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Acronis® True Image
WD Edition

User's Guide

Table of Contents

Chapter 1. Introduction

1.1 What is Acronis® True Image WD Edition?

Acronis True Image WD Edition is an integrated software suite that ensures security of all information on your PC. It can backup the operating system, applications, settings and all of your data, while also securely destroying any confidential data you no longer need. With this software, you can back the entire disk drive or selected partitions. Should your disk drive become damaged or your system attacked by a virus or malware, you can restore the back-up data quickly and easily, eliminating hours or days of work trying to rebuild your disk drive's data and applications from scratch.

Acronis True Image WD Edition provides you with all the essential tools you need to recover your computer system should a disaster occur, such as losing data, accidentally deleting critical files or folders, or a complete hard disk crash. If failures occur that block access to information or affect system operation, you will be able to restore the system and the lost data easily.

The unique technology developed by Acronis and implemented in Acronis True Image WD Edition allows you to perform exact, sector-by-sector disk backups, including all operating systems, applications and configuration files, software updates, personal settings, and data.

Acronis True Image WD Edition now helps you protect your identity as well. Simply deleting old data will not remove it permanently from your computer. Acronis True Image now includes Acronis Drive Cleanser, an application that permanently destroys files and wipes personal information from partitions and/or entire disks

You can store backups on almost any PC storage device: internal or external hard drives, network drives or a variety of IDE, SCSI, FireWire (IEEE-1394), USB (1.0, 1.1 and 2.0) and PC Card (formerly called PCMCIA) removable media drives, as well as CD-R/RW, DVD-R/RW, DVD+R/RW, magneto-optical, Iomega Zip and Jaz drives.

Acronis True Image WD Edition allows selecting only Western digital HDD as a restore location and for Cloning operation.

If you are going to install a new hard disk drive, Acronis True Image WD Edition will help you to transfer information from the old one in minutes, including operating systems, applications, documents, and personal settings. After migrating to the new hard disk you can destroy all confidential information on the old one securely. This is the recommended procedure if you intend to donate, throw away, or sell the old hard disk drive.

Wizards and a Windows XP-style interface will make your work easier. Just answer a few simple questions and let Acronis True Image WD Edition take care of everything else! The Traffic Light bar makes it easier monitoring the system backup state. When a system problem occurs, the software will get you up and running in no time.

Acronis True Image WD Edition is available for installing and launching only when a Western Digital HDD is connected.

Acronis True Image WD Edition does not support dynamic and GPT drives as sources and targets for backup, recovery, migration and cloning.

1.2 New in Acronis True Image WD Edition

- **DriveCleanser** - Securely wipe data stored on an entire hard disk, individual partitions or in individual files and eliminate traces of user system activities. You have the option to delete files or erase a whole disk using any of eight standardized data destruction methods or custom, user-defined methods. This capability comes from the inclusion of Acronis DriveCleanser, a former stand-alone product that also was a component of the Acronis Privacy Expert Suite. As a stand-alone product, Acronis DriveCleanser won several Editors' Choice Awards.
- **More user-friendly** – Many interface improvements and usability enhancements make Acronis True Image WD Edition easier to use than ever before. Acronis True Image WD Edition is packaged as a suite of smaller, simpler, independent utilities working together and it is ready to protect the computer right after installation, no reboot is necessary.
- **Sector-by-sector images** – You can create an exact sector-by-sector disk image. This feature is very useful when you need to backup corrupted disk drives or to make an image of a partition on which an important file has been deleted. This option lets you copy used and unused hard disk sectors.
- **Restoring files and folders without restoring absolute path** – You can select an option of restoring files without restoring the absolute path so the restored items will be saved to the destination folder without creating multiple additional folders.
- **Shell extension for archive validation** – You can easily validate any archive right from the Windows Explorer context menu. Simply find a backup archive, right-click on it and select "Validate Backup Archive".

1.3 System requirements and supported media

1.3.1 Minimum system requirements

Acronis True Image WD Edition requires the following hardware:

- Pentium processor or higher
- 128 MB RAM
- FDD or CD-RW drive for bootable media creation
- Mouse (recommended).

1.3.2 Supported operating systems

- Windows® 2000 Professional SP 4
- Windows XP SP 2
- Windows XP Professional x64 Edition
- Windows Vista (all editions)

Acronis True Image WD Edition also enables the creation of a bootable diskette or CD-R/W that can back up and restore a disk/partition on a computer running any Intel- or AMD-based PC operating system. The only exception is the Intel-based Apple Macintosh, which is not supported in native mode at this time.

1.3.3 Supported file systems

- FAT16/32

- NTFS

If a file system is not supported or is corrupted, Acronis True Image WD Edition can copy data using a sector-by-sector approach.

1.3.4 Supported storage media

- Hard disk drives
- Networked storage devices
- FTP servers*
- CD-R/RW, DVD-R/RW, DVD+R (including double-layer DVD+R), DVD+RW, DVD-RAM**
- USB 1.0 / 2.0, FireWire (IEEE-1394) and PC card storage devices
- Floppy disks, ZIP®, Jaz® and other removable media

* An FTP server must allow for passive mode file transfers. Data recovery directly from FTP server requires the archive to consist of files of no more than 2GB each. It is recommended that you change the source computer firewall settings to open Ports 20 and 21 for both TCP and UDP protocols and disable the **Routing and Remote Access** Windows service.

** Burned write-once discs cannot be read in Windows NT 4 without third-party software.

1.4 Technical support

Users of legally downloaded and registered copies of Acronis True Image WD Edition are entitled to free technical support.

If you experience problems installing or using our product that you can't solve yourself by using this guide, you can visit Western Digital **Knowledge Base** (Frequently Asked Questions) at: http://support.wdc.com/.

Here you can search for a solution by entering keywords, phrases or even by an answer ID in the **Contact us/Answers** tab; or describe the problem and ask questions by filling in the form in the **Ask a Question** tab at http://support.wdc.com/email/.

To download updates to the product or a user's guide, please go to:

http://support.wdc.com/downloads/retail-drive-kit/.

Chapter 2. Acronis True Image WD Edition installation and startup

2.1 Installing Acronis True Image WD Edition

To install Acronis True Image WD Edition:

- Run the Acronis True Image WD Edition setup file.
- In the Install Menu, select the program to install: Acronis True Image WD Edition.
- Follow the install wizard instructions on the screen.

Typical, **Custom** and **Complete** installation is available. Having pressed **Custom**, you can choose to install, besides Acronis True Image WD Edition, **Bootable Media Builder**.

With **Bootable Media Builder** you can create bootable rescue disks (see details in *Chapter 7. Creating bootable media*). You might not need this tool if you purchased a boxed product that contains a bootable CD. Installing the **Bootable Media Builder** will allow you to create bootable media or its ISO image at any time from the main program window or running **Bootable Media Builder** on its own.

When installed, Acronis True Image WD Edition creates a new device in the Device Manager list (**Control Panel -> System -> Hardware -> Device Manager -> Acronis Devices -> Acronis TrueImage Backup Archive Explorer**). Do not disable or uninstall this device, as it is necessary for connecting image archives as virtual disks (see *Chapter 9. Exploring archives and mounting images*).

2.2 Extracting Acronis True Image WD Edition

When installing Acronis True Image WD Edition, you can save the setup (.msi) file on a local or network drive. This will help when modifying or recovering the existing component installation.

To save the setup file:

- Run the Acronis True Image WD Edition setup file.
- In the Install Menu, right-click on the program name and select **Extract**.
- Select a location for the setup file and click **Save**.

2.3 Running Acronis True Image WD Edition

You can run Acronis True Image WD Edition in Windows by selecting **Start -> Programs -> Acronis -> Acronis True Image WD Edition -> Acronis True Image WD Edition** or clicking on the appropriate shortcut on the desktop.

If your disk data is totally corrupted and the operating system cannot boot, load the standalone Acronis True Image WD Edition version from the bootable media, supplied with the retail box or created by you using Bootable Media Builder. This boot disk will allow you to restore your disk from a previously created image.

2.4 Upgrading and updating Acronis True Image WD Edition

If you already have Acronis True Image WD Edition installed, the new version will simply update it; there is no need to remove the old version and reinstall the software.

Please keep in mind that the backups created by the later program version may be incompatible with the previous program versions, so if you roll back Acronis True Image WD Edition to an older version, you likely will have to re-create the archives using the older version. We strongly recommend that you create new bootable media after each Acronis True Image WD Edition upgrade.

Also you can upgrade Acronis True Image WD Edition to Acronis True Image Home 2009 from the Acronis web site.

The following features will be available only after upgrading to Acronis True Image Home 2009:

- Acronis Try&Decide
- Application backup
- Data backup (selected files/folders)
- Scheduling
- Archive protection
- Cleanup utilities
- Disk utilities
- Consolidating backups
- Incremental and differential backups
- Notifications.

2.5 Removing Acronis True Image WD Edition

Select **Start -> Settings -> Control panel -> Add or remove programs -> <Acronis True Image WD Edition> -> Remove**. Then follow instructions on the screen. You may have to reboot your computer afterwards to complete the task.

If you use Windows Vista, select **Start -> Control panel -> Programs and Features -> <Acronis True Image WD Edition> -> Remove**. Then follow instructions on the screen. You may have to reboot your computer afterwards to complete the task.

Chapter 3. General information and proprietary Acronis technologies

3.1 What is a disk/partition image?

Backing up disks and partitions is performed in the following way: Acronis True Image WD Edition stores a sector-by-sector snapshot of the disk, which includes the operating system, registry, drivers, software applications and data files, as well as system areas hidden from the user. This procedure is called "creating a disk image," and the resulting backup archive is often called a disk/partition image.

By default, Acronis True Image WD Edition stores only those hard disk parts that contain data (for supported file systems). Further, it does not back up swap file information (pagefile.sys under Windows NT/2000/XP/Vista) and hiberfil.sys (a file that keeps RAM contents when the computer goes into hibernation). This reduces image size and speeds up image creation and restoration. However, you might use the **Create an image using the sector-by-sector approach** option that lets you include all of the sectors of a hard disk in an image.

A partition image includes all files and folders. This includes all attributes (including hidden and system files), boot record, and FAT (file allocation table); as well as files in the root directory and the zero track of the hard disk with master boot record (MBR).

A disk image includes images of all disk partitions as well as the zero track with master boot record (MBR).

By default, files in all Acronis True Image WD Edition archives have a ".tib" extension. Do not change this file extension.

It is important to note that you can restore files and folders from disk/partition images too. To do so, mount the image as a virtual disk (see *Chapter 9. Exploring archives and mounting images*) or start the image restoration and select **Restore specified files or folders**.

3.2 Full backups

Acronis True Image WD Edition can create full backups.

3.3 Viewing disk and partition information

You can change the way data is represented in all schemes you see in various wizards.

To the right are three icons: **Arrange Icons by, Choose Details** and **i (Display the properties of the selected item)**, the last duplicated in the context menu opened by right-clicking objects.

To sort messages by a particular column, click the header (another click will switch the messages to the opposite order) or **Arrange Icons by** button and select the column.

To select columns to view, right-click the headers line or left-click the **Choose Columns** button. Then flag the columns you want to display. When left-clicking the **Choose Columns** button, you can also change the order of columns display using **Move Up** and **Move Down** buttons.

If you click the **i (Display the properties of the selected item)** button, you will see the selected partition or disk properties window.

This window contains two panels. The left panel contains the properties tree and the right describes the selected property in detail. The disk information includes its physical parameters (connection type, device type, size, etc.); partition information includes both physical (sectors, location, etc.), and logical (file system, free space, assigned letter, etc.) parameters.

You can change the width of a column by dragging its borders with the mouse.

