

VERITAS Storage Foundation™ HA 4.3 *for Windows*

POWERFUL PROTECTION AGAINST DATA, APPLICATION AND DATABASE DOWNTIME

KEY BENEFITS

- Maximize uptime of data, applications and databases
- Reduce planned or unplanned downtime
- Enable high availability solution for local, metropolitan or global clustering from within a single product
- Test your disaster recovery solution without impacting production applications
- Optimize and plan cluster configuration and policies through portable modeling and simulation tool

Data and application downtime can be attributed to the unavailability, or failure, of a resource that is trying to run a service. If a service becomes unavailable and an organization is not running clustering and storage management software the users would lose access to the resource until the problem can be manually fixed. This downtime may result in lost revenue, productivity and user satisfaction.

Storage management software can assist in decreasing data downtime associated with disk and path failures by ensuring multiple copies of data are accessible and available.

Clustering services can protect against server, application and database downtime by eliminating the single point of failure found within a single server. A cluster is a group of computers that work together to run a set of applications and provide the image of a single system to the client and application. The computers are physically connected by cables and programmatically connected by cluster software. The servers within the cluster remain in constant communication. If one of the servers or resources running on the server in a cluster becomes unavailable as a result of failure or maintenance, another server immediately begins providing service, a process known as failover. Users can continue to access the service and are unaware that it is now being provided from a different physical server.

VERITAS Storage Foundation HA *for Windows* is a powerful and comprehensive solution to deliver data and application availability to Microsoft Windows 2000, Server 2003, and Server 2003 x64 environments. VERITAS Storage Foundation HA is comprised of two industry leading availability technologies, VERITAS Storage Foundation *for Windows* and VERITAS Cluster Server.

VERITAS Storage Foundation *for Windows* is a requirement for organizations that require uninterrupted and consistent access to data. Storage Foundation provides easy-to-use, on-line storage management tools for heterogeneous enterprise environments, which reduce planned and unplanned downtime. Storage Foundation enables high availability of data, optimized I/O

performance and offers freedom of choice in storage hardware investments.

VERITAS Cluster Server™ is the industry's leading open systems clustering solution to protect your critical applications and databases against downtime, whether planned or unplanned within the local, metropolitan or wide area network. VERITAS Cluster Server provides high availability to applications, databases and servers by monitoring the health and performance of the resource and automatically restarting the resource on another available server in order to avoid a complete failure.

PRODUCT OVERVIEW

Reduce Training and Hardware Costs:

VERITAS Storage Foundation HA *for Windows* is architecture-independent, supporting Windows and UNIX platforms, as well as the industry's widest range of heterogeneous hardware configurations. Organizations can mix and match the servers and storage within a single cluster and shared storage infrastructure while utilizing a common, cross-platform management console. This unique ability allows IT personnel to manage data and application availability without requiring additional training that may be required for point platform storage management and clustering solutions.

Broad Application Support:

VERITAS Storage Foundation HA *for Windows* provides off-the-shelf support for a wide range of applications, including but not limited to Microsoft Exchange and Microsoft SQL Server with new agents being developed continuously. Custom agents can be created to ensure virtually any application is highly available on Windows Server 2003 Standard, Enterprise, Datacenter, and x64 as well as Windows 2000 Server, Advanced Server and Data Center Server.

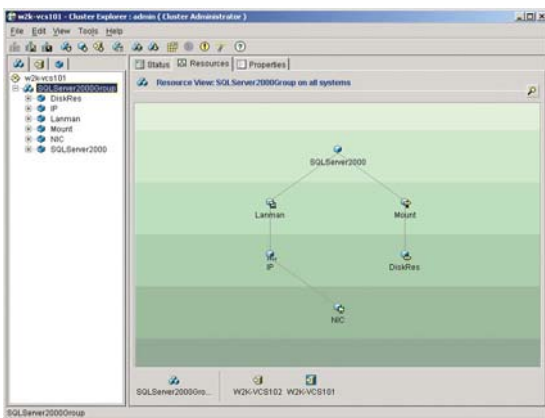
Reduce Planned Downtime:

Organizations can utilize VERITAS Storage Foundation HA *for Windows* for planned downtime by keeping data online and available when performing storage administration and migrating users from one available server to another while server maintenance is occurring. When the maintenance is finished the application can be easily moved back to the original server. By using VERITAS Storage Foundation HA *for Windows* organizations may no longer need servers to be online and available immediately thereby reducing the costs associated with expensive hardware maintenance contracts.

Single Solution for Any Architecture: VERITAS ensures that achieving local, metropolitan and wide area high availability and disaster recovery can be done using a single solution. With VERITAS Storage Foundation HA for Windows and available options, all clustering and replication can be performed and managed from a single product while allowing organization to achieve local as well as wide-area application and data availability.

