic file management functions, including file creation, file resizing, file identification, file read and file write. ODM replaces the complex set of system I/O calls with a simplified architecture that increases I/O performance, uses system resources more efficiently and improves file management.

The performance goal of ODM is to enable optimal I/O for Oracle database applications with performance equal to or greater than that of raw partitions. Early performance test results have shown that ODM equals the performance of raw partitions while running on VERITAS File System.

ODM Features

Advanced Support for File System I/O

ODM finally puts to rest the long and tedious debate over whether to store datafiles in file systems or raw partitions. Historically, DBAs choose between file system files and raw partition storage by selecting the "lesser of two evils." File system files are easier to manage, but raw partitions provide better performance. An application that doesn't have substantial performance requirements when initially deployed may change over time; in many cases, this forces administrators to migrate datafiles from file systems to raw partitions.

ODM changes all this. All ODM disk I/O traffic uses a single system call that supports all Oracle file I/O types, including sequential reads, sequential writes, direct reads, direct writes, scattered reads, Database Writer batch writes, Log Writer Redo Log buffer flushing and archiving of Redo Logs by the Archiver process. Using ODM, all of these I/O types are enhanced on both file system files and raw partitions.[2]

Oracle9*i* still supports the use of datafiles on file systems that do not support ODM, using non-ODM internals. This minimizes disruption while migrating datafiles into an ODM-compliant file system. ODM simplifies configuration, as it requires no system tunable parameters. It also allows administrators to store datafiles in file system files without sacrificing performance or advanced I/O capabilities.

File Management Features

Managing space for large, complex databases is time-consuming and difficult. Routine tasks, such as adding and naming datafiles, are prone to mistakes. Databases with unpredictable growth patterns also pose significant capacity planning challenges.

Oracle9*i* with ODM simplifies these tasks with atomic file creation and Oracle Managed File support.

File Creation with ODM

When the Oracle server is in the process of initializing a new datafile, any number of things can go wrong. The DBA must clean up from the point of failure, which may entail removing a file[3] from a file system that was too small for the data being added. On large systems with many existing datafiles, these cleanup operations can be dangerous.

ODM reduces the failures that can occur when adding a datafile to a database by using a simplified set of file creation routines:

- odm_create()
- odm_commit()
- odm_abort()

An Oracle datafile is not a file in the file system until Oracle has fully initialized it and called odm_commit(). If an Oracle failure occurs during the operation, before odm_commit(), the file never even appears in the file system.

Additionally, datafiles created with ODM consist of contiguous file system blocks. In traditional file system files, the disk space is not allocated contiguously, and the potential degradation of table scan throughput for noncontiguous datafiles is one of the reasons DBAs choose raw partitions for datafile storage.[4]

ODM files look and feel like any file system files, without special naming extensions or file system mount options.

[2] The Archivelog destination must be a directory in a file system. ODM offers improved support for large sequential writes and therefore aids the Archiver process in its task of spooling logs to the offline location.

[3] Generically speaking, Oracle9*i* will do such cleanup in the absence of ODM. However, since ODM executes in the context of the Operating System Kernel, it is the only way to ensure such cleanup occurs.

[4] In file systems that include non-Oracle files, there may be cases in which there are insufficient contiguous blocks in the file system. In this case, ODM creates the datafile or extension with as many contiguous blocks as possible. This should not happen on file systems used for Oracle datafiles only.

Oracle Managed File Support

To reduce administrative complexity, Oracle9*i* offers a feature called Oracle Managed Files (OMF). OMF manages datafile attributes, such as file names, file locations, storage attributes and whether the file is used in a database. For a comprehensive overview of the OMF feature set, see the Oracle9*i* Administrator's Guide.

OMF requires file system storage. It eliminates the mundane task of providing unique file names and offers dynamic space management using the auto-extend functionality of Oracle9*i*. OMF should be used only in file systems residing in striped/RAID-configured logical volumes that can support dynamic file system growth. File systems intended for OMF usage should support large (greater than 2GB), extensible files to enable tablespace auto-extension, a key integration point with VERITAS Database Edition 3.0 *for Oracle,* which provides these capabilities.

Managing a large database traditionally means tracking a large number of files. Using OMF allows DBAs to think of tablespaces, online redo log files and control files as database objects rather than as collections of datafiles — simplifying database administration. OMF files are created with the auto-extend capability by default. Using this feature significantly reduces the capacity planning associated with maintaining existing applications and deploying new databases. In the past, DBAs have been cautious about using auto-extend, due to concerns over file system fragmentation. ODM eliminates this concern through the introduction of the odm_resize() routine, which allocates contiguous file system blocks to files. Eliminating potential fragmentation assures that table and index scan throughput does not degrade as the tablespace grows.

File Identification

Traditionally, the Oracle server uses a standard system call to obtain a file descriptor from the operating system. It then uses that file descriptor to perform file operations such as reading and writing.

File descriptors require an allocation structure in the OS kernel. Although they are not large data structures, a server hosting a large Oracle database will have many kernel structures allocated as file descriptors for open files. For example, consider an Oracle database consisting of 200 datafiles, with 1,000 processes attached to the instance. If all processes open all files, the OS kernel would need to provide for 200,000 active file descriptors.

To support file open calls for all processes on all datafiles, DBAs must tune both system-wide and per-process limits. For a large database, the DBA may need to set the system-wide limit for open files to more than 500,000 (a one-terabyte database with files limited to 2 GB would have 500 datafiles; supporting 1000 attached processes requires 500,000 active file descriptors).

Although today's UNIX implementations can handle these kernel requirements, this is clearly wasteful. Kernel-managed file descriptors require concurrency control. On multiprocessor systems, the kernel open file list is typically protected with locking. On an active server, this locking uses an unnecessary amount of processing power.

An ODM File Identifier replaces the file descriptor, eliminating this OS overhead. ODM file identifiers are shareable — once a file has been identified in ODM, subsequent processes using the shared identifier do not incur any kernel overhead.

ODM file identifiers also enhance reliability. Calls to access a file through ODM are regulated using a special key value that Oracle attributes to a database. For large complex server systems hosting multiple applications and Oracle instances, this eliminates the possibility of a datafile being opened by two nonparticipating instances.[5] Without ODM, it is conceivable that this could occur.

[5] Such an occurrence would be due to faulty administration. ODM is added assurance that such a mistake won't happen. If running Oracle 7 or 8, continue to use VERITAS Quick I/O for proven I/O performance equal to that of Raw I/O.

VERITAS Database Edition™ 3.0 *for Oracle* and ODM

VERITAS Database Edition *for Oracle* is the first solution to implement ODM. Database Edition *for Oracle* delivers the best of both worlds: the simplified management of file systems along with optimal database performance.

In addition to providing integration with ODM, VERITAS Database Edition *for Oracle* also provides advanced storage virtualization capabilities for Oracle environments through logical volume management and "online everything" — volume and file system extension, defragmentation and on-disk recovery — all without user interruption to data. VERITAS also allows IT departments to leverage the existing hardware resources and use them more efficiently by operating across heterogeneous storage environments. You manage all your storage consistently and seamlessly, regardless of the storage vendor you may be using.