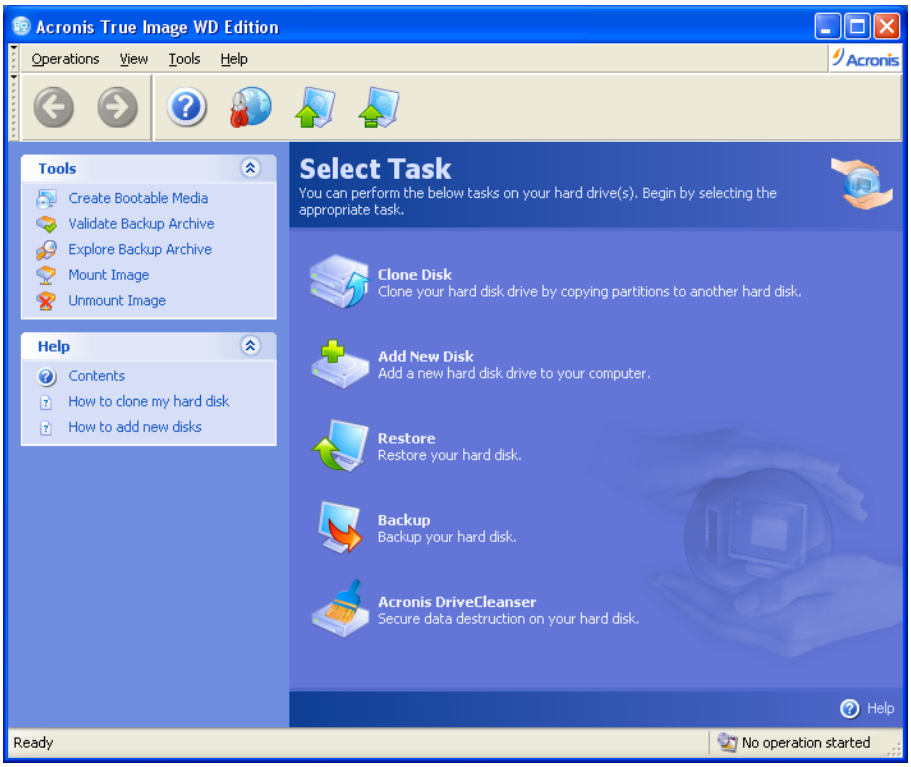
3.4 Drive Cleanser®

Acronis True Image WD Edition contains utilities for secure destruction of data on an entire hard disk drive, individual partitions, as well as for erasing individual files and eliminating user system activity traces. When replacing your old hard drive with a new, higher-capacity one, you may unwittingly leave on the old disk lots of important and confidential information that can be recovered, even if you have reformatted it. The DriveCleanser application, included in Acronis True Image WD Edition, used to be sold as a standalone product from Acronis. It provides for the destruction of confidential information on hard disk drives and/or partitions with the help of techniques that meet or exceed most national and state standards. You can select an appropriate data destruction method depending on the importance of your confidential information.

Chapter 4. Using Acronis True Image WD Edition

4.1 Program workspace

The main program window contains a menu, toolbar, a browser-like toolbar, a main area and a status bar. The main area contains the Category icons.



The Category icons are as follows.

- **Clone Disk** – Clone your hard disk drives by copying partitions to a Western Digital hard disk.
- **Add New Disk** – Add a new hard disk drive to your computer.
- **Restore** – Restore data from a previously created archive.
- **Backup** – Backup your hard disk.
- **Acronis DriveCleanser** – Secure data destruction on your hard disk.

Program menu

The program menu bar features the **Operations, View, Tools**, and **Help** items.

The **Tools** menu contains a list of the available operations:

- **Backup** – Backup the desired data.
- **Recovery** – Restore the desired data.
- **Validate backup archive** – Validate a backup archive of your choice.
- **Explore backup archive** – Explore a backup archive of your choice.
- **Mount image** – Create a virtual disk by mounting an image archive.

- **Unmount image** – Unmount the image you mounted.
- **Exit** – Exit Acronis True Image WD Edition.

The **View** menu contains items for managing the program window look:

- **Toolbars** – Contains commands that control toolbar icons size, enable/disable the Navigation and Help toolbars, as well as enable/disable text labels of the toolbar icons.
- **Status Bar** – Enables/disables the status bar

The **Operations** menu contains the following items:

- **Create Bootable Media** – Run the bootable media creation procedure
- **Management -> Manage Backup locations and Archives** – Create, edit, delete, and explore backup locations; search files in backup locations for restoration
- **Management -> Manage Tasks** – Create, edit, delete tasks manually
- **Clone Disk** – Transfer the system to a new hard disk
- **Add New Disk** – Create partitions on an additional hard disk installed in the computer
- **Acronis DriveCleanser** – Securely wipe personal data from a hard disk drive
- **Show Log** – Open the Log Viewer window
- **Options** – Open a window for editing default backup/restore options, setting text appearance (fonts), and other capabilities

The **Help** menu is used to display help and obtain information about Acronis True Image WD Edition.

Toolbar

The toolbar contains the following buttons:

- **Back** and **Forward** – for easier navigating
- **Help** – opens a Help page with information concerning Acronis True Image WD Edition
- **Support** – directs to the Technical support web page
- **Download a newer version** – allows updating the program to a newer version
- **Buy a full version** - upgrade Acronis True Image WD Edition to Acronis True Image Home 2009

Status bar

At the bottom of the main window, there is a status bar that is divided into two parts. The left side briefly describes the selected operation; the right side indicates operation progress and results. If you double-click on the operation results, you will see the logs window.

Taskbar notification area icon

During most of the operations, a special indicator icon appears in the Windows taskbar notification area (the right portion of the status bar with the clock). If you mouse over the icon, you will see a tool tip indicating the operation's progress. Right-clicking on the icon invokes a context menu where you can change process priority or cancel the operation if necessary. This icon doesn't depend on the main program window being open.

You can change the appearance of text (fonts and their size) in the program's user interface and menu items. To do so, select **Tools** -> **Options** -> **Appearance** -> **Fonts**. Click the  button to preview the results of text appearance changes.

4.2 Available operations

You can perform the following operations on the computer.

- **Back up data, including system disks/partitions**

Select **Operations -> Backup** category in the main window, select **Backup** in the **Backup and Restore** window, then follow the wizard's instructions. See details in *Chapter 5. Creating backup archives.*

- **Restore data, including system disks/partitions**

Select **Operations -> Recovery** category in the main window, select **Restore** in the **Backup and Restore** window, then follow the wizard's instructions. See details in *Chapter 6. Restoring the backup data.*

- **Browse logs of Acronis True Image WD Edition operation**

Select **Tools -> Show Log** or select **Show Log** on the sidebar to navigate to the Event Log window. See details in *8.2 Viewing logs*.

- **Set up backup/restore options, such as backup process priority or files overwriting mode**

Select **Tools -> Options** -> **Default backup options** or **Default restoration options** and make settings. See details in *5.2 Setting backup options* and *6.3 Setting restore options.*

- **Validate backup archives wherever they reside, be it on a local or network drive, or on removable media**

Select **Operations -> Validate Backup Archive** and follow the wizard's instructions. See details in *8.1 Validating backup archives*. You can also launch the wizard from Windows Explorer by right-clicking the archive and selecting **Validate Backup Archive** in the context menu.

- **Explore any archive's contents and restore individual files from any archive**

Select **Operations -> Explore Backup Archive** and then select an archive for exploring on the directory tree in the left pane. You can also explore archives by right-clicking the archive and selecting **Explore** in the context menu of Windows Explorer.

- **Mount partitions' images to explore and modify their contents, or to restore individual files**

Select **Operations -> Mount Image** and follow the wizard's instructions. See details in *9.1 Mounting an image*. Images can also be mounted through the Windows Explorer by right-clicking on an image archive and selecting **Mount** in the context menu.

- **Unmount previously mounted partition images**

Select **Operations -> Unmount Image** and follow the wizard's instructions. See details in *9.2 Unmounting an image*. You can also do this in Windows Explorer by right-clicking on the virtual disk icon and selecting **Unmount**.

- **Transfer the system to a new hard disk**

Select **Tools -> Clone Disk** or select **Disk Utilities** category in the main window and click **Clone Disk** in the **Hard Disk Utilities** group, then follow the wizard's instructions. See *Chapter 10. Transferring the system to a new disk*.

- **Format partitions on a new hard disk**

Select **Tools -> Add New Disk** or select **Disk Utilities** category in the main window and click **Add New Disk** in the **Hard Disk Utilities** group, then follow the wizard's instructions. See *Chapter 11. Adding a new hard disk*.

- **Securely destroy personal information on partitions and disks**

Select **Tools -> Acronis DriveCleanser** category in the main window and click **Acronis DriveCleanser**, then follow the wizard's instructions. See *Chapter 12. Security and Privacy Tool.*

- **Create bootable media or its ISO image**

Select **Tools -> Create Bootable Media** and then follow the wizard's instructions. See *Chapter 7. Creating bootable media*.

Chapter 5. Creating backup archives

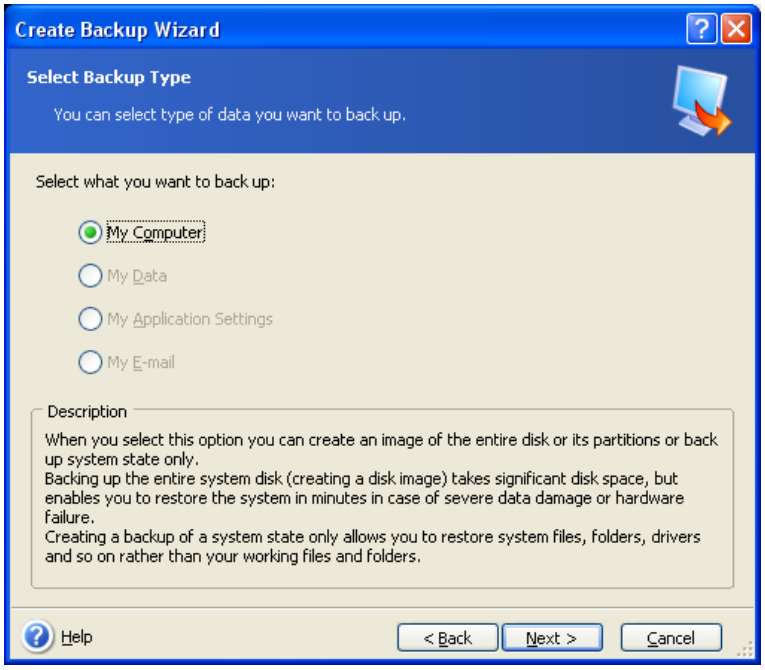
To be able to restore lost data or roll back your system to a certain known-good state, you should first create an entire system backup file.

5.1 The backup procedure

5.1.1 My Computer backup

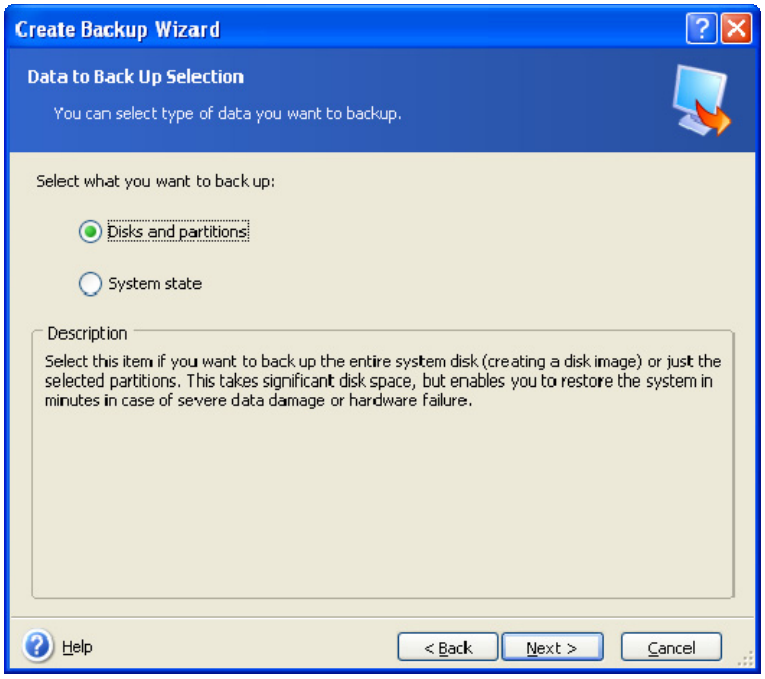
Create a backup image of any set of your computer's hard disks and partitions or back up the system state.