Prepare, Plan and Test Before Disaster Strikes: VERITAS Storage Foundation HA for Windows provides the ability to configure, implement and test your high availability and disaster recovery environment without disrupting users. The cluster simulator tool allows cluster configurations to be configured and tested without requiring a cluster testing environment or impacting the production environment. VERITAS Cluster Server's fire drill capabilities allow organizations to clone their production environment and allow the disaster recovery solution to be fully tested. These new features reduce the need to invest in additional hardware for testing and configuration purposes while ensuring resources will remain available in the production environment.

Simplified Management and Installation: VERITAS provides administrators with easy to use configuration wizards for simplified storage management and cluster implementation while providing a choice of intuitive Web- or Java-based consoles to monitor data and application availability across multiple operating systems and across an entire organization.



As seen here through the flexible Java-based graphical user interface, VERITAS Cluster Server provides flexible configuration of a wide variety of application-dependent resources.

Maximize Hardware Utilization: VERITAS Storage Foundation HA for Windows provides the flexibility for adding or removing servers and disks as needed without bringing the applications offline. Support for up to 32 servers in a single cluster allows organizations to achieve availability of applications while achieving maximum hardware utilization by automating the process of making intelligent decisions to ensure applications are hosted on the best server available within the cluster and eliminating the need for a dedicated standby server within the environment.

Part of a Comprehensive Disaster Recovery Plan: VERITAS Storage Foundation HA for Windows and the Global Cluster Option and are tightly integrated with the Volume Replicator option, or with third-party replication technologies, to provide a comprehensive disaster recovery solution across any distance. VERITAS Cluster Server handles local availability issues. VERITAS Volume Replicator replicates critical data to a remote site, and the Global Cluster Option monitors and manages the replication jobs and clusters at each site. In the event of a site outage the Global Cluster Option will control the shift of replication roles to the secondary site, bring up the critical applications and redirect client traffic with a single command or mouse click.

Replication Integration: VERITAS Storage Foundation HA for Windows protects your current investment by integrating with a number of replication solutions including VERITAS Storage Foundation, VERITAS Volume Replicator and EMC SRDF to provide a complete application and data availability solution.

World Class High Availability and Disaster Recovery Consulting Services: A solution for high availability and disaster recovery doesn't stop with the technology. Disaster Recovery and Business Continuity requires recovery objective analysis, plan recovery and strategies to name a few. VERITAS not only provides a proven solution for high availability and disaster recovery, but also offers world-class services to help you define requirements and procedures while ensuring that current investments are utilized and available.

SUPPORTED PLATFORMS

- Microsoft Windows Server 2003 (32-Bit) (Standard, Web, Enterprise, Datacenter)
- Microsoft Windows Server 2003 x64 Editions (Standard, Enterprise, Datacenter)
- Server 2003 SP1 for Itanium-Based Systems (Enterprise, Datacenter)
- Microsoft Windows 2000 (Server, Advanced Server, Datacenter)



Also available on: IBM AIX (5.1, 5.2, 5.3), HP HPUX (11i), SuSE (SLES 8), Red Hat (RHEL 3.0), Sun Solaris (2.6, 7, 8, 9, 10), VMWare (ESX 2.0.1, 2.1, 2.5)

AVAILABLE OPTIONS AND AGENTS

STORAGE FOUNDATION *FOR WINDOWS HA* OPTIONS

Global Cluster Option: The Global Cluster Option monitors and manages the replication jobs and clusters at each site. In the event of a site outage the Global Cluster Option will control the shift of replication roles to the secondary site, bring up the critical applications and redirect client traffic with a single mouse click.

Volume Replicator Option

The Volume Replicator Option allows data to be replicated between any storage device over an IP network.

Dynamic Multipathing Option: The Dynamic Multipathing (DMP) Option adds fault tolerance to disk storage by making use of multiple paths between a computer and individual disks.

FlashSnap Option

VERITAS FlashSnap allows you to create independently addressable point-in-time snapshots that are copies of mirrors of the volumes on your server. These snapshots can be easily moved to another server for backup or other purposes.

VERITAS CLUSTER SERVER AGENTS

VCS Agents are small applets that allow VCS to monitor system and application resources. Some agents come bundled with the base VCS product, and other agents are separately available for databases and other applications.

Exchange Agent: VERITAS Cluster Server Enterprise Agent for Exchange works to keep Microsoft Exchange highly available by detecting any failures and automatically bringing the application online again.

SQL Agent: The VERITAS Cluster Server Enterprise Agent for Microsoft SQL monitors Microsoft SQL Server 2000 and 2005 (pre-release) on a VERITAS Cluster Server cluster to ensure high availability by automatically detecting faults and bringing a downed database back online.

VERITAS Volume Replicator Agent: Make sure your replication is always available with the VERITAS Cluster Server agent for VERITAS Volume Replicator. This agent monitors the replication services to make VERITAS Volume Replicator highly available.

