

Fault Tolerance Registry Editor Overview

Ftdedit is a disaster recovery tool that works with Windisk and Ftdisk. You can use Ftdedit to create, edit, and delete fault tolerance sets for disks and partitions on local and remote computers. In particular, it is useful for recovering registry information pertaining to stripe sets, volume sets, stripe sets with parity, and mirror sets.

Ftdedit does not create fault tolerance sets. Instead it creates collects information about fault tolerance sets, and it stores this information in the registry. If an actual fault tolerance set (created by Windisk) is not present on your computer, the information stored in the registry by Ftdedit is ignored by Windisk and Ftdisk.

Since stripe sets and volume sets are not fault-tolerant, if one disk fails, an entire volume can become unusable.

Also, through the registry, the operating system has access to information about which disk belongs to which volume. Without this registry information, it cannot distinguish among a stripe set, a stripe set with parity, a volume set, or a mirror set. Data pertaining to volume and stripe set configuration is located in the

HKEY_LOCAL_MACHINE\System\Disk registry subkey. This information is stored in binary format, and, as it is not practical to edit it manually, you can use the Ftdedit tool to change it.

When the registry information is corrupted or missing, and no backups are available, you can use Ftdedit to rebuild the registry information and allow the operating system to read the volumes. For example, if the disk containing the boot partition becomes unusable, or the computer fails, you might want to move the disks containing stripe sets and volume sets to a different computer. Alternatively, you might decide to reinstall the operating system on a new drive. In either case, the operating system requires information about the stripe sets and volume sets.

For questions or problems with Ftdedit, please contact:

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How to Use the Fault Tolerance Registry Information Editor

You can use Ftdit to perform the following tasks.

Loading and Saving Registry Information

- [!\[\]\(31b03e46ee8a80a1f1467b8c03bd76e8_img.jpg\) Loading Local Registry Information](#)
- [!\[\]\(7d9665ff04f9d2270c38081c6215a724_img.jpg\) Loading Remote Registry Information](#)
- [!\[\]\(7cea648fec4dfc1e99934873e9173b69_img.jpg\) Saving Fault Tolerance Information](#)

Editing Fault Tolerance Sets

- [!\[\]\(815df092dd722ee9268ef8e6d0193e3a_img.jpg\) Creating a Fault Tolerance Set](#)
- [!\[\]\(c72edb9626cad660f3a9f5fb0f22a68c_img.jpg\) Deleting a Fault Tolerance Set](#)

Editing Disk Information

- [!\[\]\(c6a8736a601a632e2c96605cf66055ed_img.jpg\) Editing Disk Information](#)

Loading Local Registry Information

By default, Ftdit reads disk information in the local registry and displays it on the screen. If the last computer you read information from was the local computer and you wish to reload local information, choose [Reload FT Information](#) from the **Edit** menu.

If you have been accessing registry information on a remote computer, use [Load New FT Information](#) instead. By default, in order to read and display the disk and FT information from a computer's registry, all that is required is guest access to the system. However, in order to save changes, you need to have administrative privileges on the system.

Loading Remote Registry Information

To load and edit disk key information from a remote registry, choose [Load New FT Information](#) from the **Edit** menu. When prompted, enter the computer name and click **OK** to continue or **Cancel** to quit.

If you have adequate permissions, when prompted, you simply enter the name of the remote computer whose registry FT information you want to access. The disk key information is read from the registry and displayed on the screen. After you have manipulated this information, you can save it back to the registry.

By default, in order to read and display the disk and fault tolerance information from a computer's registry, all that is required is guest access to the system. However, in order to save changes, you need to have administrative privileges on the system.

Saving Fault Tolerance Information

To save changes made to the currently listed disk and [fault tolerance](#) sets, choose [Save Changes to System](#) from the **Edit** menu. This command saves the new disk key information back into the registry from which it was originally read. At the same time the old disk key information is saved to a backup key in HKEY_LOCAL_MACHINE\System called OLDDISK1. If OLDDISK1 already exists, the current information is saved to OLDDISK2, and so on. If you find you have made mistakes while editing registry information and need to restore the old values, you can use a registry editor such as Regedt32.exe to replace the Disk key with the OLDDISKX key.