1. Invoke the **Create Backup Wizard** by selecting **Operations -> Backup** in the main program menu, and then select **My computer.**

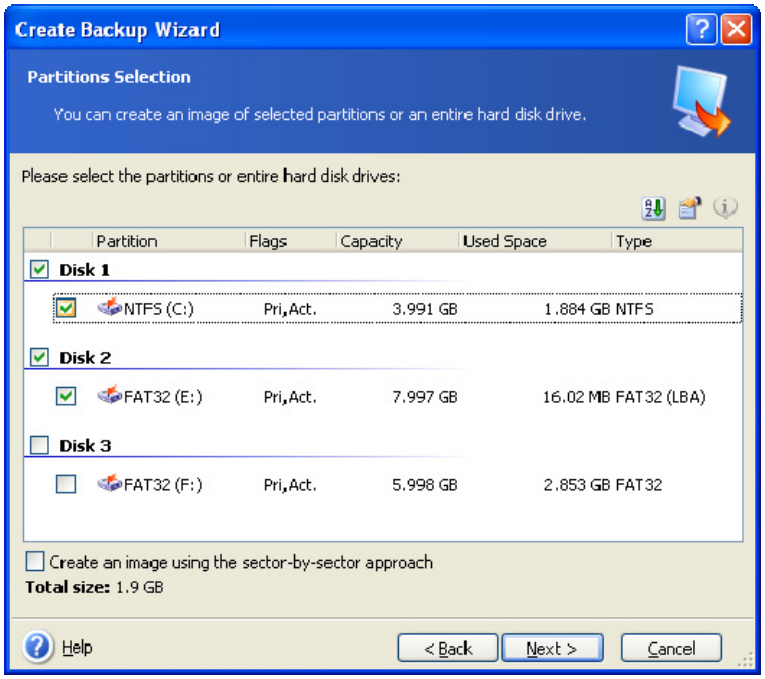


You can also launch the wizard directly from the Windows Explorer window. To do so, right-click on a disk icon and select **Backup** in the context menu. In this case the program will automatically set **My Computer** mode.

2. Select the data to backup in the next window. You can backup either disks and partitions or the system state that comprises the boot files, registry, protected Windows files, and COM+ CLASS registration database. Backing up the **System state** allows you to restore the system files, drivers, etc., but not the data files and folders you use in your work. To be able to restore the data files and folders, select the **Disks and partitions**. If such is the case, select disks or partitions to back up. You can select a random set of disks and partitions.



By default the program copies only the hard disk sectors that contain data. However, sometimes it might be useful to make a full sector-by-sector backup. For example, perhaps you deleted some files by mistake and want to make a disk image before trying to undelete them because sometimes un-deleting may create havoc in the file system. To make a sector-by-sector backup, check the **Create an image using the sector-by-sector approach** box. Please note that this mode increases processing time and usually results in a larger image file because it copies used and unused hard disk sectors.

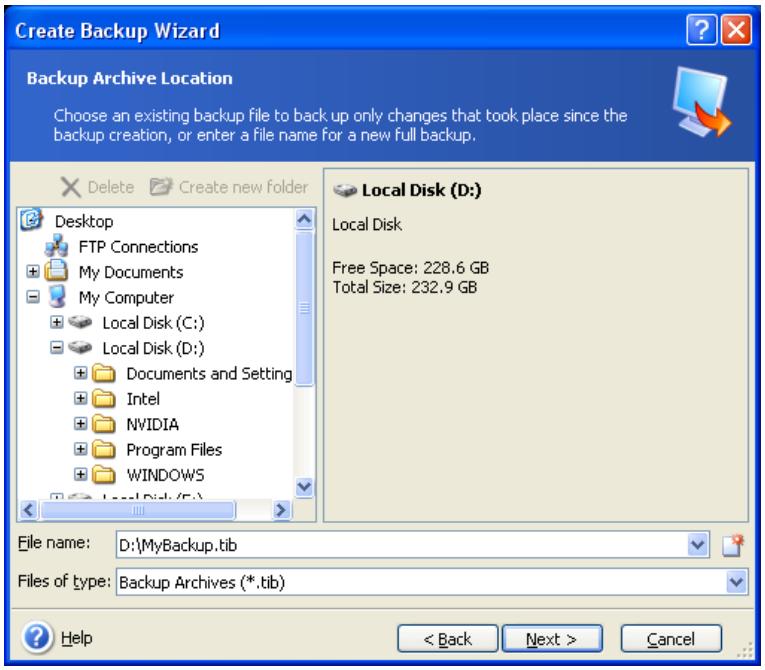


3. Go to *5.1.2 Selecting the backup destination.*

5.1.2 Selecting the backup destination

Select the destination location for the backup. Specify the archive name.

If you are going to create a new archive (i.e. perform a full backup), enter the new file name in the **Folder** line, or use the file name generator (a button to the right of the line). If you select an existing full backup file, it will be overwritten through a prompt. Overwriting a full backup means that you will discard the entire old archive and create a new one.



The "farther" you store the archive from the original folders, the safer it will be in case of disaster. For example, saving the archive to another hard disk will protect your data if the primary disk is damaged. Data saved to a network disk, FTP server or removable media will survive even if all your local hard disks are damaged.

See notes and recommendations for supporting FTP server in *1.3.4 Supported storage media*.

5.1.3 Selecting the backup options

Select the backup options (that is, backup file-splitting, compression level, password protection, etc.). You can **Use default options** or **Set the options manually**. If the latter is the case, the settings will be applied only to the current backup task. Or, you can edit the default options from the current screen. Then your settings will be saved as the defaults. See *5.2 Setting backup options* for more information.

5.1.4 Providing a comment

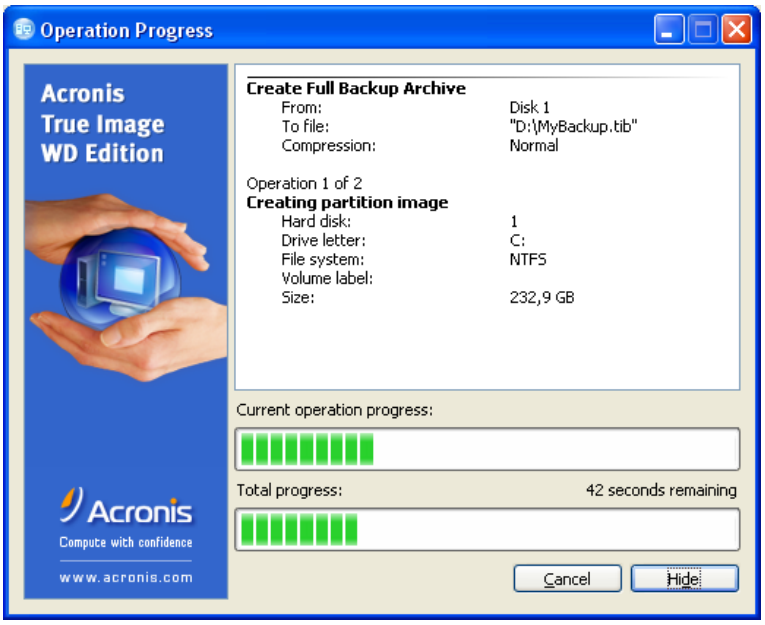
Provide a comment for the archive. This can help identify the backup and prevent you from restoring the wrong data. However, you can choose not to make any notes. The backup file size and creation date are automatically appended to the description, so you do not need to enter this information.

5.1.5 The operation summary and the backup process

At the final step, the backup task summary is displayed. Up to this point, you can click **Back** to make changes in the created task. Clicking **Proceed** will launch the task execution.

The task progress will be shown in a special window. You can stop the procedure by clicking **Cancel**.

You can also close the progress window by clicking **Hide**. The backup creation will continue, but you will be able to start another operation or close the main program window. In the latter case, the program will continue working in the background and will automatically close once the backup archive is ready. If you prepare some more backup operations, they will be queued after the current one.



You may want to adjust the backup process priority. To do so, click on the process icon in the System Tray and select Low, Normal, or High priority from the menu that appears. For information on how to set the default priority, see *5.2.2 Backup performance*

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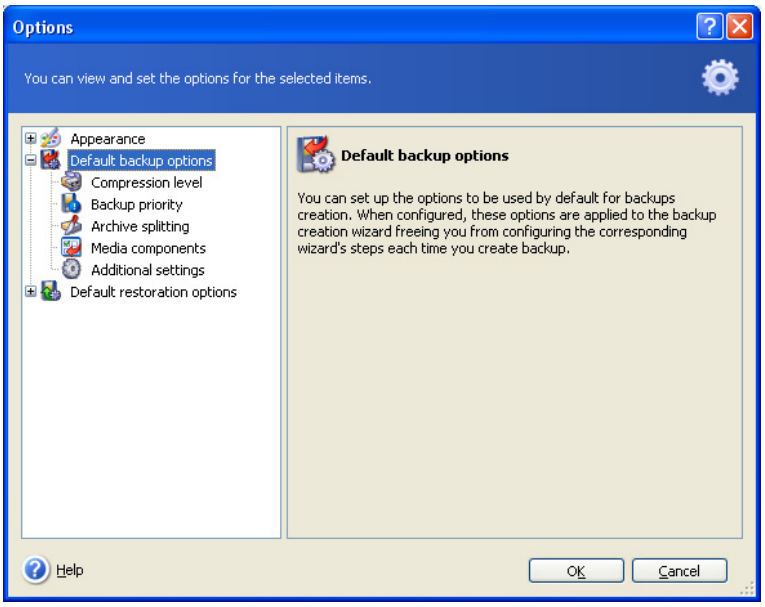
If you burn an archive to several removable media, be sure to number them, since you will have to insert them in order during restoration.

You might want to see the log when the task is completed. To view the log, select **Tools -> Show Log** in the main program menu.

5.2 Setting backup options

To view or edit the default backup options, select **Tools -> Options -> Default Backup Options** from the main program menu.

You can edit the default (or set the temporary) backup options while creating a backup task as well.



5.2.1 Compression level

The preset is **Normal**.

If you select **None**, the data will be copied without any compression, which may significantly increase the backup file size. However, if you select **Maximum** compression, the backup operation will take significantly longer.

The optimal data compression level depends on the type of files stored in the archive. For example, even maximum compression will not significantly reduce the archive size if the archive contains essentially compressed files like .jpg, .pdf or .mp3.

Generally, it is recommended that you use the default **Normal** compression level. You might want to select **Maximum** compression for removable media to reduce the number of blank disks required.

5.2.2 Backup performance

The three options below might have a more or less noticeable effect on the backup process speed. This depends on overall system configuration and physical characteristics of devices.

1. Backup process priority

The preset is **Low**.

The priority of any process running in a system determines the amount of CPU usage and system resources allocated to that process. Decreasing the backup priority will free more resources for other CPU tasks. Increasing the backup priority might speed up the backup process due to taking resources from the other currently running processes. The effect will depend on total CPU usage and other factors.

5.2.3 Archive splitting

Sizeable backups can be split into several files that together make the original backup. A backup file can be split for burning to removable media or saving on an FTP server (data recovery directly from an FTP server requires the archive to be split into files of no more than 2GB).

The preset is **Automatic**. With this setting, Acronis True Image WD Edition will act as follows.

When backing up to a hard disk: If the selected disk has enough space and its file system allows the estimated file size, the program will create a single archive file.

If the storage disk has enough space, but its file system does not allow the estimated file size, Acronis True Image WD Edition will automatically split the backup into several files.

FAT16 and FAT32 file systems have a 4GB file size limit, but a hard drive's capacity is limited to 2TB. Therefore, an archive file might easily exceed this limit, if you are going to back up the entire disk.

If you do not have enough space to store the image on your hard disk, the program will warn you and wait for your decision as to how you plan to fix the problem. You can try to free some additional space and continue or click **Back** and select another disk.

When backing up to a diskette, CD-R/RW or DVD±R/RW: Acronis True Image WD Edition will ask you to insert a new disk when the previous one is full.

Or, you can select **Fixed size** and enter the desired file size or select it from the drop-down list. The backup will then be split into multiple files of the specified size. That comes in handy when backing up to a hard disk with a view to burning the archive to CD-R/RW or DVD±R/RW later on.

Creating images directly on CD-R/RW or DVD±R/RW might take considerably more time than it would on a hard disk.