Oracle customers who are moving to Oracle 9*i* should understand that when they run Oracle 9*i* with VERITAS Database Edition 3.0 (or later), they will receive optimal I/O performance automatically with Oracle ODM. With its advanced manageability features, ODM provides a management interface that will allow DBAs to manage larger and more complex databases with little or no increase in staff.

In conjunction with ODM, VERITAS Database Edition *for Oracle* provides Oracle database administrators with a new level of manageability and performance of Oracle9*i* environments.

By Kevin Mikalsen, Product Marketing Manager, VERITAS Software

Improving Backup Performance with the New Intelligent Image Option in VERITAS Backup Exec™ for Windows NT and Windows 2000

VERITAS Backup Exec™ for Windows NT and Windows 2000, version 8.6 equips you with many features to improve data protection reliability while increasing your backup performance. Intelligent Image Option, a separately licensed and priced option (it runs with Backup Exec Server Edition, Advanced Server Edition and Small Business Server Edition) can significantly boost the speed of backing up data directly from a local media server via SCSI or fibre channel. See also page xx for an overview of new and enhanced capabilities in Backup Exec 8.6.

Keys to upgrading your backup rates

Intelligent Image Option upgrades backup rates and data protection for active servers with live file systems containing a very large number of smaller or compressed files. It delivers optimal benefits when used with Backup Exec Open File Option on servers with many open files.

Intelligent Image Option accelerates complete backups when deployed on a server with a file system containing thousands or even millions of files. Although servers with a relatively small number of larger files may not realize a performance boost over traditional file-by-file backups, users may still benefit from Intelligent Image Option's consistent point-in-time backups.

High-performance backup devices (whether tape or hard disk) maximize the speed of Intelligent Image Option, since backup rates are limited by devices that are much slower than the file system.

Three steps to point-in-time backups of open files

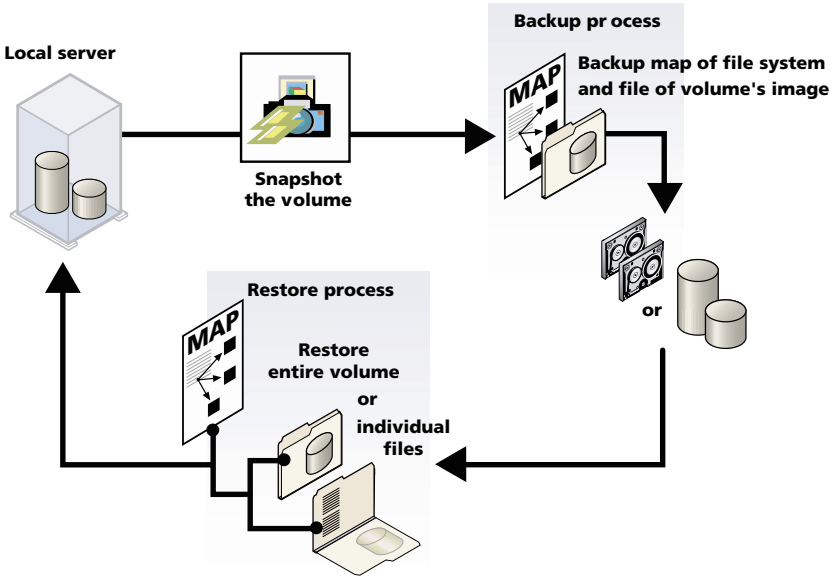
The integrated open file technology behind Backup Exec Intelligent Image Option creates a snapshot or point-in-time image of the volume while other applications continue to send read and write requests to the volume. Intelligent Image Option then searches for and locates the objects selected for backup protection and creates a comprehensive "map" of the file system. Next, Intelligent Image Option writes the data as a single image directly to the backup media at very high speed.

Faster backups with reliable protection for open files

- The greater the number of files, the greater the backup performance improvement provided by Intelligent Image Option. When a server contains tens of thousands or more smaller files, backing up data as a single image is much faster than traditional backup, even considering the overhead imposed by map creation.
- Compared to the traditional method of writing data from the selected files to the backup media one at a time, Intelligent Image Option writes files as a single image, using fewer host server CPU cycles and freeing up valuable resources for other applications.
- Unlike some raw-image backup solutions, Intelligent Image Option reduces backup media consumption and increases backup speed by not backing up unused or temporary space, thereby decreasing the overall backup volume.
- During this entire backup process, Backup Exec Intelligent Image Option uses the same open file technology found in Open File Option to deliver safe and reliable point-in-time backup of active file systems with many open files. In a traditional Backup Exec file-by-file backup, open files might be backed up while other applications are writing to them. Without open file technology, the data could become corrupted and unreasonable, or the open files might be skipped and not backed up at all.

Recover down to the file level without restoring entire volumes

The Intelligent Image Option file system map produces fast, single-file and one-pass file-by-file restores — unlike some raw-image backup solutions that require a whole volume to be restored to recover a few files. The user selects files for restore from the backup sets, just as with a traditional restore job. Intelligent Image Option then uses the file system map to locate the required data on the backup media. The file data is read from the backup media and restored to the destination disk.



Intelligent Image Option features

Flexibility distinguishes Backup Exec Intelligent Image Option from other image solution backups:

- **Backup and restore of compressed files** – Intelligent Image Option increases performance by not expanding compressed files during backup, unlike traditional methods that expand compressed files before copying them to the backup media.
- **Backup and restore of open files** – Open file technology keeps applications and data continuously available during backup and restore operations. This technology is installed at the same time as Intelligent Image Option. If Backup Exec Open File Option is installed already, it is automatically upgraded, if necessary.
- **Backup of encrypted files using nonimage methods** – Encrypted files are backed up using a nonimage method in the same job in which the image method is used for other files.
- **Full, incremental and differential backup methods** – Intelligent Image Option retains your access to these methods so you can continue routine backup strategies developed for traditional backups.

- **Individual file, multiple files and entire volume selection for restores** – For restores, make selections down to the file level. All selected files are restored to the destination disk in original volume order in a single pass.
- **Restores of compressed and noncompressed files** – If the volume the files are being restored to does not support compression, the files will be restored in their expanded form.
- **Restores using VERITAS Backup Exec Intelligent Disaster Recovery**™ – Intelligent Image Option is available when using Intelligent Disaster Recovery to create a bootable tape image, bootable CD or a set of recovery diskettes that contain all the files required to recover the Windows NT and Windows 2000 media server.
- **Product integration** – Run Intelligent Image Option from the Backup Exec administration console, from the Backup Exec Command Line applet or from the Backup Exec Network Storage Executive console.

Minimizing Intelligent Image Option backup time

During the Intelligent Image Option backup process, the open file technology imposes some overhead when it creates a temporary workspace called the "static volume." You can minimize the impact of this overhead and further shorten backup time by either optimizing the size of the static volume or by eliminating the need for it altogether via the use of a split mirror.

Optimizing static volume size

The larger the size of the static volume, the longer it takes to create. Automatic size defaults are provided within Intelligent Image Option; however, the static volume can be made smaller via the use of the Backup Exec Open File Option wizard, which is available when Intelligent Image Option is installed. Under certain conditions, you can set the static volume smaller than its default calculated size without negative effect on the backup process, resulting in improved backup time.

