VERITAS Storage Foundation™ 4.0 *for Windows*

ADVANCED VOLUME MANAGEMENT TECHNOLOGY FOR MICROSOFT WINDOWS SERVER 2003

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 labour-intensive process, often requiring that machines 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. 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.

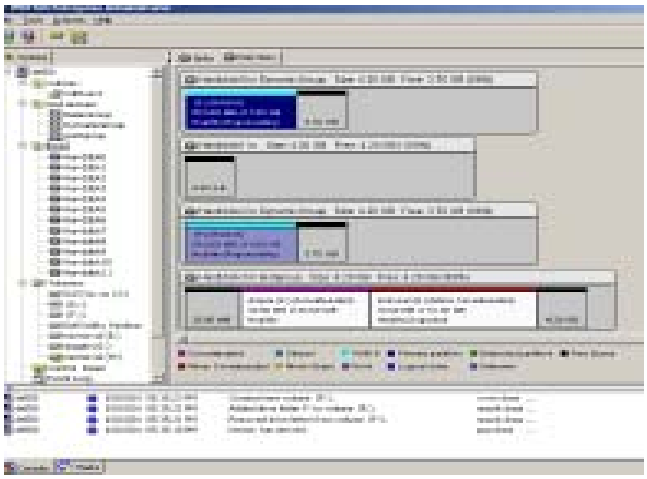
Organisations are beginning to use the enormous potential of SANs to keep server applications available in today's ever-changing e-business-focused environment. VERITAS Storage Foundation is ideal for maximising SAN-based application uptime. Storage Foundation has intrinsic features that allow organisations to increase application availability by virtualising physical storage resources within a more complex, networked storage environment. Virtualising and centralising storage resources over a SAN 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 Server 2003 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 and Microsoft Cluster Server (MSCS).

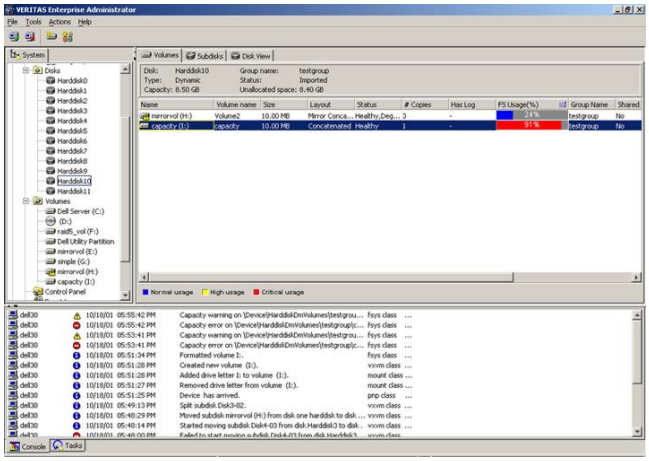
The VERITAS Enterprise Administrator GUI enables centralised, cross-platform storage management.



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

ENHANCED PERFORMANCE

Storage Foundation lets you optimise 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.



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 optimisation and Array updates and retirement. These capabilities are critical for maintaining highly available, high-performance storage on a variety of hardware devices.

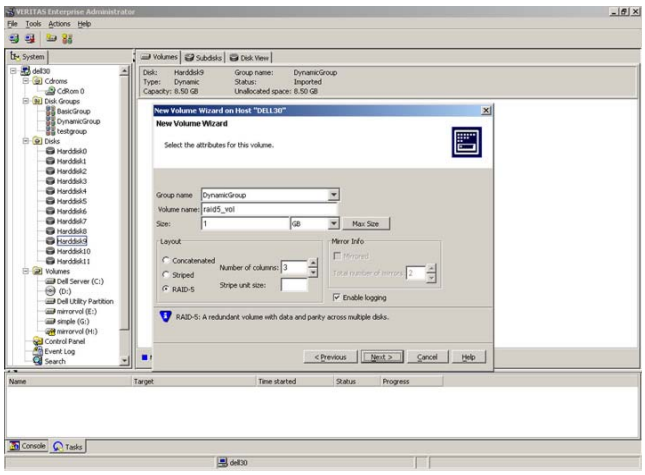
The VERITAS FlashSnap™ option also enhances administrators' ability to create online copies of real-time data with minimal impact to applications or users. With the Dynamic Multipathing (DMP) option, availability is enhanced by providing a disk path failover mechanism and performance is improved by I/O 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 organisations to protect their current hardware investment and the freedom of choice for future purchases.