5.2.4 Media components

The preset is **disabled**.

When backing up to removable media, you can make this media bootable and will not need a separate bootable disk.

If you want more functionality during restoration, write a full standalone version of **Acronis True Image WD Edition** to the bootable media. As a result, you will be able to configure the restore task using Restore Data Wizard.

Under **Advanced** tab you can select Acronis True Image WD Edition (full version) and a standalone version of the Acronis DriveCleanser utility that will allow you to destroy confidential data on your PC disks easily and permanently even if you uninstall Acronis True Image WD Edition. If you have other Acronis products installed on your computer, such as Acronis Disk Director Suite, the bootable versions of these programs' components will be offered under **Advanced** tab as well.

5.2.5 Additional settings

1. Validate backup archive upon operation completion

The preset is **disabled**.

When enabled, the program will check integrity of the just created or supplemented archive immediately after backup. When setting up a backup of critical data or a disk/partition backup, we strongly recommend you to enable the option to ensure that the backup can be used to recover lost data.

2. Ask for first media while creating backup archives on removable media

The preset is **enabled**.

You can choose whether to display the **Insert First Media** prompt when backing up to removable media. With the default setting, backing up to removable media may be not possible if the user is away, because the program will wait for someone to press **OK** in the prompt box.

Chapter 6. Restoring the backup data

6.1 Restore under Windows or boot from CD?

As mentioned above (see *2.3 Running Acronis True Image* WD Edition), Acronis True Image WD Edition can be run in several ways. We recommend that you first try to restore data running Acronis True Image WD Edition under Windows, because this method provides more functionality. Boot from the bootable media only if Windows does not load.

The boot CD, from which you loaded the program, does not keep you from using other CDs with backups. Acronis True Image WD Edition is loaded entirely into RAM so you can remove the bootable CD to insert the archive disk.

Be careful! When you use the Acronis True Image WD Edition bootable disk, the product creates disk drive letters that might differ from the way Windows identifies drives. For example, the D: drive identified in the standalone Acronis True Image WD Edition might correspond to the E: drive in Windows. This is not an error with the software.

If a backup image is located on bootable media, you might have the choice of using Acronis One-Click Restore. This operation always restores the entire physical disk. Therefore, if your disk consists of several partitions, all of them must be included in the image. Any partitions missing from the image will be lost. Please make sure that the image contains *all* disk data you plan to restore. For more information on Acronis One-Click Restore, see *5.2.4 Media components*.

6.1.1 Network settings in rescue mode

When booted from removable media, Acronis True Image WD Edition might not detect the network. That can happen if there is no DHCP server in your network or your computer address was not identified automatically.

To enable the network connection, specify network settings manually in the window, available at **Tools -> Options -> Network adapters.**

6.2 Restoring disks/partitions or files from images

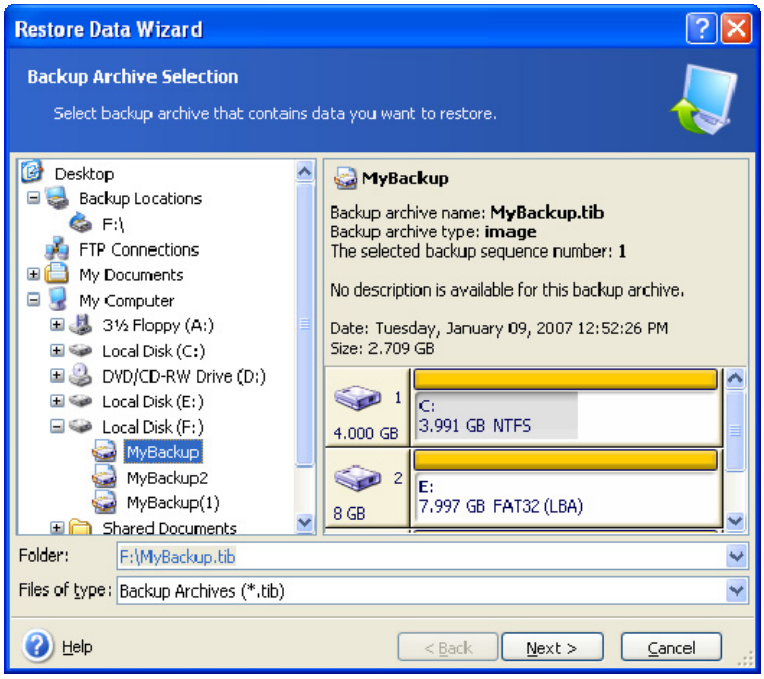
To restore a partition (disk) from an image, Acronis True Image WD Edition must obtain **exclusive access** to the target partition (disk). This means no other applications can access it at that time. If you receive a message stating that the partition (disk) cannot be locked, close applications that use this partition (disk) and start over. If you cannot determine which applications use the partition (disk), close them all.

6.2.1 Starting the Restore Data Wizard

Launch the **Restore Data Wizard** by selecting **Operations -> Recovery** in the main program menu.

6.2.2 Archive selection

1. Select the archive. If the archive is located in a backup location, select it to choose the archive at the next step.



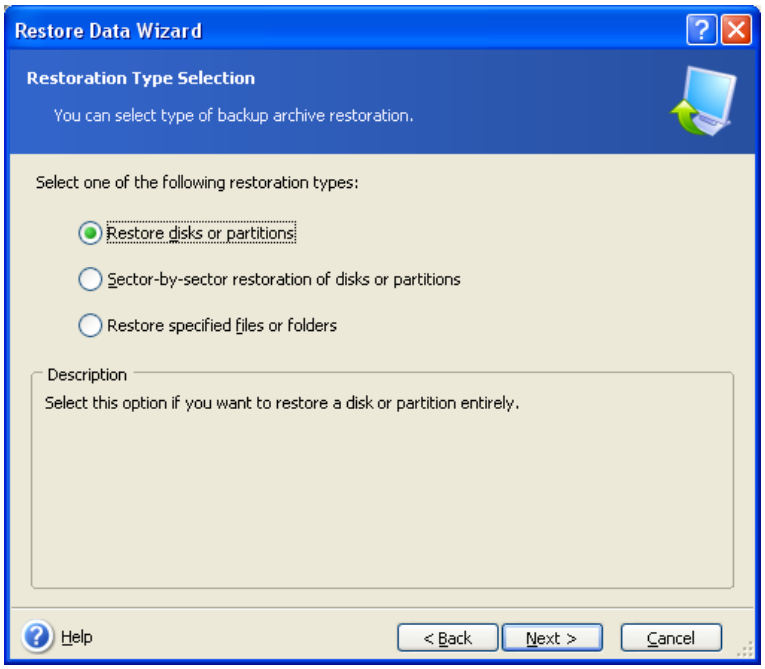
If the archive is located on removable media, e.g. CD, first insert the last CD and then insert disks in reverse order when the Restore Data Wizard prompts you.

Data recovery directly from an FTP server requires the archive to consist of files of no more than 2GB each. If you suspect that some of the files are larger, first copy the entire archive (along with the initial full backup) to a local hard disk or network share disk. See notes and recommendations for supporting FTP servers in *1.3.4 Supported storage media*.

If you added a comment to the archive, it will be displayed to the right of the drives tree. If the archive was protected with a password, Acronis True Image WD Edition will ask for it. The partitions layout, the comment and the **Next** button will be unavailable until you enter the correct password.

6.2.3 Restoration type selection

Select what you want to restore:



Restore disks or partitions

Having chosen a disks or partition recovery type, you will now select the settings described below.

Sector by sector restoration of disks or partitions

The program will restore both used and unused sectors of disks or partitions.

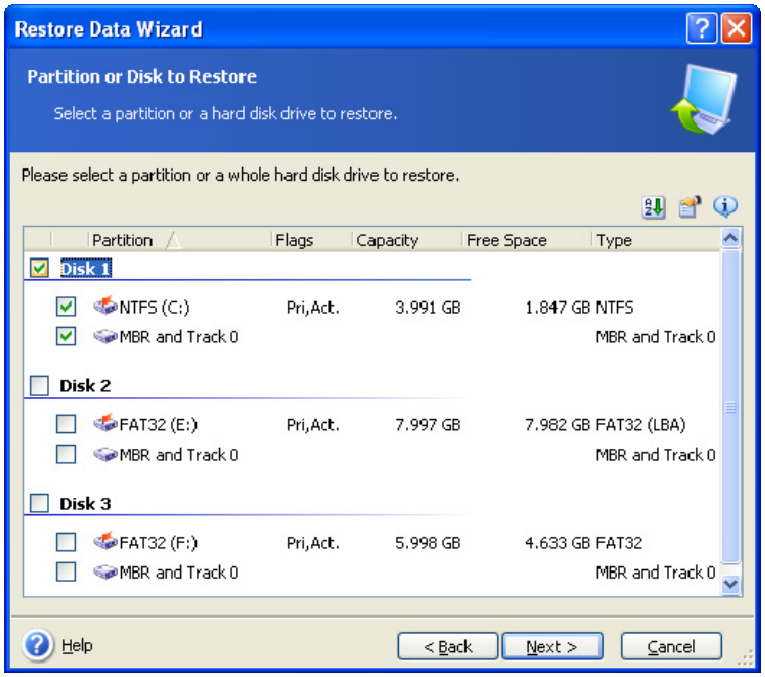
Restore specified files or folders

Finally, if you are not going to recover the system, but only want to repair damaged files, select **Restore specified files or folders**. With this selection, you will be further asked to select where to restore selected folders/files (original or new location), choose files/folders to be restored, and so on. These steps look like those in file archive restore. However, watch your selection: if you are to restore files instead of a disk/partition, uncheck the unnecessary folders. Otherwise you will restore a lot of excess files. Then you will be taken directly to Restoration Summary screen (*6.2.12 Restoration summary and executing restoration*).

You can restore files from disk/partition images only if they have the FAT or NTFS file systems.

6.2.4 Selecting a disk/partition to restore

The selected archive file can contain images of several partitions or even disks. Select which disk/partition to restore.



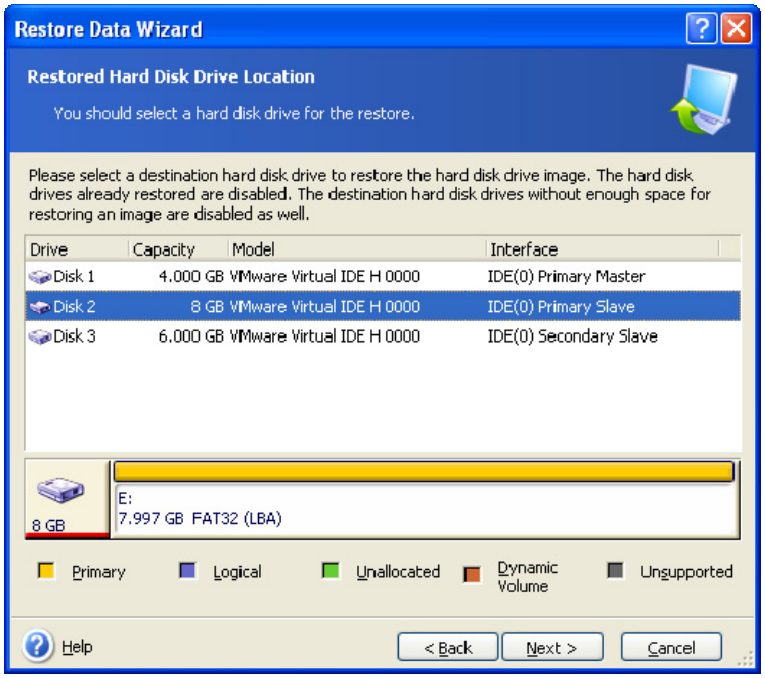
Disk and partition images contain a copy of track 0 along with MBR (master boot record). It appears in this window in a separate line. You can choose whether to restore MBR and track 0 by checking the respective box. Restore MBR if it is critical to your system boot.

6.2.5 Selecting a target disk/partition

1. Select a target disk or partition where you want to restore the selected image. You can restore data only to Western Digital HDD. The target partition should be at least the same size as the uncompressed image data.

All the data stored on the target partition will be replaced by the image data, so be careful and watch for non-backed-up data that you might need.