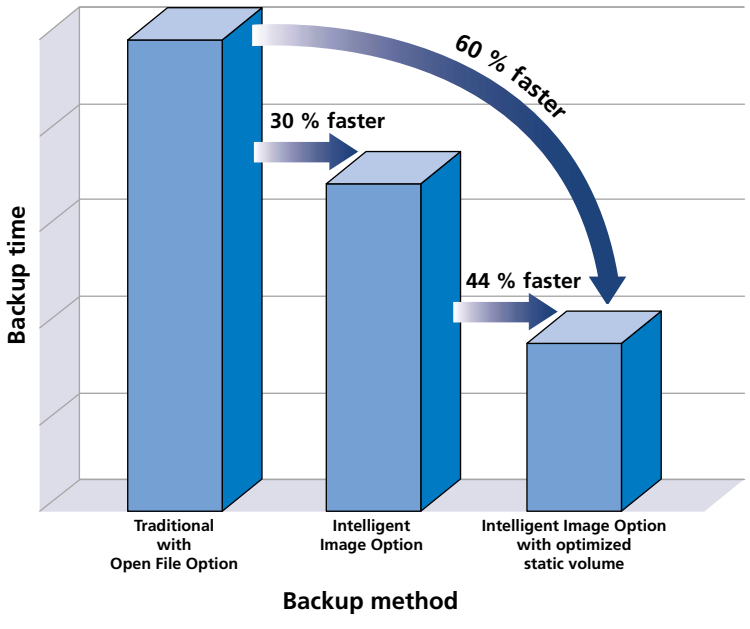
As a guideline, if the amount of data selected for backup is at least 30% less than the total amount of data, the backup may run faster if the Open File Option wizard is used to decrease the size of the static volume. Caution is advised when entering a specific size for the static volume, since the specified size will be created regardless of the size of the volume being backed up. This could result in job failure if there is insufficient space available.

Detailed information about changing the static volume size via the Open File Option wizard is in the Administrator's Guide for VERITAS Backup Exec *for Windows NT and Windows 2000*.

Boost performance even more using split mirrors

An application produces a split mirror of a volume when it creates an exact duplicate or copy of a volume at a specific point in time. Intelligent Image Option can use this static split mirror instead of creating its own static volume, while the original volume is online, active and dynamically evolving. This results in a faster total backup by eliminating the need for open file technology and regaining the time normally required for creating the static volume and other related preprocessing.

Create split mirrors using VERITAS Volume Manager™ or Compaq Enterprise Volume Manager. Achieve faster backup performance using the Backup Exec Command Line Applet to run an alias backup with Intelligent Image Option selected.



Measurable backup performance improvements with Intelligent Image Option

The results of performance tests on an active file system illustrate the performance benefit that Intelligent Image Option offers: tests. The test configuration included a host server with quad Pentium III 700Mhz processors, 2GB total physical RAM, Ultra160 SCSI HBA and two 9GB 7200rpm SCSI hard drives with an Ultrium tape drive as the Intelligent Image Option backup device. It also involved a total of 60,800 files.

The first tests compare traditional file-by-file backup using Backup Exec Open File Option to protect open files versus backup using Intelligent Image Option. The use of Intelligent Image Option increased total backup performance by more than 30%. Put another way, traditional file-by-file backup took 43% longer to complete than the Intelligent Image Option–based backup.

A second test highlights how Intelligent Image Option performance can be improved even further by optimizing the static volume size. The Intelligent Image Option results described above used a cache partition created with automatic defaults to calculate its required size. Another test was performed under the same conditions except the static volume was created using the Open File Option wizard to manually set the static volume size to a smaller, yet still adequate, size. The performance difference was significant. The Intelligent Image Option backup using the optimized static volume size was 44% faster than the backup using the default-calculated static volume size.

Highly fragmented or completely defragmented file systems can achieve similar results. In the tests described above, the file systems were fragmented up to 47%. This fragmentation is typical of active file systems that contain a very high number of smaller files that are in a constant state of change. A second set of tests performed with file system fragmentation at zero yielded performance improvements close to those of tests that were run on systems with high file fragmentation.

Please not that a number of variables will affect Intelligent Image Option performance. These include system load, machine resources, backup device, number of files, average file size, temporary cache partition size, system fragmentation and others.

For more information on Intelligent Image Option, please go to **http://www.veritas.com/products/category/ProductAddOnDetail.jhtml?productId=iio**.

See also page 15 for an overview of the new and enhanced features in Backup Exec 8.6.

By Rosemary Stark, Regional Product Manager, VERITAS Software

Increasing Availability and Performance of VERITAS Volume Manager™ Operations with Dynamic Multipathing

Background

What is Dynamic Multipathing (DMP)?

DMP is a method of providing two or more hardware paths to a single drive. For example, the physical hardware can have at least two paths, such as *c1t1d0* and *c2t1d0*, directing I/O to the same drive. VERITAS Volume Manager™ arbitrarily selects one of the two names and creates a single device entry, then transfers data across both paths to spread the I/O.

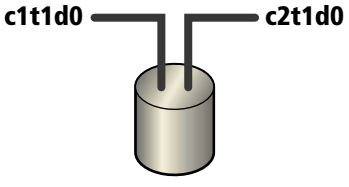


Figure 1: Two I/O paths to a single drive or array

DMP is enabled by default. Volume Manager detects multipath systems with Universal Worldwide Device Identifiers (WWD IDs) and manages multipath targets, such as disk arrays, which define policies for using more than one path.

Benefits of DMP

High availability – DMP introduces greater reliability through a path failover mechanism. In the event of a loss of one connection to a disk, the system continues to access the critical data over the other sound connections until the failed path is replaced.

Improved performance – DMP allows for greater I/O throughput by balancing the I/O load uniformly across multiple I/O paths to the disk device.

Paths supported in VERITAS Volume Manager 2.5.x vs. Volume Manager 3.x

On Volume Manager 2.5.x, DMP supports 42 paths. On Volume Manager 3.x and beyond, DMP supports unlimited paths.

Active/active disk arrays

"Active/active" is a DMP-specific term for disk arrays that allow I/Os to disks through multiple paths simultaneously, without causing any performance overhead. For these disk arrays, in the 2.5.x releases, Volume Manager follows the round-robin policy for issuing I/Os across available paths.

In its 3.x releases, VERITAS Volume Manager uses the "balanced path" policy to distribute I/Os across available paths. Load-balancing ensures that I/O throughput can be increased by using the full bandwidth of all paths. Sequential I/Os starting within a certain range are sent down the same path to optimize I/O throughput using disk track caches. However, large sequential I/Os that do not fall within this range are distributed across multiple paths to take advantage of load balancing.

These disk arrays are used in load-balancing mode by distributing I/Os across all available paths. Some examples of these types of disk array are A5X00 (SENA) disk arrays from Sun, the SPARC Storage Array (SSA), EMC Symmetrix, Hitachi 7700E.

Active/passive disk arrays

"Active/passive" is a DMP-specific term for disk arrays in which controllers "own" logical units (LUNs)/disks. Only the controller that "owns" the LUN issues I/Os to these LUNs. The controller that "owns" a LUN is called the "primary" path and the alternate controller is referred to as the "secondary" path to the LUN.

Accessing a disk/LUN through multiple available paths on such disk arrays is not allowed. If a LUN on an active/passive disk array is accessed simultaneously via multiple paths, the "ownership" of the LUN shifts back and forth across the controllers, causing the "ping-pong" effect. Because changing ownership is a time-consuming operation, this can cause immense performance degradation.