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. It also addresses issues such as shrinking maintenance windows. The snapshots that FlashSnap creates can be accessed from the same server or easily be imported to another host. This allows users to perform resource-intensive processes such as testing, decision support and reporting.
To greatly reduce the resynchronisation time and performance impact on the server when the volume snapshot is reattached, FastResync technology synchronises only the changes that occurred while the volume snapshots were split.
FlashSnap is fully integrated with Windows Server 2003 Volume Shadow Copy Service (VSS) as a VSS Provider. The FlashSnap VSS support works with most leading storage arrays and is compatible with the growing list of backup applications that are VSS enables. This delivers a powerful and flexible solution that frees you from hardware and application restrictions



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

SYSTEM REQUIREMENTS

Supported Platforms

- Windows Server 2003 Standard Edition, Web Edition, Enterprise Edition and Datacenter Edition
- Windows XP Professional and Windows 2000 Professional, Server, Advanced Server or Datacenter Server – SP3 or above (Client only)

File Systems

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

- NTFS
- FAT and FAT32 file systems

Storage Devices

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

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

Minimum Free Disk Space to Install:

250 MB of disk space is required for the full installation if optional programs are included.

Minimum System Memory Size

256MB is recommended

Minimum System Processor Speed

No minimun processor speed;
550 MHz Pentium or faster

VERITAS™

VERITAS STORAGE FOUNDATION *FOR WINDOWS*

Features	Benefits
Powerful, Centralised Storage Management Online Flexible Administration of Data Volumes	
Centralised Storage Management via an Intuitive Graphical User Interface (GUI)	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.
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 • 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 Monitoring and Notification • Capacity monitoring • SNMP alerts • E-mail/pager • Event log	Proactive storage event notification improves performance and reduces downtime • Provides a warning when any dynamic volume has nearly reached full capacity • Allows SNMP alerts to be sent to a centralised 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
Management of Free-Space Pool for Volume Growth	Simplified administration and flexible use of available hardware
High 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
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
Automatic Growth Based Upon Capacity	Proactively solves a storage-related problem based upon a predefined rule
Heterogeneous Support	
Platform Independent GUI	Simplifies operations for centralised 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 organisations to select the storage hardware solutions that best meet their needs
Ability to Move Disk Groups Between Servers	Easier migration between servers with reduced downtime

Features	Benefits
Performance and Scalability Optimised Data Management That Can Grow with the Business	
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 minimises 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	
Data Snapshots (VERITAS FlashSnap™)	Provides split-mirror data snapshots, which enable: • On-disk mirrored images for protecting mission-critical data • On-host and off-host processing of split mirrors and fast re-synchronisation of mirrors • VSS Provider allows use by any VSS enabled application

Dynamic Multipathing Support for Unlimited Failover and Load Balancing	• Continuous data access eliminates single points of failure
	• Increases availability if one path becomes unavailable
	• Increases performance by spreading I/O between multiple paths
	• Operates in fibre channel arbitrated loop, switch fabric and SCSI environments
	• Supports most leading storage arrays from a wide selection of array vendors including:
	  • Compaq EMA12000/EMA16000/RA8000/MA8000
	  • EMC Symmetric 3000, 8000 & DMX Series
	  • EMC CLARiiON/Dell CX Series
	  • Fujitsu GR Series 7xxx
	  • Hitachi 9200 Thunder Series
	  • Hitachi 9500 Series
	  • Hitachi 9900/9900V Lightning Series
	  • Hitachi Freedom 5800 & 7700E
	  • HP SureStore XP256/XP512/XP128/XP1024
	  • IBM FasT200/500/700
	  • IBM ESS Shark ESS800 & F10/F20
	  • LSI E2400/4400/4600
	  • NEC iStorage 1000/2000/4000
	  • MTI Vivant 400

Superior Clustering Support: • Allows use of dynamic disks with Microsoft Cluster Server (MSCS) • Storage migration for shared devices clustering • Mirrored MSCS quorum resources provide disaster recovery	• Allows clustered Windows servers to utilise all of the benefits of dynamic disks • Failover of the disk groups configured with Storage Foundation provides high levels of data integrity and availability • MSCS quorum resource failures can be prevented by mirroring the quorum resource in multiple locations