

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.

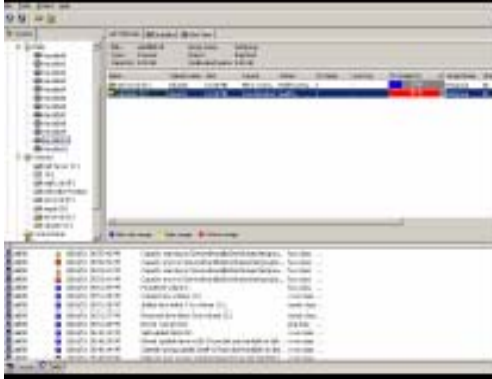


The VERITAS Enterprise Administrator GUI reduces the cost of storage administration by providing disk storage management from one central console.

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

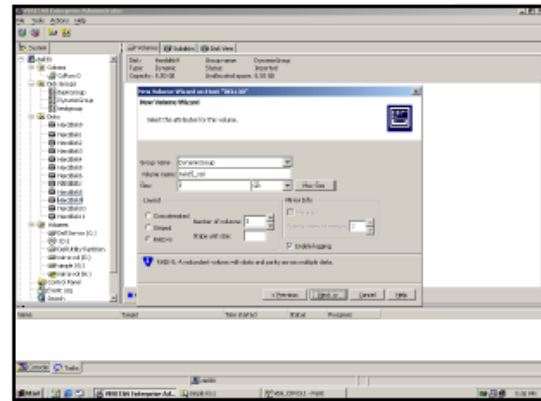
You can use Storage Foundation to protect critical applications by mirroring data across different disk devices and subsystems, including RAID devices. Storage Foundation lets you perform basic administrative tasks while the data is online and available, so planned downtime is reduced. The advanced storage 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)	Powerful, Easy-to-Use Tool for Maximizing Performance, Availability, and Manageability of Disk Storage <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	Choice of using the GUI or the command line Provides scripting capability to automate repetitive tasks
Easy Online Storage Growth, Reconfiguration and Administration	Zero downtime for storage growth and administration <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 Protects investment and lowers total cost of ownership
Proactive Storage Monitoring and Notification <ul style="list-style-type: none"> ▪ Capacity Monitoring ▪ SNMP Alerts ▪ E-mail/Pager ▪ Event Log 	Proactive storage event notification improves performance and reduces downtime <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	Reduces training costs and administrative overhead and provides maximum flexibility by allowing organizations to select the storage hardware solutions that best meet their needs <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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