2. When restoring an entire disk, the program will analyze the target disk structure to see whether the disk is free.



If there are partitions on the target disk, you will be prompted by the **Nonempty Destination Hard Disk Drive** window stating that the destination disk contains partitions, perhaps with data.

You will have to select between:

- **Yes, I want to delete all the partitions on the destination hard disk before restoring –** all existing partitions will be deleted and all their data will be lost.
- **No, I do not want to delete partitions** – no existing partition will be deleted, discontinuing the recovery operation. You will then have to cancel the operation or return to select another disk.

Note that no real changes or data destruction will be performed at this time! For now, the program will just map out the procedure. All changes will be implemented only when you click **Proceed** in the wizard's final window.

To continue, select the first choice and click **Next**. You will be taken directly to step *6.2.10 Restoring several disks or partitions at once*.

6.2.6 Changing the restored partition type

When restoring a partition, you can change its type, though it is not required in most cases.

To illustrate why you might need to do this, let's imagine that both the operating system and data were stored on the same primary partition on a damaged disk.

If you are restoring a system partition to the new (or the same) disk and want to load the operating system from it, you will select **Active**.

Acronis True Image WD Edition automatically corrects boot information during restore of the system partition to make it bootable even if it was restored to other than original partition (or disk).

If you restore a system partition to another hard disk with its own partitions and OS, most likely you will need only the data. In this case, you can restore the partition as **Logical** to access the data only.

By default, the original partition type is selected.

Selecting **Active** for a partition without an installed operating system could prevent your computer from booting.

6.2.7 Changing the restored partition file system

Though seldom required, you can change the partition file system during its restoration. Acronis True Image WD Edition can make the following file system conversions: **FAT 16 -> FAT 32, Ext2 -> Ext3**. For partitions with other native file systems this option is not available.

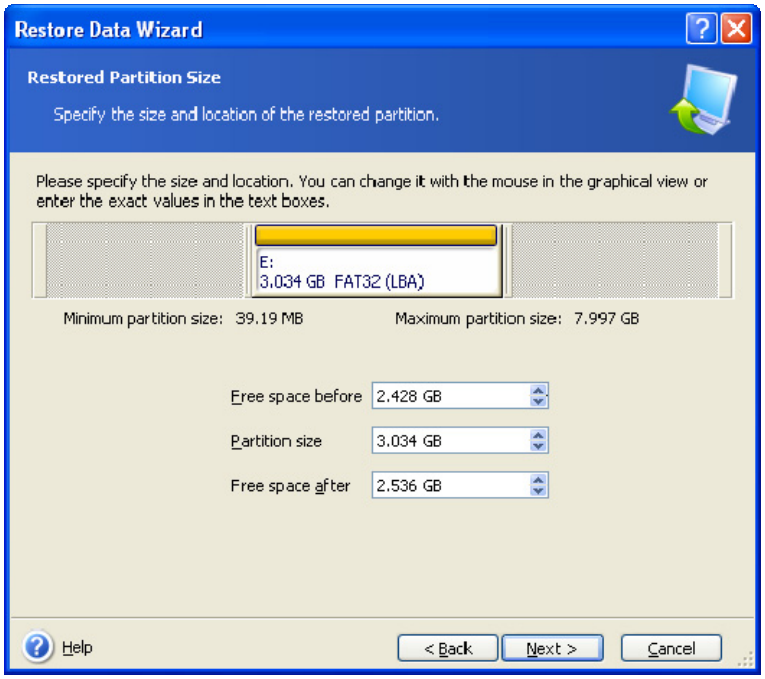
Let's say you want to restore a partition from an old, low-capacity FAT16 disk to a newer disk. FAT16 would not be effective and might not even be available for the high-capacity hard disk. That's because FAT16 supports partitions up to 4GB, so you will not be able to restore a 4GB FAT16 partition to a partition that exceeds that limit without changing the file system. It would make sense here to change the file system from FAT16 to FAT32.

However, keep in mind that not all operating systems support FAT32. MS-DOS, Windows 95 and Windows NT 3.x, 4.x do not support it and will not be operable after you restore a partition and change its file system. These can be normally restored on a FAT16 partition only.

6.2.8 Changing the restored partition size and location

You can resize and relocate a partition by dragging it or its borders with a mouse on the horizontal bar on the screen or by entering corresponding values into the appropriate fields.

Using this feature, you can redistribute the disk space among partitions being restored. In this case, you will have to restore the partition to be reduced first.



These changes might be useful if you are to copy your hard disk to a new high-capacity one by creating its image and restoring it to a new disk with larger partitions.

6.2.9 Assigning a letter to the restored partition

Acronis True Image WD Edition will assign an unused letter to a restored partition. You can select the desired letter from a drop-down list. If you set the switch to **No**, no letters will be assigned to the restored partition, hiding it from OS.

You should not assign letters to partitions inaccessible to Windows, such as to those other than FAT and NTFS.

6.2.10 Restoring several disks or partitions at once

During a single session, you can restore several partitions or disks, one by one, by selecting one disk and setting its parameters first and then repeating these actions for every partition or disk to be restored.

If you want to restore another disk (partition), select **Yes, I want to restore another partition or hard disk drive**. Then you will return to the partition selection window (6.3.4) and will have to repeat the above steps. Otherwise, don't set this switch.

6.2.11 Setting restore options

Select the options for the restoration process (that is, restoration process priority, etc.). You can **Use default options** or **Set the options manually**. If the latter is the case, the settings will be applied only to the current restore task. Or, you can edit the default options from the current screen. Then your settings will be saved as defaults. See *6.3 Setting restore options* for more information.

6.2.12 Restoration summary and executing restoration

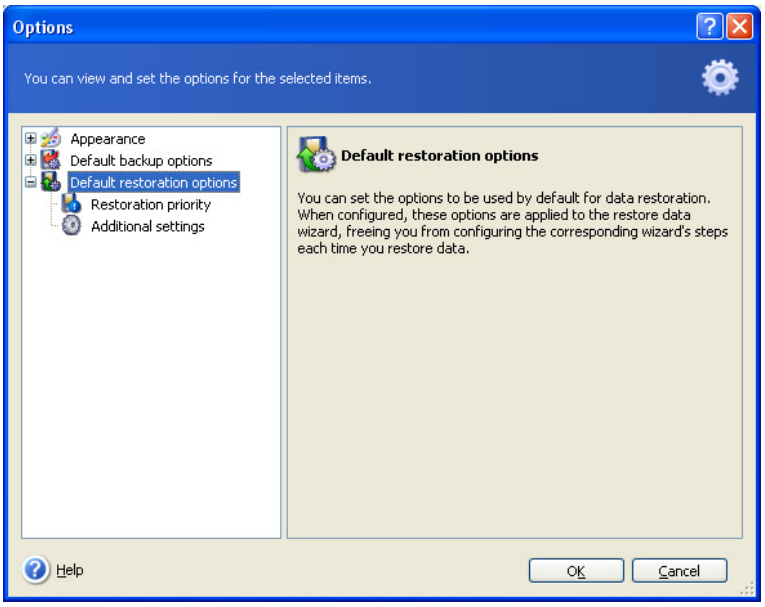
At the final step, the restoration summary is displayed. Up to this point, you can click **Back** to make changes in the created task. If you click **Cancel**, no changes will be made to disk(s). Clicking **Proceed** will launch the task execution.

The task progress will be shown in a special window. You can stop the procedure by clicking **Cancel**. However, it is critical to note that the target partition will be deleted and its space unallocated – the same result you will get if the restoration is unsuccessful. To recover the "lost" partition, you will have to restore it from the image again.

6.3 Setting restore options

To view or edit the default restore options, select **Tools -> Options -> Default Restoration Options** from the main program menu.

You can edit the default (or set the temporary) restore options while creating a restore task as well.



6.3.1 Restoration priority

The preset is **Low**.

The priority of any process running in a system determines the amount of CPU usage and system resources allocated to that process. Decreasing the restoration priority will free more resources for other CPU tasks. Raising restoration priority may speed up the restore process as it takes resources from other currently running processes. The effect will depend on total CPU usage and other factors.

6.3.2 Additional settings

1. You can choose whether to restore file date and time from the archive or assign the files the current date and time. By default the current date and time will be assigned.

2. Before data is restored from the archive, Acronis True Image WD Edition can check its integrity. If you suspect that the archive might have been corrupted, select **Validate backup archive before restoration**.

3. Having restored a disk/partition from an image, Acronis True Image WD Edition can check the integrity of the file system. To do so, select **Check file system after restoration**.

Verification of the file system is available only when restoring disk/partitions using FAT16/32 and NTFS file systems.

Chapter 7. Creating bootable media

You can run Acronis True Image WD Edition from an emergency boot disk on a bare-metal system or a crashed computer that cannot boot. You can even back up disks on a non-Windows computer, copying all its data into the backup archive by imaging the disk one sector at a time. To do so, you will need bootable media that has a copy of the standalone Acronis True Image WD Edition version installed on it.

If you purchased the boxed product, you already have a bootable CD, because the installation CD itself is bootable in addition to serving as the program installation disk.

If you purchased Acronis True Image WD Edition on the Web or as a download from a retailer, you can create bootable media using the Bootable Media Builder. For this, you will need a CD-R/RW blank, DVD±R/RW blank, several formatted diskettes (the wizard will tell you the exact number), or any other media from which your computer can boot, such as a Zip drive.

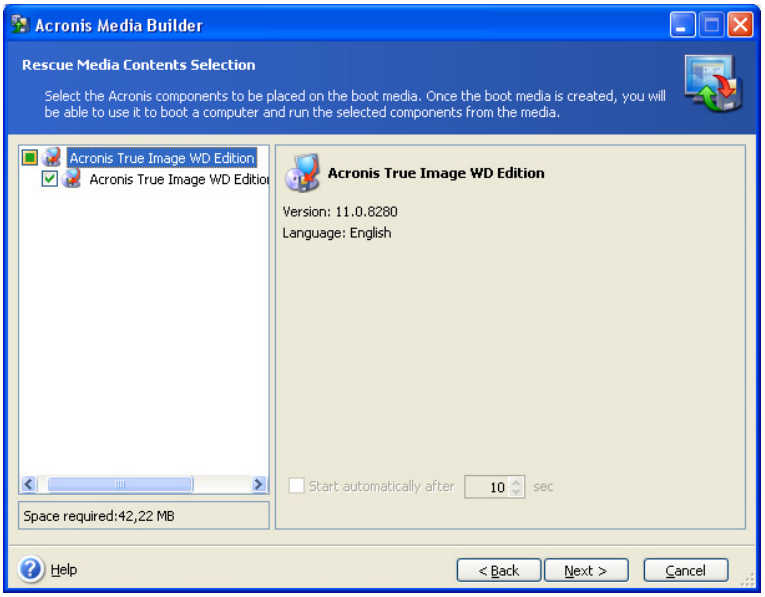
Acronis True Image WD Edition also provides the ability to create an ISO image of a bootable disk on the hard disk.

If you have other Acronis products installed on your computer, such as Acronis Disk Director Suite, you can include standalone versions of these programs on the same bootable disk as well.

If you have chosen not to install the Bootable Media Builder during Acronis True Image WD Edition installation, you will not be able to use this feature.

1. Click **Create Bootable Media** on the sidebar, or select **Create Bootable Media** from the **Tools** menu. You can also run the Bootable Rescue Media Builder without loading Acronis True Image WD Edition by selecting **Programs -> Acronis -> Acronis True Image WD Edition -> Bootable Media Builder** from the **Start menu**.