For such disk arrays, DMP policy is to use the available primary path as long as it is accessible. DMP shifts I/Os to the secondary path only when the primary path fails. This is called "failover" or "standby" mode of operation for I/Os. Examples of such disk arrays are Hitachi 5700E, Hitachi 5800E, Nike (Model 10, 20), Galaxy and Purple (T300).

Scheduling I/Os

Volume Manager 2.5.x

DMP follows the round-robin policy of scheduling I/Os across available paths. I/Os within 64K on either side of the last I/O are sent down the same path. This sequential I/O detection is done in Volume Manager 2.5.x for A5000 disks only.

If DMP cannot identify multiple paths on Volume Manager 2.5.5 on Solaris 2.6, it may lack the proper license to turn on multipathing, or the disks are not returning unique serial number information in Standard Inquiry data in bytes 36–47.

Volume Manager 3.x

DMP follows a "balanced path policy" for scheduling I/Os across available paths for Active/Active disk arrays such as EMC.

Balance random I/Os across all the available paths using the following method:

```
iopath = ((bp->b_blkno >> 7) % dmpp->tpaths);`
```

This means that all I/Os starting within a certain 64K range go through the same path. I/Os that start within other 64K ranges on the disk will be routed through a different path.

dmpp->tpaths indicates the total number of paths to this disk, and *iopath* is the path used for the I/O. I/Os are sent down only those paths that are enabled. In other words, the I/O load is balanced across all the available paths, and sequential I/Os within a 64K range are sent down the same path.

Path failure

If a path fails, alternate paths are used. If all access paths have failed, the disk is considered to have failed. A disk driver failure will not cause a DMP failure.

The flow of event notification during I/O failure is as follows:

1. Device driver/HBA controller issues SCSI III commands to disk and command fails
2. OS kernel trying to issue write fails, generates an error
3. Based on the error code, the DMP driver takes the correct action and fails over the I/O to the alternate host-bus adapter
4. I/O is reissued down alternate path

The failover process can be very fast for an active/active disk array like the XP256 or EMC Symmetrix. The DMP driver itself does not take any time to switch over. However, the total time for failover is dependent on how long the underlying disk driver retries the command before giving up. On HP, the user can set the PowerFail timeout value for that disk.

DMP allows the administrator to indicate to the DMP subsystem in Volume Manager whether the connection is repaired or restored. This is called DMP reconfiguration. The reconfiguration procedure also allows the detection of newly added devices, as well as devices that are removed after the system is fully booted (if the operating system detects them properly).

Disabling DMP

NOTE: The following procedures will require a system reboot for the changes to take effect.

Typically, DMP is disabled when other multipathing drivers cannot coexist with DMP, or when DMP does not handle certain devices properly.

Disabling DMP on an HP system

Follow these steps:

1. Stop *vxconfigd* using the command `vxdctl stop`
2. Save the */stand/system* file as */stand/system.vxdmp* by executing the command

   ```
   cp /stand/system /stand/system.vxdmp
   ```
3. Save the */stand/vmunix* file as */stand/vmunix.vxdmp* by executing the command

   ```
   cp /stand/vmunix /stand/vmunix.vxdmp
   ```
4. Edit the */stand/system* file and remove the *vxdmp* entry
5. Run the */etc/vx/bin/vxdmpdis* script

If all of the steps are completed successfully, reboot the system. When the system comes up, DMP will have been removed.

Verify this by running the *vxdmpadm* command. The following message should appear:

```
Volume Manager:vxdmpadm: ERROR: vxdmp module
is not loaded on the system. Command invalid.
```

Also the command `vxdisk list <da_name>` should not display any multipathing information.

Disabling DMP on a Solaris system

In Volume Manager 2.5.x and Volume Manager 3.x, the user can disable DMP by following these steps:

1. Remove the directories */dev/vx/dmp* and */dev/vx/rdmp* and any files in these directories
2. Use the following commands to link the */dev/vx/dmp* and */dev/vx/rdmp* directories to the */dev/dsk* and */dev/rdsk* directories, respectively:

   ```
   # ln -s /dev/dsk /dev/vx/dmp
   ```

   ```
   # ln -s /dev/rdsk /dev/vx/rdmp
   ```
3. Remove the line forceload: *drv/vxdmp* from the */etc/system* file by commenting out that entry to ** forceload: drv/vxdmp* or by deleting that line
4. Go to the */kernel/drv* directory and execute the following:

   ```
   # mv ./vxdmp ./vxdmp.orig
   ```

Considerations for Disabling DMP in Volume Manager 3.1.1

Adopting the current method of removing the DMP layer altogether is not flexible. This takes away the multipathing functionality that DMP provides for other devices in the system.

Two new features, coexistence with third-party multipathing solutions and platform-independent device naming, require that the DMP driver always be present in the system. In Volume Manager 3.1.1, customers will be able to prevent Volume Manager (DMP) from multipathing some or all devices on the system, without removing the DMP layer.

The user will be presented with interfaces through vxinstall and vxdiskadm to do the following:

- Suppress devices from Volume Manager's view
- Unsuppress devices that were previously suppressed from Volume Manager's view
- Prevent devices from being multipathed by VERITAS DMP
- Allow VERITAS DMP multipathing for devices that were prevented earlier

The user can specify the devices for the above operations using the following mechanisms:

- Using a VendorID:ProductID combination, e.g., EMC:SYMMETRIX
- Using controller name, e.g., c1
- Specifying path names, e.g., c1t0d9
- All devices on the system

Files are used to keep the exclude information the user specified (through *vxinstall* or *vxdiskadm*).

- Devices that the user has suppressed from Volume Manager's view are kept in the file */etc/vx/vxvmexclude*
- Devices that the user has specified not be multipathed are kept in the file */etc/vx/vxdmpexclude*

Enabling DMP on an HP System (where DMP is fully disabled)

Follow these steps:

1. Stop *vxconfigd* using the command `vxdctl stop`
2. Save the */stand/system* file as */stand/system.vxdmp* by executing the command

   ```
   cp /stand/system /stand/system.vxdmp
   ```

3. Save the *"/stand/vmunix"* file as *"/stand/vmunix.vxdmp"* by executing the command

   ```
   cp /stand/vmunix /stand/vmunix.vxdmp
   ```

4. Edit the */stand/system* file and add the *vxdmp* entry to it (after the *VxVm* entry)
5. Run the */etc/vx/bin/vxdmpen* script

If all the steps are completed successfully, reboot the system. When the system comes up, DMP should be enabled. Verify this by running the *vxdmpadm* command. This command should show multipathing information. Also, the command `vxdisk list <da_name>` should show multipathing information.

Retrieving Information on DMP Nodes

The *vxdmpadm* utility is an administrative interface to the DMP subsystem. Using the *vxdmpadm* utility, you can:

- List all controllers connected to disks attached to the host
- List all the paths connected to a particular controller
- List all paths under a DMP device
- Retrieve the name of the DMP device corresponding to a path
- Enable or disable a host controller
- Rename an enclosure

Supported Arrays

DMP-supported arrays are a subset of arrays that Volume Manager supports. For a current and accurate list, please refer to **http://www.veritas.com/products/category/ProductDetail.jhtml?_requestid=417**.