EMC SRDF Agent: The VERITAS Cluster Server agent for EMC SRDF monitors the status of the replication service, and in case of failure, takes corrective action to maintain data replication between sites, regardless of distance.

Network Appliance SnapMirror Agent: VERITAS Cluster Server Agent for Network Appliance SnapMirror enables seamless configuration of Network Appliance storage systems as well as the full support of disaster recovery from local to remote clusters.

For more information visit: <http://www.veritas.com/vcs>

RELATED INFORMATION

- VERITAS Storage Foundation *for Windows* Datasheet
- VERITAS Services Datasheet
- VERITAS Volume Replicator Datasheet
- VERITAS CommandCentral™ Availability Datasheet
- VERITAS Supported Clustering Architectures Datasheet
- HCL: <http://support.veritas.com/>

VERITAS Storage Foundation™ 4.3 for Windows

Advanced Volume Management Technology for Windows

In distributed client/server environments, users demand that databases, mission-critical applications and other resources be continuously available and safe from disk failure damage. Traditional disk storage management is a labor-intensive process, often requiring that servers be taken offline for hours at a time— disabling user access to data and requiring tedious, manual intervention by system administrators. **VERITAS Storage Foundation for Windows** brings advanced volume management technology to Windows Server 2003 and Windows 2000 environments. By creating virtual storage devices from physical disks and disk arrays, Storage Foundation removes the physical limitations of disk storage so you can configure, share and manage storage for optimal results. Storage Foundation provides easy-to-use, online storage management for enterprise computing and Storage Area Network (SAN) environments.

Organizations are beginning to use the enormous potential of Storage Area Networks (SANs) to keep server applications available in today's ever-changing e-business-focused environment. VERITAS gives customers the choice of fibre channel (FC) or Internet Small Computer System Interface (iSCSI) based SANs. Fibre Channel is the SAN of choice for Datacenters. iSCSI IP SANs are starting to be adopted by organizations who want to achieve storage networking using their existing Ethernet infrastructure for departmental and remote Windows servers. VERITAS Storage Foundation gives you the choice of using either an iSCSI Host Bus Adapter (HBA) or standard Ethernet Adapters with the Microsoft's iSCSI Software Initiator.

VERITAS Storage Foundation is ideal for maximizing storage networking-based application uptime. Storage Foundation has intrinsic features that allow organizations to increase application availability by virtualizing physical storage resources within networked storage environments. Virtualizing and centralizing storage resources over a storage network reduces administrative overhead and provides a scalable foundation to manage the unpredictable growth of Internet-driven businesses.

Microsoft selected VERITAS Software, the leading enterprise-class storage-management software provider, to develop the disk management software for Windows 2000 and Windows Server 2003. Microsoft's built-in disk and volume management software, Logical

Disk Manager (LDM), was jointly developed by Microsoft and VERITAS. The fully featured VERITAS Storage Foundation for Windows extends and enhances the capabilities of Windows Disk Management. Data created in Disk Management is easily migrated to VERITAS Storage Foundation for Windows. The Storage Foundation enterprise-class storage-management capabilities offer you the most flexibility to create and manage storage configurations that grow and adapt with your business needs.

Simplified, Centralized Storage Management

VERITAS Storage Foundation enables online administration from a single management console across multiple hosts and operating systems. The easy-to-use interface simplifies disk administration tasks, such as adding or moving storage resources or data. Storage Foundation configures and monitors leading hardware RAID arrays, manages SAN-based storage and supports clustering configurations with VERITAS Cluster Server (VCS) and Microsoft Cluster Server (MSCS).

The VERITAS Enterprise Administrator GUI enables centralized, cross-platform storage management.

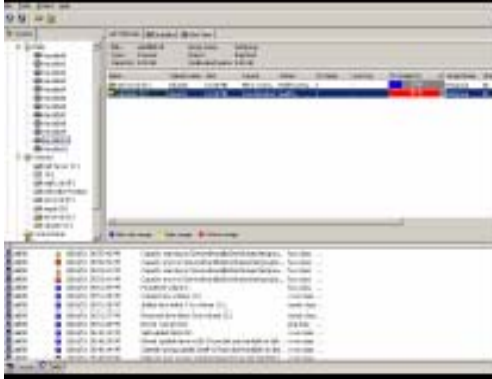


The VERITAS Enterprise Administrator GUI reduces the cost of storage administration by providing disk storage management from one central console.

Enhanced Performance

Storage Foundation lets you optimize storage performance based on your usage patterns. Storage Foundation identifies storage bottlenecks and allows you to migrate data to other devices by simply dragging and dropping, even while applications and their data remain online and available. Use Storage Foundation to balance I/O loads and to stripe data across multiple storage devices and subsystems for maximum throughput. Additionally, the VxCACHE functionality available in

Storage Foundation enables the user to set caching for specific dynamic volumes to substantially improve read performance for those specific volumes.