2. Select which components of Acronis programs you want to place on the bootable media.



Acronis True Image WD Edition offers the following components:

- **Acronis True Image WD Edition full version**

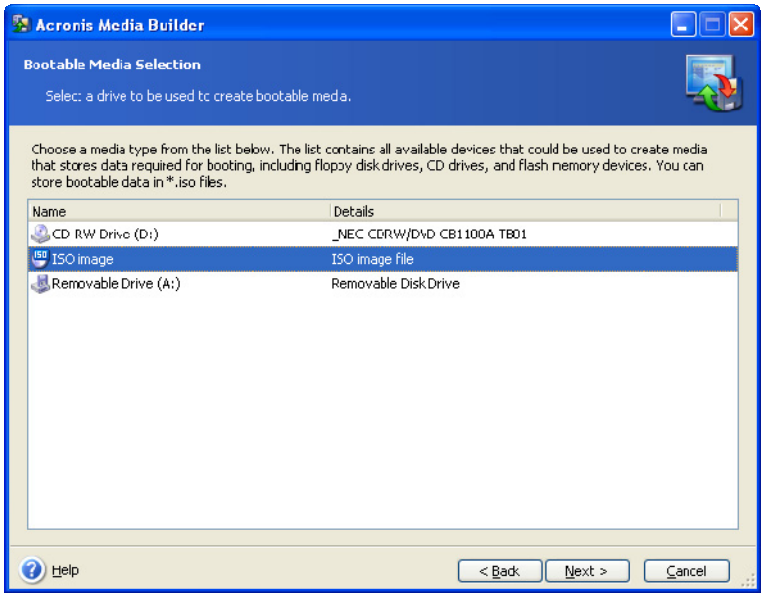
Includes support of USB, PC Card (formerly PCMCIA) and SCSI interfaces along with the storage devices connected via them, and therefore is strongly recommended.

In the next window you can set Bootable Media Startup Parameters in order to configure bootable media boot options for better compatibility with different hardware. Several options are available (nousb, nomouse, noapic, etc.). All the available startup parameters are listed in *Appendix C. Startup Parameters*. These parameters are provided for advanced users. If you encounter any hardware compatibility problem while testing boot from the bootable media, it may be the best to contact Acronis Technical Support.

By the way, you can also download an Acronis True Image WD Edition plug-in for the well-known **Bart PE** utility that is used for booting into a Windows-like environment from CD. Applications are installed into Bart PE in the form of plug-ins. Downloading the plug-in provides ability to include Acronis True Image WD Edition into a Bart PE plug-in tab.

3. Select the type of bootable media (CD-R/RW, DVD±R/RW or 3.5" diskettes) to create. If your BIOS has this feature, you can create other bootable media such as removable USB flash drives. You can also choose to create a bootable disk ISO image.

When using 3.5" diskettes, you will be able to write on a diskette (or a set of diskettes) only one component at a time (for example, Acronis True Image WD Edition). To write another component, start Bootable Media Builder again.



4. If you are creating a CD, DVD or any removable media, insert a blank disk so the program can determine its capacity. If you choose to create a bootable disk ISO image, specify the ISO file name and the folder in which to place it.

5. Next, the program will estimate how many blank disks are required (in case you have not chosen ISO or CD) and give you time to prepare them. When you are finished, click **Proceed**.

After you create a boot disk, mark it and keep it in a safe place.

Please keep in mind that the backups created by the later program version may be incompatible with the previous program versions. Due to this reason, we strongly recommend that you create a new bootable media after each Acronis True Image WD Edition upgrade.

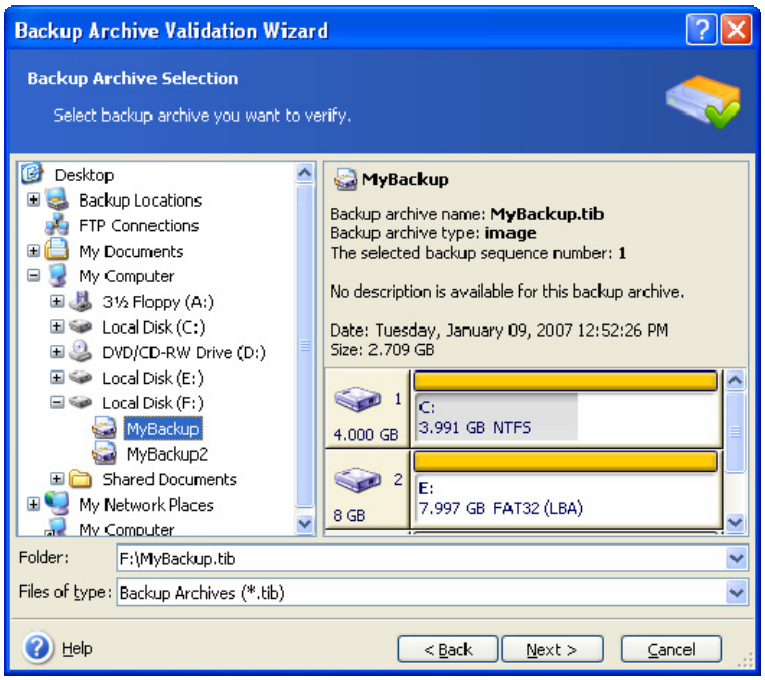
Chapter 8. Other operations

8.1 Validating backup archives

You can check the integrity of your backup images to be certain that your archives are not damaged. You may perform such validations by launching the **Backup Archive Validation Wizard**.

1. To launch the **Backup Archive Validation Wizard**, select **Operations -> Validate Backup Archive** from the main program menu.

2. Select the archive to validate. Backup locations can be selected only as a whole because all their contents are viewed by the program as a single archive. You can validate individual archives in backup locations using Windows Explorer. To do so, open a backup location as a common folder, then select the archive to validate, right-click the archive and select **Validate Backup Archive** in the context menu. The **Backup Archive Validation Wizard** will be launched with this archive selected. Click **Next** to continue.



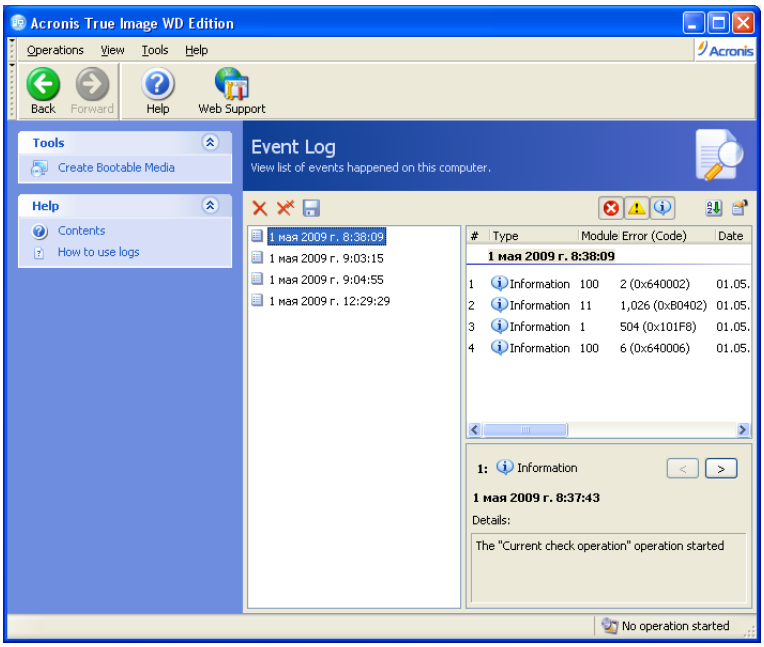
3. Clicking **Proceed** in the summary window will launch the validation procedure. After the validation is complete, you will see the results window. You can cancel validation by clicking **Cancel**.

8.2 Viewing logs

Acronis True Image WD Edition allows you to view its working logs. They can provide information about backup task results, including reasons for failure, if any.

To open the log window, select **Show Log** from the **Tools** menu or click **Show Log** on the sidebar.

The log browsing window contains two panes: the left one features the log list, while the right one shows selected log contents.



The left pane can contain up to 50 log entries. If there are more, you can browse the list using the buttons with the left and right arrows.

To delete a log entry, select it and click the **Delete** icon. To delete all log entries click the **Delete all log entries** icon. You can also save a log entry to file by clicking the appropriate icon.

If any step was terminated by an error, the corresponding log will be marked with a red circle with a white cross inside.

The right window features the list of steps contained in the selected log. The three buttons to the right control message filters: the white cross in the red circle filters error messages, the exclamation sign in a yellow triangle filters warnings, and the "i" in the blue circle filters information messages.

To select columns (step parameters) to display, right-click the headers line or left-click the **Choose Columns** button. Then check the desired parameters.

To sort messages by a particular parameter, click its header (click again to reverse order) or the **Arrange Icons by** button (the second from the right) and select the desired parameter.

You can also change column width by dragging the borders with a mouse.

Chapter 9. Exploring archives and mounting images

Acronis True Image WD Edition offers two kinds of archive contents management: mounting for images and exploring for both images and file-level archives.

Exploring images and file-level archives lets you view their contents and copy the selected files to the hard disk.

Mounting images as virtual drives lets you access them as though they were physical drives. This means that:

- a new disk with its own letter will appear in the drives list
- using Windows Explorer and other file managers, you can view the image contents as if they were located on a physical disk or partition
- you will be able to use the virtual disk in the same way as the real one: open, save, copy, move, create, delete files or folders. If necessary, the image can be mounted in read-only mode

The operations described in this Chapter are supported only for the FAT and NTFS file systems.

Please keep in mind that, though both file archives and disk/partition images have a default ".tib" extension, only **images** can be mounted. If you want to view file archive contents, use the Explore operation. Images residing in backup locations cannot be mounted if the Mount Image Wizard is launched from the main menu. However, such images can be mounted through the Windows Explorer by right-clicking on an image archive and selecting the **Mount** item in the context menu. The following is a brief summary of the Explore vs Mount operation:

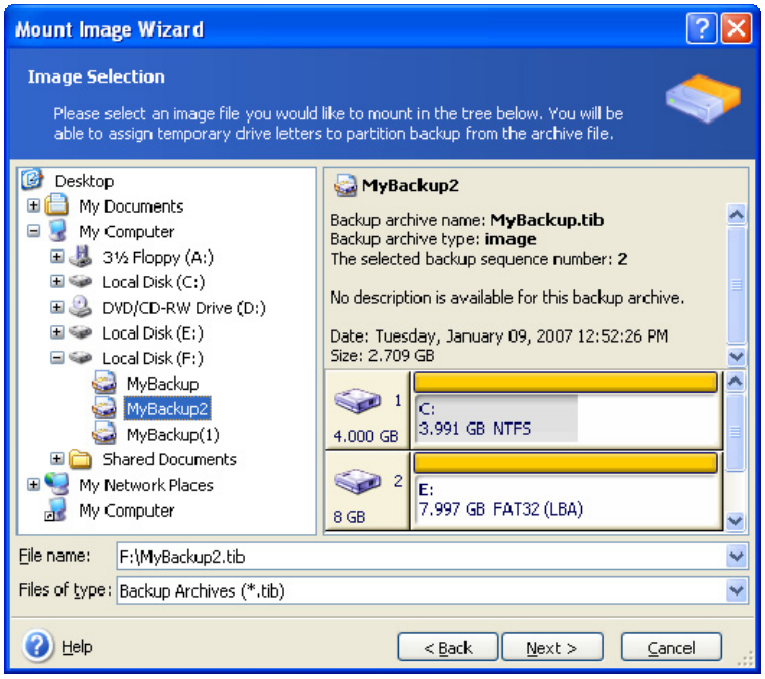
	Explore	**Mount**
Archive type	File-level, disk or partition image	Partition image
Assigning a letter	No	Yes
Archive modification	No	Yes (in R/W mode)
Files extraction	Yes	Yes

The current version of Acronis True Image WD Edition can mount or explore an image archive only if all its volumes reside in the same directory. If your archive spans several CD-R/RW discs and you wish to mount the image, you should copy all volumes to a hard disk drive or network drive.

9.1 Mounting an image

1. Launch the **Mount Image Wizard** by selecting **Operations -> Mount Image** in the main program menu or by right-clicking on an image archive and selecting **Mount** in the Windows Explorer's context menu.