Solaris 2.6, 7, 8

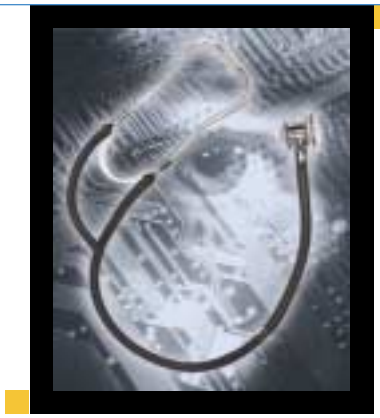
- EMC Symmetrix when configured in the *Common Serial Number Mode* before installing VERITAS Volume Manager
- HP SureStore E Disk Array XP256/XP512
- IBM Enterprise Storage Servers (ESS)
- Hitachi Data Systems 5700E Disk Array Subsystem
- Hitachi Data Systems 5800E/7700E Disk Array Subsystem
- Sun StorEdge A5x00 Array
- Sun StorEdge T3 Array
- JBOD (Just a Bunch of Disks)
- Seagate disks that return unique serial numbers in standard SCSI inquiry data
- Storage Computer OmniRAID disk array. To multipath Storage Computer disk arrays connected to the system while using Volume Manager 3.1.1, you must assign a unique system name for each disk array connected to a machine. The RAID-5 Users Manual at the Web site **www.storage.com** describes how to set up a system name for Storage Computer disk arrays.
- ECCS Synchronix Array

HP-UX 11.0 with the XSWGR1100 Extension Pack (May 1999), and HP-UX 11i

- HP AutoRAID disk array with SCSI
- EMC Symmetrix with fibre channel and SCSI when configured in the *Common Serial Number Mode* before installing VERITAS Volume Manager
- HP SureStore E Disk Array XP256 and XP512
- HP FC1010D with fibre channel
- HP NIKE disk array models 10, 20, 30 with fibre channel and SCSI
- Hitachi Data Systems 5700E disk array subsystem with SCSI
- Hitachi Data Systems 7700E disk array subsystem with fibre channel and SCSI
- JBOD

The Doctor Explains: iSCSI

This issue, in a break with tradition, instead of answering several of your questions, I am going to look a little more closely at iSCSI. Several of you have asked me about this and what it means to storage — the concept seems to be on everybody's mind right now.



What is iSCSI?

One of the new technologies that is emerging in the field of storage is iSCSI, or IP Storage, also referred to as Internet Storage or Storage over IP. There are also vendor-specific names. All of these mean the same thing — applying standard TCP/IP that is used for standard Ethernet connectivity to storage.

What does this mean? Well, most computers attach directly to their storage through the Small Computer System Interface (SCSI) and run a block-level protocol to give the best performance. In the past, this has meant that the furthest the storage could be from the computer was a few meters. Even though you could buy additional hardware called SCSI extenders, the distance was still limited to less than a 100 meters (ca. 330 feet), without degrading the performance. Then storage area networks (SANs) happened. SANs provided a new mechanism for attaching storage to servers using a serial optical interface called fibre channel, which transported the SCSI commands to give access to the traditional storage. This increased the distance by which you could easily separate the storage from the server to more than 10 kilometers (ca. 6.2 miles), creating a new flexibility in storage architectures. In addition, it was a way to increase the connectivity, so more servers could attach to the same storage without the prohibitive cost of a multiported disk controller. Separating storage from the server and allowing it to be connected in virtually any way required, SANs created a new level of flexibility. However, this required a whole new infrastructure, including fibre-based switches and hubs as well as the fibre interconnect. Administrators need new skills to effectively manage the new network, and new tools to help them.

It seemed like a lot of trouble and effort when all the computers were already attached to a network. Was it possible to use the existing network rather than having to introduce a new one? The answer is, of course, yes — and so the iSCSI movement began.

Why wasn't this done before?

The standard speed of an Ethernet network is 10Mbps (megabits per second). While many organizations are now upgrading to 100Mbps, it is still not fast enough for efficient storage using block-level protocols like SCSI. In comparison, fibre channel was introduced in 1997 at 1,000Mbps and now has been upgraded to 2,000Mbps. However, with the current availability of Gigabit Ethernet (1 Gigabit per second = 1,000 Mbps) and with 10Gbps Ethernet in the foreseeable future, the network will soon have the bandwidth to sustain storage transfer rates that are comparable to those of SANs[1]. This will mean that IT departments can use not only the existing infrastructure, but also the same management tools. The skills of a traditional network administrator will easily adapt to the storage network. Another key factor is that the hardware for Ethernet networks has been around for many years, and compatibility is not an issue. This is still a challenge for SANs.

One of the fundamental differences in using TCP/IP instead of fibre channel protocols is the way in which the client consumes the packets of data. In TCP/IP, the packets are sorted and assembled in a buffer before being processed by the application. When using fibre channel,

[1] Note that there will be 10Gbps Fibre Channel as well as 10Gbps Ethernet, and they'll use essentially an identical physical interface. 1Gbps fibre channel and Gbps Ethernet use the same physical parts. For historical reasons, the actual data rates are slightly different.

the packets can be written straight to the application, saving time and hence improving application performance. However, within a few years we will see specialist interface cards that will carry out this operation, removing it from the main processor. This will result in a big performance improvement over the current mechanism. Even with the new bandwidths, there will be latency issues for distances over 20 kilometers (ca. 12.4 miles); the size of iSCSI networks will be limited.

Who are the players?

The list of companies that are investing in iSCSI is very long. It includes big network players such as Cisco and Intel and leading operating system and server vendors such as IBM and HP, along with many storage hardware vendors such as EMC and Adaptec. VERITAS is exploring the technology, so are other software providers and many new start-ups including Nishan Systems, Falconstor, SANValley and Alacritech are becoming involved. At an iSCSI event organized by the Storage Network Industry Association (SNIA) earlier this year, more than 30 companies took part — proving that iSCSI is taken very seriously.

Does iSCSI mean the end of today's SANs?

Some people say that it will, because iSCSI will use existing infrastructure and management. However, since deployment is 12 to 18 months away, and SANs have now been around and deployed for more than two years, it is unlikely that they will be displaced. Some observers think iSCSI is a way for smaller companies that have not invested in a SAN to gain most of the benefits a SAN can offer without the added complexity or cost.

Be aware that most of the iSCSI supporters also support fibre channel. Most of the players realize that both iSCSI and SANs using fibre channel have their place in the enterprise and can justify organizational initiatives for both.

What does this new technology mean for VERITAS?

In one way, iSCSI makes very little difference for VERITAS products. It is just another interconnect that uses SCSI commands and has TCP/IP as its transport protocol. If the drivers work, our products will as well. However, there are other ways to exploit this new interconnect. Developers need to create a new set of functionality to allow for things like storage pools on iSCSI and third-party copy technologies. Discovery of devices will be as important in iSCSI as it is in the SAN. Without being able to easily find and use devices as they appear on the network, the benefits will be limited. VERITAS is working with our partners and the standards industry to ensure that our products use the new iSCSI functionality transparently to administrators. This will mean that if you start to use iSCSI in your organization, our products can incorporate it and work seamlessly with it.

Where can I find out more?

