What's New in NTFS

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Applies To: Windows 7, Windows Server 2008 R2

What are the major changes?

Several enhancements to improve performance have been made to the NTFS file system. The following changes are available in Windows® 7 and Windows Server® 2008 R2:

- Delete notification for solid state devices (SSDs) that support T10 Trim
- New opportunistic locks (oplocks) semantics and introduction of oplock keys
- Support for file system metadata defragmenting
- Improvements in Volume Shrink
- Ability to disable short names on a per-volume basis
- Improved concurrency of read requests while flushing
- Native VHD support
- **Chkdsk** performance improvements
- Robocopy performance enhancement
- Local file copy improvements

Who will be interested in this feature?

IT administrators who deploy Windows 7 and Windows Server 2008 R2 will be most interested in these changes to NTFS.

What new functionality does NTFS provide?

This section describes each of the changes that are new to NTFS.

T10 Trim delete notification

In Windows 7 and Windows Server 2008 R2, for storage devices that support T10 Trim, NTFS now sends a delete notification to the device when files are deleted. If a device supports T10 Trim as defined in the ATA protocol's Data Set Management command, NTFS sends the notification when files are deleted and it is safe to erase the storage that backs up those files. This new functionality enables storage devices such as solid state disks (SSDs) to better utilize their storage capability, and it improves their performance.

Oplock semantics

Opportunistic locks (oplocks) provide a mechanism that allows file server client computers that are using the SMB and SMB 2.0 protocols to dynamically alter the buffering strategy for a given file or data stream in a consistent manner. This increases performance and reduces network use. SMB 2.1 brings an important performance enhancement to the protocol in Windows 7 and Windows Server 2008 R2 with the introduction of a new client oplock leasing model. The new leasing model allows greater file and stream handle caching opportunities for an SMB 2.1 client computer, while preserving data integrity. You do not need to make any changes to current applications to take advantage of this capability.

Another important change is the introduction of oplock keys, which apply oplocks on a per-client, rather than per-handle basis. It is becoming more common that single applications open multiple handles to the same file with different access or share modes. Traditionally, the second opening would cause the oplock to revoke or downgrade, thereby impacting the client computer's ability to effectively cache data. The new leasing model helps prevent applications from breaking their oplocks, and it enables the files to take advantage of caching opportunities. This capability helps decrease overall network and disk loads.

Support for file system metadata defragmenting

Prior to Windows 7 and Windows Server 2008 R2, certain file system metadata associated with user data files (for example, reparse point or Encrypting File System (EFS) data) could not be defragmented. Enhancements to the defragment engine enable certain file system metadata to be defragmented. This change helps improve the performance of files with many reparse points and resident files. It can also help enable Volume Shrink to reclaim more space than was previously possible.

Improvements to Volume Shrink

By optimizing the placement of immovable system files, the ability to shrink a volume through the Volume Shrink utility is improved. This results in a greater amount of disk space that can be reclaimed. This enables administrators to avoid moving data off a volume and formatting it, to split the current partition at the free-space boundary.

Ability to disable short names on a per-volume basis

The **shortname** property (a DOS 8.3 naming convention) can now be individually managed on a per-volume basis. Prior versions of Windows only allowed short names to be disabled globally. Also, the command-line utility **Fsutil** has been enhanced with additional **shortname**-related commands. It can now strip short names from a directory, and it keeps a log that contains details of the stripped files and errors that occur. However, after short names have been stripped, there is no automated way to restore them. If the directory structure has changed in any way, there is no guarantee that the short names will be completely restored. Disabling and stripping short names can significantly reduce the time that is required for file creation and directory enumeration in directories with a very large number of files.

Improved concurrency of read requests while flushing

Prior to Windows 7 and Windows Server 2008 R2, if a read request occurred while a file is being flushed (through a call to FlushFileBuffers), the read request would wait until the flush request was completed. To enhance overall concurrency in the system, NTFS now supports a concurrent read request of a file at the same time that cached data is saved to the disk by the flush request.

Native VHD support

Virtual hard disk (VHD) drives are commonly used by virtualization packages, such as Microsoft® Virtual PC, and by Microsoft Hyper-V™-based virtualization systems. Enhancements to the mount and boot mechanisms and additional support across multiple Windows components provide the following capabilities:

- **Instance mobility**: Migrate an operating system instance from one computer to another without having to reconfigure the operating system, the configured roles, or workloads.
- **Multiple-instance VHD management**: Have a single computer maintain multiple instances of operating systems without having to make changes to disk partitioning. Examples of typical usage include easier failover of operating system images and the ability of a server to change workloads.
- **Centralized deployment**: Boot from a single, centralized image, significantly easing the deployment and rollout process.
- **Offline servicing of computer images**: Perform offline servicing of a computer by patching the image, rather than having to bring the VHD online to service it.
- **Backup**: Boot from a backup image through Windows Server Backup.

Chkdsk performance improvements

In Windows Server 2008 R2, enhancements to the command-line tool **Chkdsk** increase the availability of volumes by reducing the amount of time it takes to perform a **Chkdsk** run. **Chkdsk** scales with the amount of available RAM in the system. Running Chkdsk on a server running Windows Server 2008 R2 is significantly faster than on a server running Windows Server 2008 or systems with similar configurations.

Robocopy performance enhancement

The copy utility, Robocopy, has been enhanced to allow for multithreaded copies. This significantly improves remote and high-latency transfer rates by opening multiple threads to perform a concurrent copy operation, which increases the total data throughput.

Local file copy improvements

Optimizations in the memory and cache manager enable improvements in local file copy scenarios. File copy times for small, medium, and large (greater than 8 MB) files have been reduced. The greatest improvement is for medium and large files (depending on the nature of the file set, storage, and memory subsystems).

What settings have been added or changed?

Registry settings

Setting name	Location	Previous default value (if applicable)	D va
NtfsDisable8dot3NameCreation	HKLM\SYSTEM\CurrentControlSet\Control\FileSystem	0	2
DisableDeleteNotification	HKLM\SYSTEM\CurrentControlSet\Control\FileSystem	0	0

Group Policy settings

Setting name	Location	Previous default value (if applicable)	Default value	Possible values

Short name creation options	Computer Configuration\Administrative Templates\System\Filesystem\NTFS	Not configured (controlled by registry)	Not configured (controlled by registry)	Enabled on all volumes Disabled on all volumes Enabled or disabled on a per volume basis Disabled on all data volumes
Enable NTFS PageFile encryption	Computer Configuration\Administrative Templates\System\Filesystem\NTFS	Not configured (controlled by registry)	Not configured (controlled by registry)	Enabled Disabled
Do not allow compression on all NTFS volumes	Computer Configuration\Administrative Templates\System\Filesystem\NTFS	Not configured (controlled by registry)	Not configured (controlled by registry)	Enabled Disabled
Do not allow encryption on all NTFS volumes	Computer Configuration\Administrative Templates\System\Filesystem\NTFS	Not configured (controlled by registry)	Not configured (controlled by registry)	Enabled Disabled
Disable delete notifications on all volumes	Computer Configuration\Administrative Templates\System\Filesystem	Not configured (controlled by registry)	Not configured (controlled by registry)	Enabled Disabled

Which editions include this feature?

This feature is available in all editions of Windows 7 and Windows Server 2008 R2.

Is it available in both 32-bit and 64-bit versions?

Yes, changes to NTFS are available in both 32-bit and 64-bit versions.

Additional references

For more information about new **8dot3NameCreation** registry settings, see NtfsDisable8dot3NameCreation in the Windows Server TechCenter (http://go.microsoft.com/fwlink/?LinkId=182069).

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