The VERITAS Enterprise Administrator GUI allows you to see all volumes mounted from one location to quickly determine the volume, status and capacity.

Keep Data Online and Available

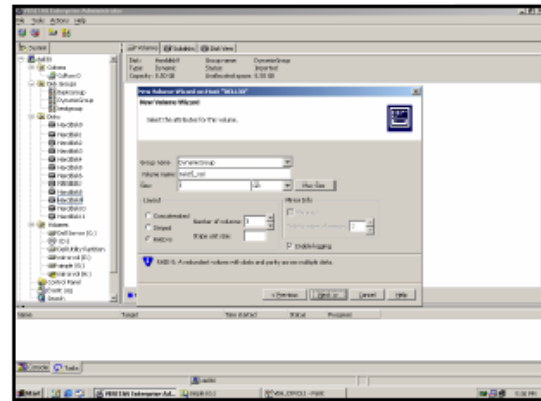
You can use Storage Foundation to protect critical applications by mirroring data across different disk devices and subsystems, including RAID devices. Storage Foundation lets you perform basic administrative tasks while the data is online and available, so planned downtime is reduced. The advanced storage management tools found in Storage Foundation include online storage configuration, online logical volume management and flexible I/O performance monitoring. Storage Foundation enables dynamic disk movement via drag-n-drop to facilitate storage consolidation, DAS to SAN migration, performance optimization and Array updates and retirement. These capabilities are critical for maintaining highly available, high-performance storage on a variety of hardware devices.

The VERITAS FlashSnap option also enhances administrators' ability to create online copies of real-time data with minimal impact to applications or users. With the Dynamic Multipathing (DMP) option, availability is enhanced by providing a disk path failover mechanism and performance is improved by I/O load balancing.

Hardware and Software Investment Protection

VERITAS Storage Foundation ships with the VERITAS Enterprise Administrator (VEA) graphical user interface, which enables cross-platform volume management. Storage Foundation is not tied to specific hardware and provides a consistent approach to heterogeneous storage hardware environments, thus allowing organizations to protect their current hardware

investment and the freedom of choice for future purchases.



The Storage Foundation Wizards provide easy, step-by-step instructions.

VERITAS FlashSnap™

VERITAS FlashSnap, an option of VERITAS Storage Foundation, is a flexible, storage management solution that enables administrators to create point-in-time copies with minimal impact to applications and users. FlashSnap is fully integrated with Windows Server 2003 Volume Shadow Copy Service (VSS) as a VSS Provider. There is also VSS Requester support built-in to allow creation of persistent snapshots for quick recovery. The FlashSnap VSS support works with most leading storage arrays and is compatible with the growing list of backup applications that are VSS enabled. This delivers a powerful and flexible solution that frees you from hardware and application restrictions

Administrators need the ability to quickly recover from data corruption problems. This is especially true in mission-critical Exchange environments. An easy restore process ensures quick recovery from Exchange data corruption problems. The Exchange VSS snapshot process provides the ability to fully restore Exchange to a point-in-time or to roll forward to the point immediately before a failure. Automating this process simplifies the operation, reduces human error and provides protection for mission-critical data.

FlashSnap also addresses issues such as shrinking maintenance windows. The FlashSnap snapshots can be accessed from the same server or easily be imported to another host. This allows users to perform resource-intensive processes such as backups, testing, decision support and reporting off-host. To greatly reduce the resynchronization time and performance impact on the server when the volume snapshot is reattached, FastResync technology synchronizes only the changes that occurred while the volume snapshots were split. FlashSnap also provides the capability to restore a single file.