Creating a Fault Tolerance Set

To create a new FT set, choose **Create FT Set** from the **Edit** menu or click the **Make FT Set** button. A pop-up dialog box appears, prompting you to select the type of FT set you wish to create. Once you have made your selection, click **OK** to continue or **Cancel** to quit.

Once you start making an FT set, the **Create FT Set** command is grayed out and the **Make FT Set** button changes to a **Cancel** button.

Once you have selected the type of FT set you want to create, you can add **partitions** to the set by double-clicking partition descriptions in the Partitions box. When you add a partition, it is listed in the FT Set box and the partition description is marked with asterisks (*) as being used. At any time you can cancel the process by clicking the **Cancel** button. Once you have finished creating the FT set, click the **Save FT Set** button or choose **Save Changes to System** from the **Edit** menu.

Deleting a Fault Tolerance Set

To delete an FT set definition, select the FT set you want to delete in the FT Set Information box, and then choose **Delete FT Set** from the **Edit** menu.

Editing Disk Information

To delete disk information from a registry, select the disk in the [Disks](#) box, and choose [Delete Drive](#) from the **Edit** menu. You cannot delete a disk that is a member of a currently defined FT set, nor can you delete a disk if it is the only one listed.

Open

This command is currently disabled. In future versions of Ftedit it will allow you to open a saved Disk key or System hive and extract disk and FT information.

Save

This command is currently disabled. In future versions of Ftedit it will allow you to save edited disk and FT information to a file.

Exit

Exits Ftdit.

Note Changes made to the registry are not automatically saved when you exit Ftdit.

Create FT Set

Choose this command to create a new FT set definition. Once you have started making an FT set, the **Create FT Set** command is grayed out and the **Make FT Set** button changes to a **Cancel** button. For more information on creating FT sets, see [Creating a Fault Tolerance Set](#).

Save FT Set

Choose this command when you have finished defining a new FT set. The new set will be created using the [partitions](#) listed in the FT Set Information box. Before choosing this command, you can cancel the creation of a new FT set by clicking the **Cancel** button. Once you have saved an FT set, the only way to remove the new set is to delete it.

Add Drive

You can use this command to create a "phantom" drive when one disk is missing from a stripe set with parity and you need to recreate the set definition in order to regenerate the stripe set with parity. Once you have chosen this command, you must select an existing [partition](#) that is part of the stripe set so it can be used as a template for the partition on the 'phantom' drive. To do this, identify the partition you wish to duplicate by double-clicking its description in the Partitions box.

This command can only be used to replace a single missing disk in a stripe set with parity. If you are missing more than one disk or you do not have a stripe set with parity, you cannot use this command.

Note A drive created by using this command are not recognized by Disk Administrator as they do not correspond to an existing physical disk. If you add a new physical disk, run Disk Administrator to make sure the disk information is correctly added to the registry.

Delete FT Set

Choose this command to delete the FT set that is currently selected in the FT Set Information box.

Delete Drive

Choose this command to delete the disk that is currently selected in the Disks box. Trying to delete a disk that is part of an FT set will result in an error, as will trying to delete a disk when it is the only one listed in the registry.

Save Changes to System

Choose this command to save the current disk and FT set information back into the registry from which it was originally read. This can be either the local registry or a remote registry.

Note If you do not have the necessary permissions to write to the System subkey of the registry you are editing, you cannot save any changes you have made.

Reload FT Information

Choose this command from the **Edit** menu to abandon all changes you have made since the last time you saved the disk key and reload the disk and FT information from the last registry you accessed. To read information from a different registry (either remote or local), choose [Load New FT Information](#) from the **Edit** menu.

Load New FT Information

When you choose this command from the **Edit** menu, you are prompted to enter the name of a computer whose disk and FT information you wish to edit. This can be a local computer or any computer to which you have network access.

Disks

This box displays the disks on the computer, and provides the following information:

Disk #	The order in which the disks are listed in the Registry, starting with 0
Signature	A 32-bit unsigned integer used to uniquely identify a disk

Click a disk to display the partitions it contains in the [Partitions](#) box. By default, Disk 0 is selected.