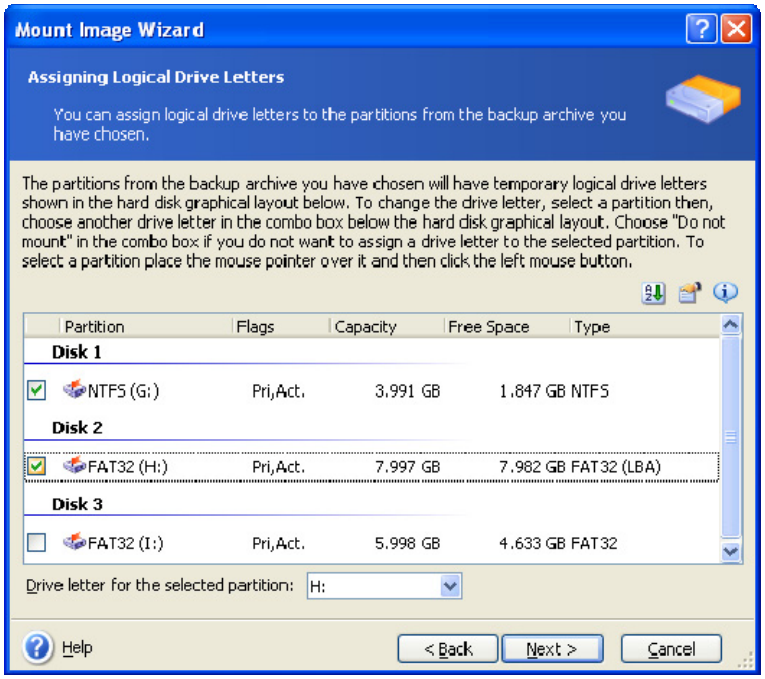
2. Select the archive from the drives tree. The mount operation does not support backup locations, so they are not displayed in the tree. However, if an image is stored in a backup location, you can select this location in the tree as a normal folder and then select the image for mounting.



If you added a comment to the archive, it will be displayed to the right of the drives tree. If the archive was protected with a password, Acronis True Image WD Edition will ask for it. Neither the partitions layout, nor the **Next** button will be enabled until you enter the correct password.

3. Select a partition to mount as a virtual disk. (Note that you cannot mount an image of the entire disk except in the case when the disk consists of one partition).

You can also select a letter to be assigned to the virtual disk from the **Drive letter** drop-down list. If you do not want to mount the virtual drive, select **Do not mount** in the list.



4. Select whether you want to mount image in **Read-only** or **Read/Write** mode.

5. If you select **Read/Write** mode, the program assumes that the connected image will be modified. It is strongly recommended that you list the forthcoming changes in the Comment section to this file.

6. The program displays a summary containing a single operation. Click **Proceed** to connect the selected partition image as a virtual disk.

7. After the image is connected, the program will run Windows Explorer, showing its contents. Now you can work with files or folders as if they were located on a real disk.

You can connect multiple partition images. If you want to connect another partition image, repeat the procedure.

9.2 Unmounting an image

We recommend that you unmount the virtual disk after all necessary operations are finished, as keeping up virtual disks takes considerable system resources. If you do not unmount the disk, it will disappear after your computer is turned off.

To disconnect the virtual disk, click **Unmount Image** and select the disk to unmount. You can also do this in Windows Explorer by right-clicking on the disk icon and selecting **Unmount**.

Chapter 10. Transferring the system to a new disk

10.1 General information

Sooner or later, most computer users find that their hard disk is too small. If you just don't have space for more data, you can add another disk just for data storage as described in the following chapter.

However, you might find that your hard disk does not have enough space for the operating system and installed applications, preventing you from updating your software or installing new applications. In this case, you have to transfer the system to a higher-capacity hard disk.

To transfer the system, you must first install the disk in the computer (see details in the *Appendix B. Hard disks and BIOS setup*). If your computer doesn't have a bay for another hard disk, you can temporarily install it in place of your CD drive or use a USB 2.0 connection to the external target disk. If that is not possible, you can clone a hard disk by creating a disk image and restoring it to a new hard disk with larger partitions.

Important! You can clone the system only to a Western Digital HDD.

There are two transfer modes available: automatic and manual.

In the automatic mode, you will only have to take a few simple actions to transfer all the data, including partitions, folders and files, to a new disk, making it bootable if the original disk was bootable.

There will be only one difference between these disks – partitions on the newer disk will be larger. Everything else, including the installed operating systems, data, disk labels, settings, software and everything else on the disk, will remain the same.

This is the only result available in the automatic mode. The program can only duplicate the original disk layout to the new one. To obtain a different result, you will have to answer additional questions about cloning parameters.

The manual mode will provide more data transfer flexibility.

1. You will be able to select the method of partition and data transfer:

- as is
- new disk space is proportionally distributed between the old disk partitions
- new disk space is distributed manually

2. You will also be able to select operations to perform on the old disk:

- leave partitions (and data!) on the old disk
- remove all information from the old disk
- create new partitions on the old disk (and remove all the old information)

On program screens, damaged partitions are marked with a red circle and a white cross inside in the upper left corner. Before you start cloning, you should check such disks for errors using the appropriate operating system tools.

10.2 Security

Please note the following: if the power goes out or you accidentally press **RESET** during the transfer, the procedure will be incomplete and you will have to partition and format or clone the hard disk again.

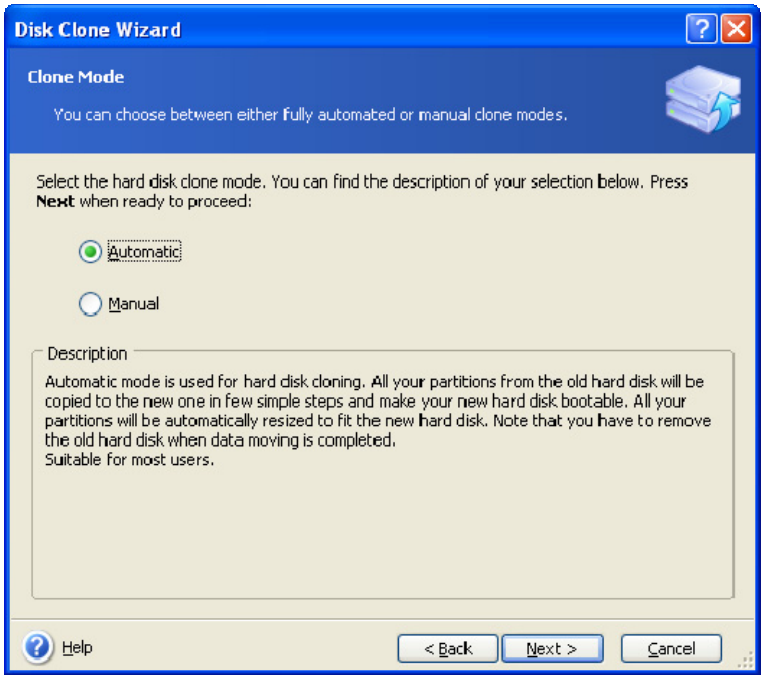
No data will be lost because the original disk is only being read (no partitions are changed or resized) until data transfer is completed.

Nevertheless, we do not recommend that you delete data from the old disk until you are sure it is correctly transferred to the new disk, the computer boots up from it and all applications work.

10.3 Executing transfers

10.3.1 Selecting Clone mode

You will see the **Clone mode** window just after the welcome window.

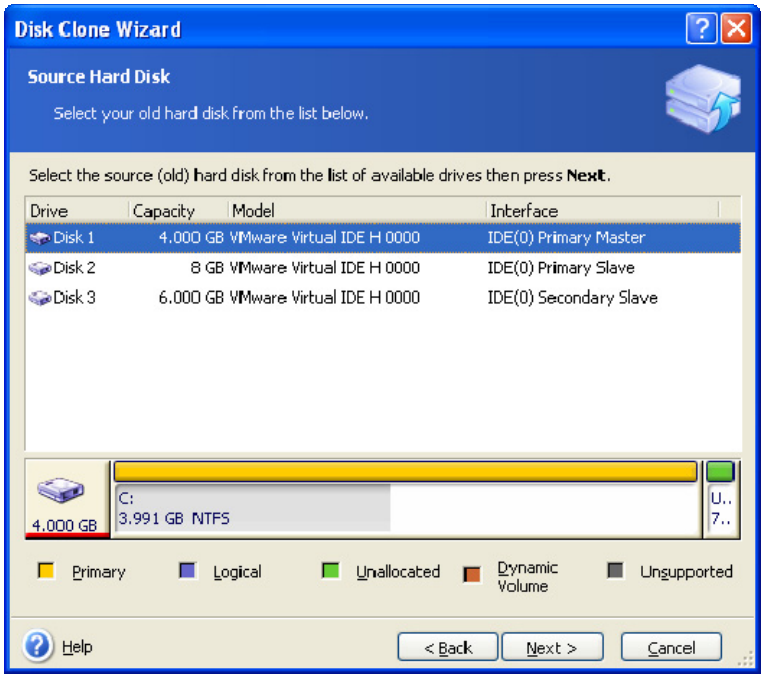


We recommend using automatic mode in most cases. The manual mode can be useful if you need to change the disk partition layout.

If the program finds two disks, one partitioned and another unpartitioned, it will automatically recognize the partitioned disk as the source disk and the unpartitioned disk as the destination disk. In such a case, the next two steps will be bypassed.

10.3.2 Selecting source disk

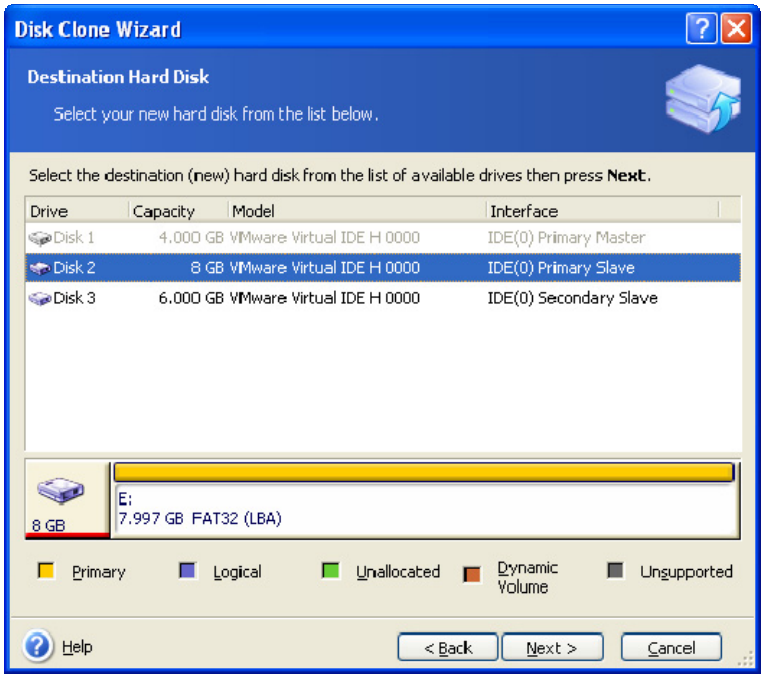
If the program finds several partitioned disks, it will ask you which one is the source (i.e. the older data disk).



You can determine the source and destination using the information provided in this window (disk number, capacity, label, partition, and file system information).

10.3.3 Selecting destination disk

After you select the source disk, you have to select the destination where the disk information will be copied.

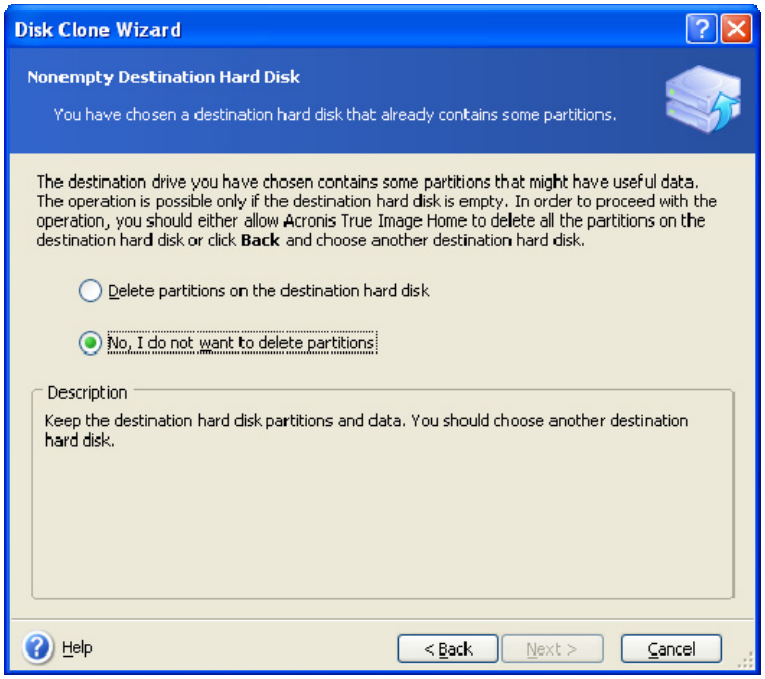


The previously selected source becomes grayed-out and disabled for selection.