VERITAS STORAGE FOUNDATION FOR WINDOWS

Features	Benefits
Powerful, Centralized Storage Management Online Flexible Administration of Data Volumes	
Centralized Storage Management via an Intuitive Graphical User Interface (GUI)	<p>Powerful, Easy-to-Use Tool for Maximizing Performance, Availability, and Manageability of Disk Storage</p> <ul style="list-style-type: none"> ○ Displays logical view of storage devices and provides easy monitoring of disk configurations. ○ Simplified configuration and management improve productivity and reduce the cost of storage administration. ○ Storage Management of disk groups, disks, volumes, arrays and applications allow flexible storage management ○ Drag-n-Drop Storage Management
Advanced Command Line (CLI) Support	<p>Choice of using the GUI or the command line Provides scripting capability to automate repetitive tasks</p>
Easy Online Storage Growth, Reconfiguration and Administration	<p>Zero downtime for storage growth and administration</p> <ul style="list-style-type: none"> ○ Grow volumes dynamically with no downtime ○ Easily move volumes from array to array using drag-and-drop GUI ○ Reduce storage costs by combining the unused space on multiple arrays ○ Increase server availability and eliminate server downtime associated with storage growth <p>Protects investment and lowers total cost of ownership</p>
Proactive Storage Monitoring and Notification <ul style="list-style-type: none"> ▪ Capacity Monitoring ▪ SNMP Alerts ▪ E-mail/Pager ▪ Event Log 	<p>Proactive storage event notification improves performance and reduces downtime</p> <ul style="list-style-type: none"> ○ Provides a warning when any dynamic volume has nearly reached full capacity ○ Allows SNMP alerts to be sent to a centralized management console. ○ Sends storage administrators an e-mail or page in the event of a storage related problem ○ Logs all storage-related events to allow storage administrators the ability to review storage changes and events ○ Full event message list on CD for integration into management platforms such as Microsoft MOM
Automatic Growth Based Upon Capacity	Proactively solves a storage-related problem based upon a predefined rule
Management of Free-Space Pool for Volume Growth	Simplified administration and flexible use of available hardware
Availability Advanced, Integrated Volume Support	
Dynamic Online Growth for all Volumes	Reduced downtime for storage administration and growth without rebooting the Server
Software RAID Capabilities for Simple, Spanned, Striped, Mirrored, Mirrored Stripe and RAID 5 Volumes	Allow software RAID capabilities to be combined with hardware RAID to provide the optimum storage resource for your applications
Dynamic Relayout	Allows software RAID type changes dynamically while users and applications stay online
Hot Relocation	Proactive storage management when I/O errors occur on disks
Dirty Region Logging	Provides fast recovery for mirrored volumes after system or power failure
RAID 5 Logging	Ensures prompt recovery of a RAID 5 volume in the event of a power failure
Self-Monitoring Analysis and Reporting Technology (SMART)-enabled	Monitors disk resources for potential hardware failures to take proactive measures to prevent storage failures
Disk Replacement or Disk Evacuation	Allows the disk configuration to be easily moved to an alternate disk in the case of disk failure and disk retirement
Boot from SAN Support	Advanced support for Windows servers that boot from the SAN
Storage Independent Heterogeneous Support	
Platform Independent GUI	Simplifies operations for centralized cross-platform management, which reduces storage administration and training costs
Supports Multiple Heterogeneous Storage Hardware	<p>Reduces training costs and administrative overhead and provides maximum flexibility by allowing organizations to select the storage hardware solutions that best meet their needs</p> <ul style="list-style-type: none"> ○ Support for most leading storage arrays ○ Fibre Channel SAN support ○ iSCSI SAN support
Ability to Move Disk Groups Between Servers	Easier migration between servers with reduced downtime

VERITAS STORAGE FOUNDATION FOR WINDOWS

Features	Benefits
Performance and Scalability Optimized Data Management That Can Grow with the Business	
VxCache	Using cache memory for read operations, significantly improves read performance for selected dynamic volumes.
Aids the Allocation of Shared Disks in Storage Networks	Improves efficiency, which reduces pre-allocated, non-shared storage by allocating disks only when needed
Striping and Selective Disk Mirroring	Increases throughput and bandwidth while providing scalable performance and balancing of application data loads
Spanning Data Across Multiple Disks	Offers storage without physical limitations
Independence From Device Drivers, the File System and Databases	Supports existing systems that do not require new hardware or software, and integrates easily with disk subsystems and arrays, including hardware RAID systems
Online Performance Monitoring and Tuning Tools	Identifies and minimizes I/O bottlenecks
Preferred Mirror (read-only from target plex of mirror volume)	Improves read performance by assigning a local mirror disk for read operations
Striping Across Disk and RAID Devices	High performance from existing devices
Multiple Dynamic Disk Groups	Allow easy storage migration from server to server
Private Disk Group Protection	Protects Windows SAN-based storage resources from being imported into other servers
Options	
VERITAS FlashSnap™ Option	<ul style="list-style-type: none"> • Hardware Independent Leverages Your Storage Resources <ul style="list-style-type: none"> ○ SCSI/ATA Internal Disks ○ Fibre Channel & iSCSI SAN Arrays • Volume Snapshots for Quick Recovery or Off-Host Backup <ul style="list-style-type: none"> ○ Fully integrated with VERITAS NetBackup and Backup Exec for on and off host backup support ○ Up to 32 Split Mirror Snapshots per volume ○ VERITAS FastResync speeds volume recoveries ○ VERITAS Fast File Resync speeds recovery of individual files • Compatible with Microsoft Volume Shadow Copy Service (VSS) & VDI <ul style="list-style-type: none"> ○ GUI Visualization of VSS Writers (Microsoft Exchange) ○ VSS Provider allows use by any VSS enabled application ○ VSS Snapshot GUI Wizard allows easy creation of persistent snapshots for quick recovery • VDI support for Microsoft SQL snapshots
VERITAS Dynamic Multipathing (DMP) Option	<ul style="list-style-type: none"> ▪ Advanced Multipathing Management <ul style="list-style-type: none"> ○ GUI Visualization of array resources ○ Advanced CLI Management ○ Path performance statistics ○ System & SNMP alerts for path failures and recoveries ○ Proactive path health checking ▪ Supports for Most Leading Storage Arrays <ul style="list-style-type: none"> ○ Fibre Channel and iSCSI SAN Support ▪ Path Failover & Load Balancing <ul style="list-style-type: none"> ○ Automatic I/O path failure detection and failover ○ Dynamic reconfiguration and auto fail back ○ Wide selection of load balancing methods including Balanced Path, Dynamic Least Queue Depth, Active/Passive Concurrent ○ Active/Active DMP Support with clustering (MSCS/VCS) ▪ Compatible with Microsoft MPIO Architecture <ul style="list-style-type: none"> ○ 32-Bit and 64-Bit (IA64/X64) Windows Support ○ Microsoft WHQL MPIO Logo Qualified
VERITAS Cluster Option for Microsoft Cluster Server (MSCS)	<ul style="list-style-type: none"> ▪ Allows dynamic disk support with Microsoft Cluster Server (MSCS) ▪ Failover of the disk groups configured with Storage Foundation provides high levels of data integrity and availability ▪ Metropolitan Area Clustering support <ul style="list-style-type: none"> ○ Mirrored MSCS quorum resources eliminate single point of failure and provide disaster recovery
VERITAS Volume Replicator Option	<ul style="list-style-type: none"> ▪ Reliably, efficiently and consistently mirrors data to remote locations over any IP network for maximum business continuity. An elegant, flexible, storage independent solution to deliver true disaster recovery when data currency and availability are paramount