Partitions

This box displays basic partition information for the disk selected in the [Disks](#) box. This information includes:

Partition ID	The partition ID assigned to the disk by Disk Administrator. Normally, partitions are assigned IDs in the order in which they appear in the list, even though the ID numbers may not be sequential.
Drive Letter	If a drive letter has been permanently assigned to this partition using Disk Administrator, it is listed here. Otherwise this field will be blank
Partition Size	The size of the partition in megabytes.
FT Group	If the partition is a member of an FT group, the group number is listed here, The FT Group number is the same for all partitions included in an FT set. Otherwise it will read N/A.
FT Member	If this partition is a member of an FT group, this number reflects the order in which the partitions are listed in the FT set.

When you are not in the process of creating an FT set or adding a disk, double-click a [partition](#) entry to display a dialog box containing more information on the FT set.

FT Set Information

This box contains an entry for each FT set defined in the registry. Any set listed here has been added to the disk key information maintained by Ftedit, although it may not yet have been saved into the registry. The following information is provided for each set:

FT Set	The FT set number, which is based on the order the set appears in the registry, and might differ from the FT Group number listed in the partition descriptions. Note that this number might also be different from the FT Set number that Disk Administrator assigns to it.
FT Type	The type of FT set: mirror set, volume set, stripe set, or stripe set with parity.

FT Set Member Information

This box displays member information for the currently selected FT set in the [FT Set box](#). The following information is displayed for each member:

Disk Number	The disk that the partition is on. This value corresponds to the Disk # entry in the Disks box.
Partition ID	This number corresponds to the partition ID in the Partitions box.

New FT Set Information

This box displays each member of a newly created FT set as it is added. The title of the box changes during the creation of an FT set to reflect the type of set being created. The following information is provided for each member:

Disk Number	Corresponds to the Disk # entry in the Disks box
Partition Number	The number of the partition based on the order it appears in the Partitions box. Do not confuse this number with the partition ID.

When you choose [Save FT Set](#) from the **Edit** menu or by clicking the button, the FT set listed in this box is added to the main [FT Set](#) and [FT Set Member Information](#) boxes and the New FT Set Information box is cleared. You can also click **Cancel** to clear the New FT Set Information box.

Disk Basics




In order to properly maintain mass storage media, it is necessary to understand basic concepts such as [partitions](#), [volumes](#), [volume sets](#), and [stripe sets](#). The Master Boot Record (MBR) on each hard disk contains an area called the Partition Table, that the operating system uses to access areas of the disk. This table has room for four entries, called partitions, that you can create to organize your information. A partition can be either primary or extended. A [primary partition](#) is formatted for a particular file system and is assigned a drive letter. An [extended partition](#) is effectively a logical disk. You do not format an extended partition, nor do you assign a drive letter to it. Within an extended partition, you can create one or more [logical drives](#) to which you assign a drive letter, then you format each logical drive for a particular file system. If required, one primary partition must store the [system partition](#).

You can have up to four partitions on a hard disk. All four of these partitions can be primary partitions, or you can include one extended partition and up to three primary partitions. If the disk does not contain the system partition, you do not have to create any primary partitions. You can only create one extended partition on a hard disk.

Note Windows 2000 requires that the system partition be a primary partition.

Volume Set

You create a volume set by combining multiple areas of free space on one or more hard disks into a single logical disk. When you create a volume set, Windows 2000 uses the HKEY_LOCAL_MACHINE\SYSTEM\Disk registry subkey to access the areas on the disk(s) that are part of the volume set. A volume set can be made up from the following elements:

-  Free space on multiple disks.
-  Multiple areas of free space on one disk.
-  Multiple areas of free space on multiple disks.

Each volume set can include up to 32 areas of free space from one or more physical disks. When creating a volume set, the free space can be unallocated area within an extended partition, or a non partitioned area elsewhere on the disk.

Stripe Set

A stripe set is composed of non partitioned areas located on 2 to 32 disks. The amount of space you use on each disk is equal to the smallest non partitioned space you selected on the disks. As with volume sets, Windows 2000 uses the HKEY_LOCAL_MACHINE\SYSTEM\Disk registry subkey to access the areas on the disk(s) that are part of the stripe set.

Primary Partition

A primary partition is a portion of a physical disk that can be marked for use by an operating system. There can be up to four primary [partitions](#) per physical disk (or up to three, if there is an [extended partition](#) on the disk). A primary partition cannot be sub-partitioned.