There are many places to find more information; here are a couple of useful links:

http://www.t10.org/

the best place to find all about SCSI in general

http://www.ietf.org/html.charters/ips-charter.html

the IP Storage standards page

http://www.cs.uml.edu/~mbrown/iSCSI

Linux and iSCSI

http://www.snia.org/English/Forums/IP_Storage/IP_Storage.html

SNIA IP Storage Forum Page

iSCSI is not the only thing that the IETF standards group is working on in this space — take a look at:

http://www.ietf.org/html.charters/ips-charter.html

Other initiatives are:

- **iFCP** – Nishan's alternative to iSCSI
- **FC-IP** – a tunneling mechanism that lets FC switches be transparently interconnected over an IP WAN

Any questions?

E-mail doctor@veritas.com.

By Scott Monaghan, Senior Manager, ECS Service Development, VERITAS Software

VERITAS VProAssess Services: Delivering Business Value through Strategic Data Management

As a business decision maker, you need to consider the strategic impact of information management. Speed and agility rule the day. Companies must continue to do what's made them successful in the past, but also leverage partnerships that help them speed up their execution cycles and reduce time-to-market for new business strategies. VERITAS consultants deliver the full spectrum of information management expertise essential in this intelligent teaming approach. VProAssess Services make full use of our best-practice experience and our extensive knowledge of proven heterogeneous data availability strategies. They are the first step in the comprehensive VERITAS VProServices design and deployment lifecycle.

In the last issue of VOX, we generally discussed VERITAS VProServices and the value of using VERITAS Enterprise Consulting to minimize the risk of change. Today, we take a closer look at VERITAS VProAssess Services and the strategic value they offer to you.

Customers today want an IT infrastructure that:

- Makes uninterrupted data availability a core competence of IT operations
- Integrates multiple operating environments easily
- Accelerates time-to-market development strategies in which data management enables change
- Measures technology ROIs over shortened solution deployment windows
- Reduces the risk of change

With all the technology and expertise available to share data and make it highly available, many IT organizations still struggle with implementing seamless data management. Operations often use a segmented approach, in which each new business initiative and associated application platform results in a different data management technology to support it. VERITAS VProAssess Services can help you develop an integration strategy for you data management infrastructure planning, and maximize your current technology environment at the same time. Our consultants assist you in architecting and implementing the best blend of processes and technology available to share, manage and protect your data assets. Goals of VProAssess Services are:

- Define storage area networking, high availability, disaster recovery and backup architectures that eliminate specific short-term data availability challenges
- Facilitate a closer alignment between long-term business strategies and current supporting IT Information platforms and processes
- Document gaps between current data management approaches and future information-service-level requirements
- Create a strategic roadmap that cost-effectively delivers the promise of business agility through VERITAS' enterprisewide data management solutions

The VProAssess methodology uses a process of five phases to accomplish these goals:

1. **Documentation of current state** – Through a series of focused data-gathering workshops, our consultants document and assess the current data management processes and supporting technologies. This phase includes an analysis of the products, people and processes that deliver current data service levels.
2. **Identification of business information drivers** – During this phase, our consultants review current and future business and application drivers that impact critical data availability, performance and growth requirements on the customer's current information infrastructure.
3. **Gap analysis** – This analysis highlights the risks, complexity and costs associated with operational status quo. The discrepancy between the current state environment and the

business information drivers demonstrates risks and impediments to the successful delivery of data availability. Organizations need to understand where these risks are and how VERITAS consultants can mitigate them.

4. **Development of a strategic data management roadmap** – Once the gap analysis is complete, our consultants will work with you to define a comprehensive data management strategy to meet current and future storage management goals. This strategy roadmap may include recommendations on hardware, software and process improvements based on VERITAS' extensive knowledge of industry best practices.

5. **Quantification of value** – Where possible, our consultants will quantify the dollar value of our solutions in the context of your business. Expected returns on your investment in VERITAS technology allow you to more easily justify its expense.

What's the bottom line in choosing a a solution partner? That partner must provide your enterprise with a greater ability to develop and execute your business strategy quickly, gain maximum return on your investment and accommodate change without losing momentum or competitive edge. The combination of VERITAS storage software with customized VPro Enterprise Consulting Services delivers that competitive edge in today's information-driven digital economy.

VERITAS Education Services in the UK Gains Accreditation by the Institute of IT Trainers (IITT)

VERITAS Education Services (VES) in the United Kingdom recently received confirmation that it has been awarded accreditation by the Institute of IT Trainers (IITT). The Institute's mission is to maximize the effectiveness of investments in information technology through continuous improvement in training and skills-transfer practices. VES had been working towards accreditation for several months. The process included a rigorous audit of its entire operation. By becoming accredited by the IITT, VES in the UK has met extremely high standards, joining some of the world's best training organizations.

The IITT promotes and maintains the professionalism and integrity of IT training by enabling and encouraging widespread use of best practices. It gives members opportunities to develop their knowledge and skills, improving the qualifications of anybody active in an IT training role. The IITT acts as an accreditation and certification body for organizations, departments and individuals involved in IT training, both commercially and educationally.

VES now aims to establish strong working links with people and organizations involved with IT skills development to help create a consistent and consensual approach to the profession's development

Preparing for tomorrow

Institute of IT Training

Accredited Training Provider

"We are pleased to be part of an organization that aims to continuously raise standards of professionalism within the IT training industry, and to establish benchmarks of excellence against which we can be measured, thus ensuring we are still providing the best possible training for our customers."

Steve Macfarlane
Director, VERITAS Education Services
VERITAS Software
— EMEA

VERITAS Opens New Offices in Dubai and Poland

New regional office in Dubai Internet City with extensive training capabilities

On May 6 of this year, VERITAS Software Middle East opened its new regional head office in the impressive surroundings of Dubai Internet City. The opening was under the patronage of Sheikha Lubna Al Qasimi. Sheikha Lubna Al Qasimi is widely respected for her involvement in the Middle East's IT sector and is the managing director of Tejari.com, the region's premier business-to-business marketplace. Also present was Lindsey Armstrong, Vice President EMEA, VERITAS Software, who is responsible for the development of enterprise and channel sales and marketing throughout EMEA.

Commenting on the relocation, Mike Hynes, Country Manager – Gulf States, described the move as an important milestone that bodes well for the company's future in the region: "The Middle East team is really excited to be in the heart of the region's technology center, and the new office facility provides a foundation for growth, both in business and in its employee base."

Since it began direct operations in the Middle East last year, VERITAS has built a full team covering sales, technical support, marketing, consulting and account management. In addition, the office can strengthen relations with customers and partners. Its training facilities accommodate lab-based SAN training on real-life heterogeneous environments for customers and class-based training on entry-level backup products for channel partners. Regional technical consultants Conny Peukert, Satish Shenoy and Paul Ransted support the training. They are also responsible for growing VERITAS education and training throughout the Middle East. Mike Hynes said, "We now have the structure in place, and a platform from which to drive the company ahead, and we have every reason to look forward to an exciting future."

New Polish office meets growing demand for data availability technology

On June 20, 2001, VERITAS opened a new office in Warsaw, Poland, to meet the growing local demand for data availability solutions in the Polish market. This office is headed by Marcin Motel, Country Manager – Poland, VERITAS Software.

Marcin Motel explains, "Polish companies are just starting to understand the critical nature of data availability for the ongoing survival of their businesses. As data volumes continue to expand, users of computers are generating more and more corporate information which needs to be protected and kept available at all times. We see a great demand in Poland for VERITAS solutions that protect data, deliver it reliably and with extremely high performance."