System Requirements

Supported Platforms

- Microsoft Windows Server 2003 (32-Bit)
(Standard, Web, Enterprise, Datacenter)
- Microsoft Windows Server 2003 x64 Editions
(Standard, Enterprise, Datacenter)
- Microsoft Windows Server 2003 for Itanium-based
Systems
(Enterprise, Datacenter)
- Microsoft Windows 2000
(Server, Advanced Server, Datacenter)
- Microsoft Windows XP Professional and Windows 2000
Professional (Client only)

Supported Applications

Compatible with most leading Windows server applications including:

- Microsoft Exchange Server 2003, 2000 and 5.5
- Microsoft SQL Server 2005, 2000 and 7.0
- Oracle 8i,9i, 10g

For additional information in support for VERITAS Storage Foundation HA for Windows and the Volume Replicator Option, view the Storage Foundation HA for Windows, VERITAS Cluster Server and VERITAS Volume Replicator data sheets.

File Systems

VERITAS Storage Foundation for Windows supports all standard file systems, including:

- NTFS
- FAT and FAT32 file systems
- MBR and GPT Partition Support

Storage Devices

VERITAS Storage Foundation for Windows supports a wide variety of storage devices

- Supports any device in the Microsoft Windows Server Catalog
- If multipathing or clustering functionality is being used, check with your VERITAS representative for compatibility

Minimum Free Disk Space to Install

475MB Minimum, 675MB of disk space is required for the full installation if optional programs are included

Minimum System Memory Size

Minimum required: 256 MB
Recommended: 512 MB

If VERITAS Dynamic Multipathing MPIO or VxCache Options are installed:

Minimum required: 512 MB
Recommended: 1 GB

Minimum System Processor Speed

300 MHz Pentium II minimum processor speed
550 MHz Pentium III or faster

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For additional information about VERITAS Software, its products, or the location of an office near you, please call our corporate headquarters or visit our Web site at www.veritas.com.

VERITAS Storage Foundation™ *for Windows* Disaster Recovery

DISASTER RECOVERY ESSENTIALS FOR MICROSOFT WINDOWS ENVIRONMENTS

KEY BENEFITS

- Data and application recovery for virtually any application, any network and over any distance
- Reduce disaster recovery costs through heterogeneous storage support and increased hardware utilization
- Increase reliability of successful disaster recovery using proven solutions and planning / testing tools

Disaster recovery technologies can be difficult to implement due to the complexity and costs associated with a complete IT recovery solution. Essential components span multiple technologies and multiple providers which creates implementation issues along with costs that often exceed the benefits. Making disaster recovery an achievable goal, VERITAS offers a complete solution on Microsoft Windows that provides organizations with the software essentials to help ensure that their data and applications are always available even in the event of a complete site outage.