Starting a Session

This section shows how to rebuild a stripe set. After opening Disk Administrator to update a disk's configuration information, go to Fedit. In the **Disks** box, all the disks connected to the system are displayed. The **Partitions** box contains information about the currently selected disk.

On the **Edit** menu, click **Create FT Set**. In the **FT Set Type** dialog box, click the type of FT set you wish to create. In this case, click **Stripe Set with Parity**.

Selecting Partitions

You must select the first disk that is to be a member of the stripe set with parity. Available partitions are displayed in the **Partitions** box.

To select partitions

- 1 Double-click the partition on each disk that will make up the stripe set with parity. The disk and partition information is displayed in the **Stripe Set Information** box. Note that the title of this list box reflects the type of FT set that you are creating.
- 2 Click the **Save FT Set** button. The information you enter is transferred to the FT Set Member Information box. Check to make sure that it is correct.
- 3 On the **Edit** menu, click **Save Changes to System**. The following message is displayed: "The DISK key on the local system has been saved successfully. The old Disk key has been backed up under HKEY_LOCAL_MACHINE\SYSTEM as OLDDISK1".

Activating a Stripe Set

To activate a stripe set

- 1 Exit Ftdedit, close any open programs, and restart your computer. This ensures that the new information is loaded into the registry.
- 2 Open Disk Administrator, and click one of the partitions in the stripe set. If the status bar has a message similar to "Stripe set # n [Initializing], the system on which you were previously using the stripe set did not complete the shutdown," wait for Disk Administrator to complete initialization.
- 3 On the **Tools** menu in Disk Administrator, click **Drive Letter**. In the **Assign Drive Letter** dialog box, click **Assign Drive Letter**, and then choose a drive letter for the new volume. At this point the volume is accessible from Windows Explorer and My Computer, and to the rest of the operating system.

Extended Partition

Created from [free space](#) on a hard disk, an extended partition can be sub-partitioned into zero or more [logical drives](#). Only one of the four partitions allowed per physical disk can be an extended partition. You do not have to have a primary partition in order to create an extended partition.

System Partition

The system partition is a primary partition on a disk that contains the hardware-specific files used to load and initialize the operating system. Only a primary partition can be used as a system partition. Some programs such as Disk Administrator use the term *active partition* to refer to a system partition.

Volume

The generic term volume refers to all of the following entities that you can create and use on a hard disk.



Primary partition.



[Logical drive](#) in an extended partition.



Volume set.



Stripe set.

Fault Tolerance

Fault tolerance ensures data integrity when hardware failures occur. In Windows 2000, fault tolerance is provided by the Ftdisk.sys driver. In Disk Administrator, fault tolerance is provided using [mirror sets](#), [stripe sets with parity](#), and [volume sets](#).

Mirror Sets

A mirror set provides an identical twin for a selected disk; all data written to the primary disk is also written to the mirror, or shadow, disk. This enables you to have instant access to another disk that contains a redundant copy of the information on a failed disk. Mirror sets provide [fault tolerance](#).

RAID

RAID (Redundant Array of Inexpensive Disks) is a standard technology for combining multiple physical disks into one or more logical disks.

Stripe Sets

Stripe sets are used to save data across identical partitions on different disks. Stripe sets associate free space on up to 32 different physical disks. When you write to a stripe set, some of the data is written to each of the physical disks in the set. Stripe sets are a type of software [RAID](#) that use Ftdisk. A stripe set does not provide [fault tolerance](#); however [stripe sets with parity](#) do. Elements such as stripes and volumes are physical storage units. Related configuration information, required by the operating system, is stored in the Registry and is interpreted by Ftdedit, which displays it in readable form. Stripes and volumes are the software equivalent of physical disk arrays or RAID's.

Stripe Sets with Parity

This method provides protection by striping data in large blocks across all the disks in an array. Data redundancy is provided by the parity information. This method provides [fault tolerance](#). See also [stripe sets](#).

Logical Drive

A subdivision of an [extended partition](#) on a hard disk.

Partition

A partition is a portion of a physical disk that functions as though it were a physically separate unit.

Free Space

Free space is an unused and unformatted portion of a hard disk that can be partitioned or sub-partitioned. Free space within an extended partition is available for the creation of [logical drives](#). Free space that is not within an [extended partition](#) is available for the creation of a partition, with a maximum of four partitions allowed per disk.