VERITAS Software has already been present in the Polish market via its reseller partners Big Vent, Comp and Comarch and distributors Incom, Alstor and Tech Data. The new Warsaw office will focus on building a strong team to deliver dedicated sales and technical support to current and potential customers.

Country Manager Marcin Motel is a graduate of the Foreign Trade Department of the Warsaw School of Economics. His professional career started in Comp S.A., where he worked as a sales director until 1999. Then he was business development manager in Central Europe for Data General until its acquisition by EMC, when he moved to managing channel sales in Middle and Eastern Europe. He is 33 years old, married with two sons and speaks fluent English and Russian.

VERITAS Software Foundation Contributes Funds to Educational Programs and Scholarships for Bay Area Students

VERITAS Software Foundation, the not-for-profit charitable organization established by VERITAS Software, recently announced the donation of $40,000 to Eastside College Preparatory School, Capri Elementary School and Girl Scouts of Santa Clara County to be used for academic programs and scholarships.

Eastside College Preparatory School, founded in 1996, is a private East Palo Alto school that gives academically motivated high school students from low-income minority families an education that will prepare them for college. Students attend Eastside only on a full scholarship basis. Eastside is an independent, nonprofit high school offering a community-based alternative to students. The VERITAS Software Foundation provides Eastside School with a $21,000 grant to support its general scholarship program.

Capri Elementary School is a K–5 school in the Campbell Union School District. Almost half the population at Capri are students who speak 20 different languages and represent 36 different countries. Urgent areas of need are reading comprehension and mathematics problem solving. Due to restrictions in state funding, Capri is unable to use state monies to purchase two programs that motivate student achievement: Accelerated Reader is a motivational tool for reading both in the library and in the computer lab, and Excel Math is a program that inspires students to take math to the next level, already used at Capri for three years. The $9,000 grant given to Capri will be used for these two programs.

> “Educational programs are the focus of our giving this year, and we are very pleased to support organizations such as Eastside Preparatory School that have proven their effectiveness in enriching the lives of students. We want to make sure that we do our part to make a difference in our community, especially in these tough economic times.”
>
> Mark Leslie
> Chairman of the Board
> VERITAS Software

Girl Scouts of Santa Clara County provides a unique program to its members: In-School Scouting (ISS), now in its tenth year, is a supplementary science and technology program for students between grades two and six in east San Jose. The public education system has difficulties in finding sufficient teaching staff trained to teach hands-on science to its young students. Girl Scouts of Santa Clara County has addressed that need by making available this 24-week supplemental science education program. It has its own teaching staff, especially trained to teach science and technology with lab investigations and experiments, as called for in California’s Science Standards. The $10,000 grant from the Foundation will help ensure the continued education of In-School Scouting.

If your organization is interested in applying for a VERITAS Software Foundation grant or receiving more information on its activities, e-mail vinquiry@veritas.com or send mail to: VERITAS Software Foundation, 350 Ellis St., Mountain View, CA 94043. Visit the Foundation’s Web site at **www.veritassoftwarefoundation.org**.

European Events

Please come see us at these seminars and conferences. For additional detail and to register for any events organized by VERITAS, please visit **www.veritas.com/uk/events/**.

HITACHI
DATA SYSTEMS

VERITAS HA Everywhere Half-Day Seminars

In this free morning seminar, VERITAS will outline issues and solutions associated with achieving availability from applications to the storage pool, across wide distances and in today's complex, heterogeneous environments. During breaks and over lunch, you will be able to discuss these topics further with us and our partners, including Hitachi Data Systems.

VERITAS VERTEX™ Half-Day Seminars

In this free afternoon seminar, you can learn how to tackle data protection with our latest suite of solutions, known as the VERITAS VERTEX™ Initiative. We will discuss how each of the products in this suite can translate into business success for your corporate IT environment. You'll get a unique look at how VERITAS is bringing the future of data protection to its customers today. During breaks and over wine and canapés after the event, you will be able to discuss these topics further with us and our partners, including Hitachi Data Systems.

Dates and locations for the HA and VERTEX seminars

September 18 – Stockholm, Sweden

September 20 – Munich, Germany

September 25 – London, UK

Please check the Web site for dates in Italy, Spain, the Benelux countries and France.

Forum Stockage 2001

September 25 – 27, 2001
Location : Porte de Versailles, Paris
URL : **<http://www.stockage2001.com/>**

VERITAS will be presenting several new versions of important products at this specialized IT Storage forum. They include:

- VERITAS SANPoint Control™ v2.0
- VERITAS SANPoint Foundation Suite™ HA
- VERITAS ServPoint product family
- VERITAS Volume Manager™ v2.7 *for Windows NT and Windows 2000*
- VERITAS Volume Manager v3.2 *for UNIX*
- VERITAS Database Edition™ v3.0 for Oracle 9i
- VERITAS NetBackup™ Professional v3.1

Our local product managers, Hervé Lequippe and Philippe Nicolas, will be leading two conferences at this event:

- Data protection solutions for more complex SAN and NAS environments
- Needs, constraints and advantages to consider in determining the right online data management solution to meet today's challenges

For more information, please go to **http://www.stockage2001.com** or e-mail naomi.hicks@veritas.com. To find out about more VERITAS trade shows, seminars and conferences in France, go to **http://www.veritas.com/fr/events/**

Storage Expo 2001

October 17–18, 2001
Hall 11, NEC Birmingham
Stand number 112

The UK's only independent, dedicated storage event, Storage Expo 2001 will in addition to the exhibits include a series of seminars and tutorials. They will cover key topics impacting the storage decision-making process. This event will be most interesting for those with direct responsibility for data storage and retrieval.

VERITAS is a Founding Sponsor of Storage Expo 2001, along with Quantum ATL, Sun Microsystems and Network Appliance.

For more information and to register, please visit **www.storage-expo.com** .

Storage Networking World

September 10 – 12, 2001
Hotel Alcora, Seville, Spain

This is widely regarded as the world's leading storage conference, presenting business solutions and user perspectives. If you deploy storage technology in your business, you are likely to find this conference of value. Keynote speakers include Patrick Bonelli, Vice President and General Manager, EMEA Storage Organization, Hewlett Packard; Walter Raizner, General Manager, Global Storage Products Division, IBM Storage Systems Group; Charles Inches, IT Director, Service Delivery and Infrastructure Architecture, Corner Bank. VERITAS is a Gold Sponsor of this event. VERITAS' Paul Massiglia, Technical Director, Engineering, will speak at the conference.

In addition to featuring industry-leading executives and innovative thinkers, Storage Networking World EuroStorage will also feature:

- Interoperability lab and vendor demonstrations
- Real-life enterprise storage strategies, case studies and solutions
- Interactive and user-oriented tutorial sessions from industry experts

To see a full conference agenda and to register, please visit **www.snweurope.com**.

Data Availability as a Competitive Advantage

VERITAS Technology Maintains Service-Level Agreements At Telia Dedicated Web Hosting

Telia, online at **www.telia.com**, is a service provider headquartered in Sweden and active in almost 40 countries worldwide. The company has approximately 30,000 employees. Its core services are mobile services, fixed network services and Web portal services. The last includes Dedicated Web Hosting. Customers in the Scandinavian countries are extremely sophisticated in all aspects of communication and Internet technology. Telia aims to distinguish itself from its competitors by being the first to offer the latest and best technology and by offering user-friendly and responsive services.