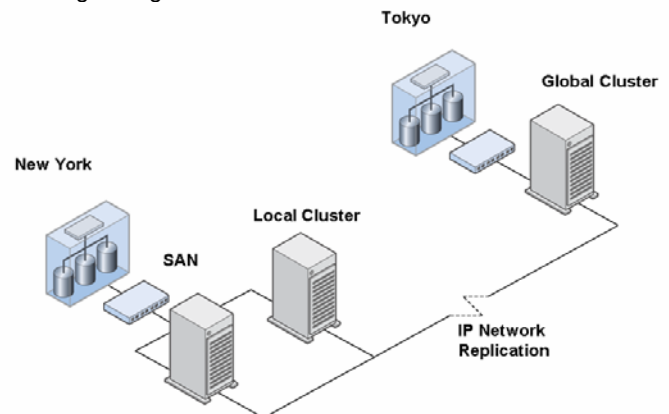
Available for Windows Server 2000 and Windows Server 2003, Storage Foundation *for Windows* Disaster Recovery (DR) is a bundled solution that combines clustering technologies with storage management technologies to provide an integrated and comprehensive disaster recovery solution to protect your environment. The single bundle is comprised of VERITAS Storage Foundation with the Dynamic MultiPathing and FlashSnap options, VERITAS Volume Replicator and VERITAS Cluster Server with the Global Cluster Option (GCO)

VERITAS Storage Foundation™ *for Windows* extends and enhances the capabilities of Microsoft's LDM and provides effective storage management by creating virtual storage devices from physical disks and disk arrays. This removes the physical limitations of disk storage which allows customers to configure, share and manage storage for optimal results. Additionally, options such as Dynamic MultiPathing and FlashSnap provide protection against single point of failure by enabling I/O path redundancy as well as ensuring that additional copies of data are accessible and available in the case of site outages

VERITAS Cluster Server™ is the industry's leading open systems clustering solution to protect your critical applications and databases against downtime, whether planned or unplanned. VERITAS Cluster Server provides high availability locally while the Global Cluster Option extends high availability across any distance to applications, databases and servers by monitoring the health and performance of the resource and

automatically restarting the resource on another available server in order to avoid a complete failure.

VERITAS Volume Replicator™ helps organizations reduce data loss and recovery time from days to minutes (or even seconds), in the event of site outages. With Storage Foundation *for Windows* managing storage within the SAN at a local level, Volume Replicator allows customers to replicate data across any distance by replicating data over IP between similar or dissimilar storage devices. This gives customers the flexibility to maintain remote copies of data using new or existing storage hardware.



Storage Foundation for Windows DR provides local and remote storage management and application availability

PRODUCT OVERVIEW

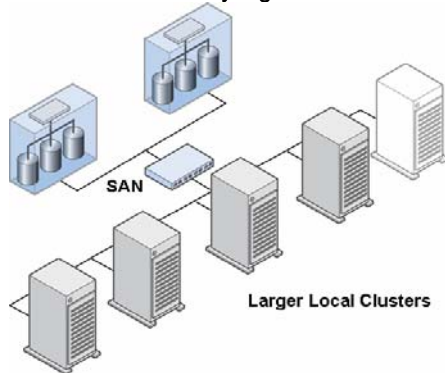
Reduce Hardware Costs:

VERITAS Storage Foundation *for Windows* DR provides storage virtualization and replication tools for heterogeneous storage environments, which leads to cost savings by giving organizations the freedom to choose the appropriate storage hardware for disaster recovery needs. For example, organizations can choose high end storage arrays at primary locations where performance is critical and lower cost storage, from virtually any vendor, at the remote location for disaster recovery purposes.

Maximize Hardware Investment:

Not only do organizations have the choice of using heterogeneous storage hardware, but VERITAS Cluster Server technology enables organizations to choose server cluster configurations that provide high levels of application availability with lower levels of idle resources. For example, VERITAS

clustering technology included in Storage Foundation for Windows DR can significantly increase server utilization through larger server clusters and adaptive workload management. At the same time these server clusters help ensure that applications at primary and secondary locations stay online to achieve extremely high service levels.



High availability combined with increased hardware utilization leads to increased service levels and cost savings

Reduce Impact to Production Environment:

Another benefit of Storage Foundation for Windows DR is the ability to take storage independent snapshots for point-in-time copies of data at primary and secondary locations. These snapshots can be used for off-host processing such as backups and testing which means organizations can increase the frequency of backups and speed up the recovery process in the event of a site outage or logical failure. VERITAS enabled snapshots also provide the ability to use utilize non-production servers to carry out backups and testing which leads to an increased level of data protection that does not cost the organization performance on primary production systems.

Broad Application Support:

VERITAS Storage Foundation for Windows DR provides off-the-shelf support for a wide range of applications, including but not limited to Microsoft Exchange and Microsoft SQL Server with new agents being developed continuously. Custom agents for application availability can be created to ensure virtually any application is highly available on Windows Server 2003 Standard, Enterprise Server and Datacenter Server as well as Windows 2000 Server, Advanced Server and Data Center Server.

Reduce Data Loss and Downtime:

Outages are generally caused by application, server, network, or storage failures. Storage Foundation for Windows DR includes solutions for all levels. If an application, database, or complete server goes down locally, Storage Foundation for Windows DR immediately detects the failure and automatically brings up services on an available server then redirects traffic. In the event of local disk failures, or I/O path failures due to network failures, the storage management capabilities of Storage Foundation for Windows DR continue on redundant

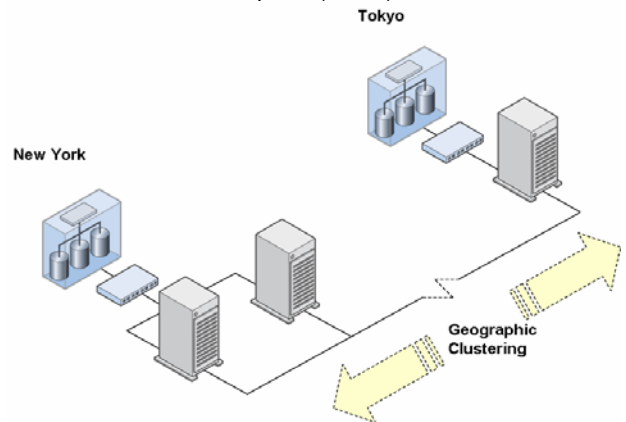
systems without having to off-line storage or experience down-time.

Leverage Existing Network:

Recognizing that organizations have unique IT environments VERITAS provides disaster recovery capabilities within a SAN as well as over IP networks. Storage Foundation for Windows DR enables synchronous mirroring of data volumes within both fibre channel or iSCSI networks for local and metropolitan area storage protection. Synchronously mirroring data ensures that data is protected in real-time with absolutely no data loss. In addition to SAN based mirroring technology, Storage Foundation for Windows DR enables synchronous or asynchronous replication natively over IP networks. This extends the reach of disaster recovery capability over any distance and allows organizations to leverage existing network infrastructure. By giving organizations a choice of SAN or IP networks VERITAS allows organizations to choose cost effective solutions for disaster recovery that will work at any distance and in virtually any environment.

Eliminate Single Point of Failure:

In addition to enabling data redundancy through replication and local mirroring, Storage Foundation for Windows DR also helps protect against single point of failure in data paths through Dynamic MultiPathing (DMP). VERITAS DMP enhances Disaster Recovery by making local systems more robust, eliminating I/O path single point of failure problems within a SAN by managing all routes between the server and storage subsystem. An unlimited number of paths from the server into the storage subsystem are supported, and VERITAS DMP manages the interface between the host server file system and two or more Host Bus Adapters (HBAs).



Geographic clustering provides complete site migration capabilities

Disaster Recovery over Any Distance:

Storage Foundation for Windows DR lets organizations replicate critical data natively over IP, which means real-time, consistent copies of data can be distributed anywhere around the globe for disaster recovery needs. Maintaining up-to-date copies of critical data at remote locations provides the foundation for quick recovery of critical applications. For example, an organization may choose to replicate the same

critical data volumes from New York to New Jersey and from New York to Tokyo. This data can be mounted and recovered at either location at any moment. Once the data is mounted, it can then be used to bring applications online.

Complete Site Protection:

In addition to real-time data replication and local clustering, Storage Foundation *for Windows* DR also includes remote clustering technology to provide complete site migration capabilities over any distance during planned or unplanned downtime. In the event of a local site outage (or local planned maintenance) replication roles are shifted to the secondary site, critical applications are brought online and client traffic is redirected. All of this can happen with a single command or mouse click. This capability is most useful when organizations want to reduce downtime by automating the manual process of bringing up applications and replication at a remote location once the initial site has gone down.

Test Before Disaster Strikes:

VERITAS Storage Foundation *for Windows* DR provides the ability to configure, implement and test your high availability and disaster recovery environment without disrupting users. VERITAS offers free simulation tools in conjunction with Storage Foundation *for Windows* DR that allow users to test the potential network impact of replication and to test cluster configurations without requiring a separate cluster testing environment or impacting the production environment. Clustering tools even allow organizations to clone their production environment and allow the disaster recovery solution to be fully tested. These new features reduce the need to invest in additional hardware for testing and configuration purposes while ensuring resources will remain available in the production environment.

Put It All Together

VERITAS Storage Foundation for Windows Disaster Recovery combines a number of proven VERITAS technologies to provide Microsoft Windows customers with a complete, fully tested and reliable Disaster Recovery package that can easily be implemented. Storage management, local clustering, IP replication, snapshots, Dynamic MultiPathing and remote clustering technologies are available in one VERITAS package thereby reducing the risks and costs associated with implementing a Disaster Recovery solution.

PRODUCT SPECIFICATIONS

Microsoft Windows: 2000, Server 2003

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