Customers want performance, scalability, availability

Telia's growth has been very rapid, especially in the Web hosting area, which is its newest service offering. Telia launched the Dedicated Web Hosting services in April of this year. The 24/7 services give customers the means to have a full presence on the World Wide Web without having to hire and train their own dedicated staff and make investments in hardware and software. Telia owns, manages and maintains the complex service infrastructure, including hardware, software and communications. The services are available to customers under both UNIX and Microsoft Windows 2000. Customers require high performance, full security, uninterrupted availability of data and scalability of the services as data volumes keep expanding.

Ulf Hedin, Product Manager for Dedicated Web Hosting, explains the customers' mind-set. "Today the Internet has moved on from being all media hype about user interfaces and graphical design to become part of the mission-critical business infrastructure of many companies. At least this is what today's customers expect. For them there's no difference between how corporate Web sites must work and the way customer service, telephone sales or call centers work."

"Our standardized and dedicated environment means we can guarantee our enterprise customers data availability, which is a major competitive advantage for us."

— Ulf Hedin, Product Manager, Dedicated Web Hosting Services, Telia

VERITAS' technology, responsiveness and understanding of customers support service innovation

Telia decided to offer a high level of data availability as a competitive advantage. After evaluating several software providers, it settled on VERITAS and a full range of VERITAS availability and storage management products. Today, the company is using VERITAS NetBackup™, VERITAS File Server Edition™, VERITAS Database Edition™, VERITAS Cluster Server™, and VERITAS Foundation Suite™, which includes VERITAS File System™ and VERITAS Volume Manager™. As Ulf Hedin explains, "There was more than one factor in favor of VERITAS. First, VERITAS is very strong in software for clustering and backup, and simply offers the best solutions. Second, VERITAS has a solid strategy for serverless backup that is going to become essential to our SAN environment. VERITAS also has a great deal of expertise to offer. They speak the same language as the customer and they are available when needed. In other words, customer focus."

Hedin explains how the services are set up. "The basic idea behind Telia Dedicated Web Hosting is that we use a standardized server farm as a controlled environment in which everything is in place from the start — from firewalls to VERITAS' solutions for data availability ... [to] backup power and cooling — everything. Our customers can use any applications they like as long as they are Web-based. This is a major difference compared with traditional outsourcing, where services are still produced in a mixed customer environment."

Exceeding customer expectations with focus on the user experience

This makes Telia Dedicated Web Hosting a platform tailored to the Web, databases, applications, intranets and extranets, as well as integrated business solutions. Telia's standard configuration guarantees 98 percent availability with a service-level agreement (SLA) for the operations environment. Every customer is assigned a dedicated Telia support engineer and can enjoy the extra resilience of an environment that is monitored around the clock. The solution is based on storage area networks (SANs). Two other SLAs include a semiredundant basic package that offers 99 percent availability and a fully redundant package that offers 99.5 percent availability.

"Our offering goes beyond the average industry value proposition by measuring availability as perceived by the user. It's no use if every single component in the solution works if the application doesn't respond. We therefore decided to use network robots that relentlessly look up pages on our customers' sites. In cases where there's no response, an alert notifies our support staff, who then deal with the problem. This level of data availability is harder to deliver but also much more important to customer satisfaction and the perception of superior service quality," says Ulf Hedin.

Availability infrastructure enables business growth

The design process and implementation for the new availability infrastructure took almost a year. Telia implemented the VERITAS products simultaneously. It used one of VERITAS' Swedish partners, Proact, for consulting during the project. On the Intel platform side of the service, it uses Dell servers running under Windows 2000, Windows NT and Linux. On the UNIX side, there are Sun servers under Solaris. Brocade switches power the SAN. With its bundled management tools, Telia supports Oracle, Microsoft SQL Server and Sybase. VERITAS technology in place, Telia is looking to further centralize data center management and reduce the administrative overhead. This frees up technicians to work on customer issues instead of routine data management tasks.

VERITAS availability solutions make it easy for Telia to support its fast growth without any service interruption and to continously add new customers as demand increases. "Our standardized and dedicated environment means we can guarantee our enterprise customers data availability, which is a major competitive advantage for us. During the past few years the Internet has become an all-important vehicle for information, communication and trade. This requires generous opening hours. Our role is to act as a power plant in the information economy by providing the means for future e-commerce and electronic customer relationships," says Ulf Hedin.

Rising demand for reliable, available Web hosting services

The success of the Telia Dedicated Web Hosting services would show that the company made the right business decision in offering high levels of data availability to its customers. The Swedish Labour Market Board is using the service for a project of the European Community: a European CV (curriculum vitae) database. Other customers are in education, pharmaceutics, forestry and the travel industry. Says Hedin, "Because we can guarantee availability from day one we've already noticed a huge interest for our business concept. More and more companies are learning about the high cost of not having sufficient data availability, either by experiencing this themselves or by seeing others experience it. It's just not an option."

During 2002, the market for Web hosting services is expected to grow 60 percent as companies increasingly ensure data availability and cut their costs. Ovum, an industry observer and analyst in the UK, predicts that e-commerce will be a key driver in 2001 and 2002 and that sophisticated services such as Telia's Dedicated Web Hosting will successively dominate demand.

"The Swedish market will grow exponentially because companies' needs are not being satisfied at all today. As more and more functionality is moved into Web environments, they'll become increasingly complex to manage. Also, broadband connections will lead to even higher performance expectations. Environments with broadband customers require content and services to be delivered promptly and on demand. Improved communication capacity means that user expectations must be met with even faster response times," says Ulf Hedin.

OverView

VERITAS and Telia

The Customer

Telia and its Dedicated Web Hosting services operation, bringing high-quality Web services to customers worldwide

Business Requirements

Ensuring different levels of data availability to customers, while also maintaining competitively high levels of performance, scalability and security

The Solution

- VERITAS NetBackup™
- VERITAS Cluster Server™
- VERITAS File Server Edition™
- VERITAS Database Edition™
- VERITAS Foundation Suite™, including VERITAS File System™ and VERITAS Volume Manager™
- Consulting from a VERITAS partner

Business Benefits

- Uninterrupted data availability as a competitive business advantage, experienced as such by users
- Ability to grow the business and accommodate more customers and enlarging data volumes
- Protection, high performance and increased manageability of data and applications
- Centralized data center operation with reduced administrative overhead

VERITAS™

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Thanks to everybody who completed the form with your address and contact information. That will help us get VOX VERITAS to you in a timely fashion. We're repeating the form in this issue in case you haven't seen it yet. We are also doing a survey of our readers to see what your reading and content preferences are. This will help set directions for VOX VERITAS. You find the survey in this issue, and from October 1 on, it will be in the VOX page in the News Center at VERITAS.com as well.

As many of you have asked us to do, we are working to make a Web-friendly version of VOX VERITAS available soon. Watch the News Center at veritas.com for VOX online. While the print version has its advantages and is preferred by many of you, there are things we can do on the Web site that we can't in print. For example, a tour of VERITAS' Executive Briefing Center to go with an article about it may be far more interesting and enjoyable than copy and pictures in print.

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