If any disk is unpartitioned, the program will automatically recognize it as the destination and bypass this step.

10.3.4 Partitioned destination disk

At this point, the program checks to see if the destination disk is free. If not, you will be prompted by the **Nonempty Destination Hard Disk** window stating that the destination disk contains partitions, perhaps with data.



You will have to select between:

- **Delete partitions on the destination hard disk** – all existing partitions will be deleted during cloning and all their data will be lost.
- **No, I do not want to delete partitions** – no existing partition will be deleted, discontinuing the cloning operation. You will have to cancel this operation and return to select another disk.

To continue, select the first choice and click **Next**.

Note that no real changes or data destruction will be performed at this time! For now, the program will just map out cloning. All changes will be implemented only when you click **Proceed.**

10.3.5 Old and new disk partition layout

If you selected the automatic mode, the program will not ask you anything else. You will see the window graphically illustrating information (as rectangles) about the source disk (partitions and unallocated space) and the destination disk layout.
Along with the disk number, some additional information is provided: disk capacity, label, partition and file system information. Partition types — primary, logical and unallocated space — are marked with different colors.

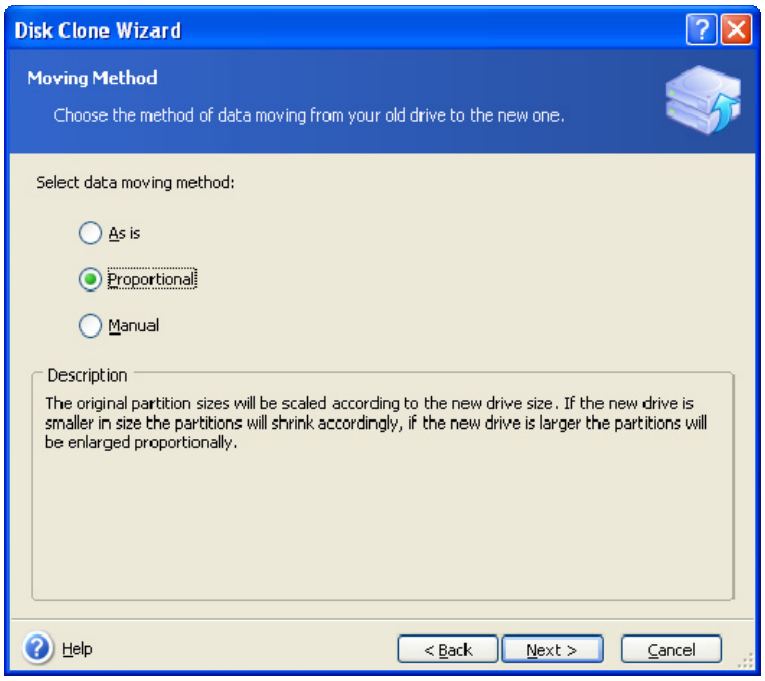
Next you will see the cloning summary.

10.3.6 Selecting partition transfer method

Acronis True Image WD Edition will offer you the following data transfer methods:

- **As is**

- **Proportional** – the new disk space will be proportionally distributed among cloned partitions
- **Manual** – you will specify the new size and other parameters yourself



If you elect to transfer information "as is," a new partition will be created for every old one with the same size and type, file system and label. The unused space will become unallocated. Afterwards, you will be able to use the unallocated space to create new partitions or to enlarge the existing partitions with special tools, such as Acronis Disk Director Suite.

As a rule, "as is" transfers are not recommended as they leave much unallocated space on the new disk. Using the "as is" method, Acronis True Image WD Edition transfers unsupported and damaged file systems.

If you transfer data proportionally, each partition will be enlarged, according to the proportion of the old and new disk capacities.

FAT16 partitions are enlarged less than others, as they have a 4 GB size limit.

Depending on the selected combination, you will proceed to either the old disk partitioning window, or the disk partition layout window (see below).

10.3.7 Partitioning the old disk

If you selected **Create a new partition layout** earlier in the process, it is now time to repartition your old disk.

During this step, you will see the current disk partition layout. Initially, the disk has unallocated space only. This will change when you create new partitions.

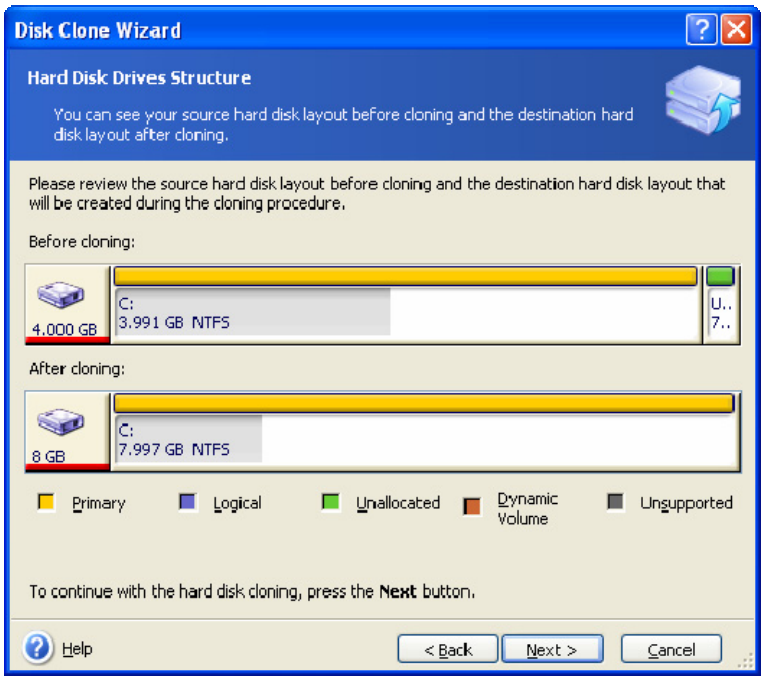
Having completed the required steps, you will add a new partition. To create another one, simply repeat those steps.

If you make a mistake, click **Back** to redo.

After you create the necessary partitions, uncheck the **Create new partition in unallocated space** box and click **Next**.

10.3.8 Old and new disk partition layouts

In the next window, you will see rectangles indicating the source hard disk, including its partitions and unallocated space, as well as the new disk layout.

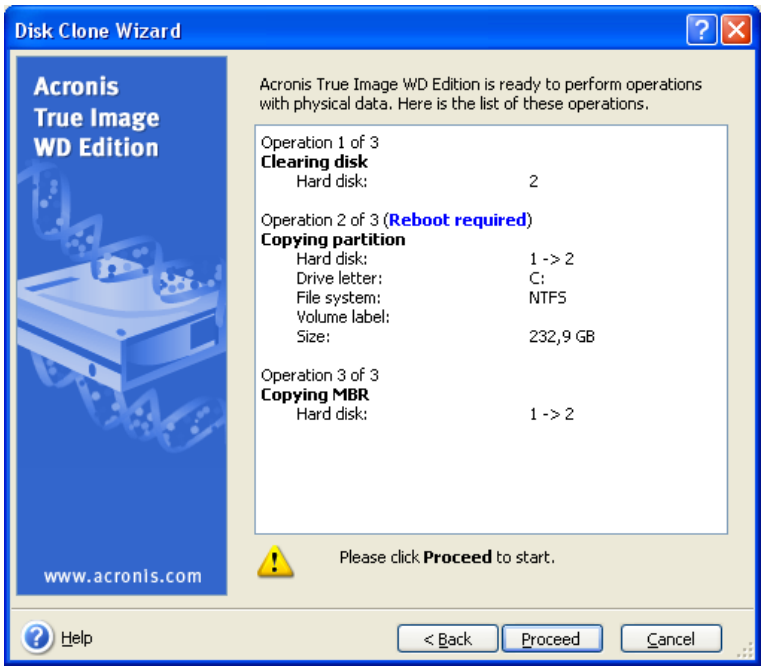


Along with the hard disk number, you will see disk capacity, label, partition, and file system information. Different partition types, including primary, logical, and unallocated space are marked with different colors.

If you selected manual partition creation earlier, the partition layout will look different. This partitioning method is described below.

10.3.9 Cloning summary

In the next window, you will see a list of briefly described operations to be performed on the disks.



Cloning a disk containing the currently active operating system will require a reboot. In that case, after clicking **Proceed** you will be asked to confirm the reboot. Canceling the reboot will cancel the entire procedure. After the clone process finishes you will be offered an option to shut down the computer by pressing any key. This enables you to change the position of master/slave jumpers and remove one of the hard drives.

Cloning a non-system disk or a disk containing an operating system, but one that is not currently active, will proceed without reboot. After you click **Proceed**, Acronis True Image WD Edition will start cloning the old disk to the new disk, indicating the progress in a special window. You can stop this procedure by clicking **Cancel**. In that case, you will have to repartition and format the new disk or repeat the cloning procedure. After the cloning operation is complete, you will see the results message.

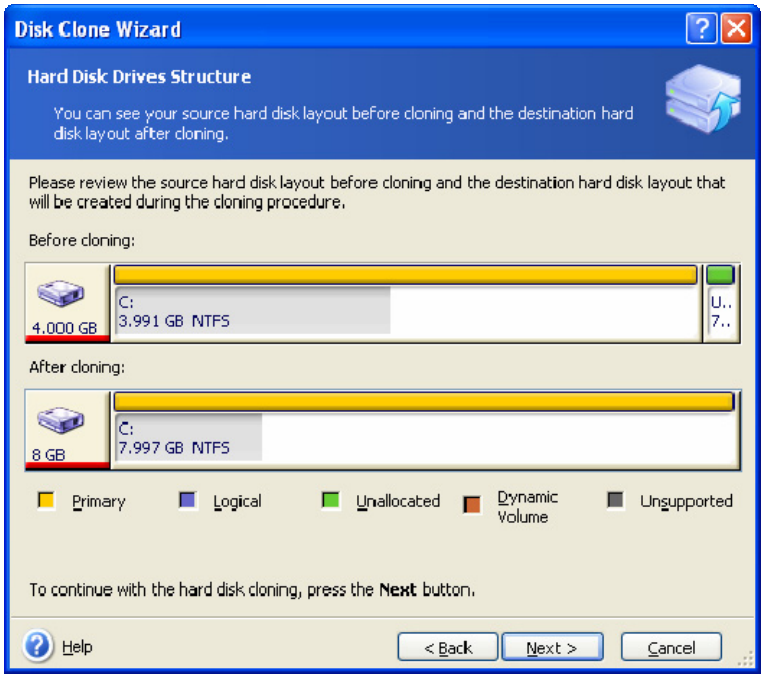
10.4 Cloning with manual partitioning

10.4.1 Old and new disk partition layouts

The manual transfer method enables you to resize partitions on the new disk. By default, the program resizes them proportionally.

In the next window, you will see rectangles indicating the source hard disk, including its partitions and unallocated space, as well as the new disk layout.

Along with the hard disk number, you will see disk capacity, label, partition, and file system information. Different partition types, including primary, logical, and unallocated space are marked with different colors.



To resize any partition, check the **Proceed relayout** box. If you are satisfied with the partition layout shown, uncheck this box (if checked). Clicking **Next**, you will proceed to the cloning summary window.

Be careful! Clicking **Back** in this window will reset all size and location changes that you've selected, so you will have to specify them again.

First, select a partition to resize. It will be underlined in red.

Resize and relocate it on the next step.

You can do this by entering values to **Unallocated space before, Partition size, Unallocated space after** fields, by dragging partition borders or the partition itself.

If the cursor turns into two vertical lines with left and right arrows, it is pointed at the partition border and you can drag it to enlarge or reduce the partition's size. If the cursor turns into four arrows, it is pointed at the partition, so you can move it to the left or right (if there's unallocated space near it).

Having provided the new location and size, click **Next**. You will be taken two steps back to the partition layout. You might have to perform some more resizing and relocation before you get the layout you need.

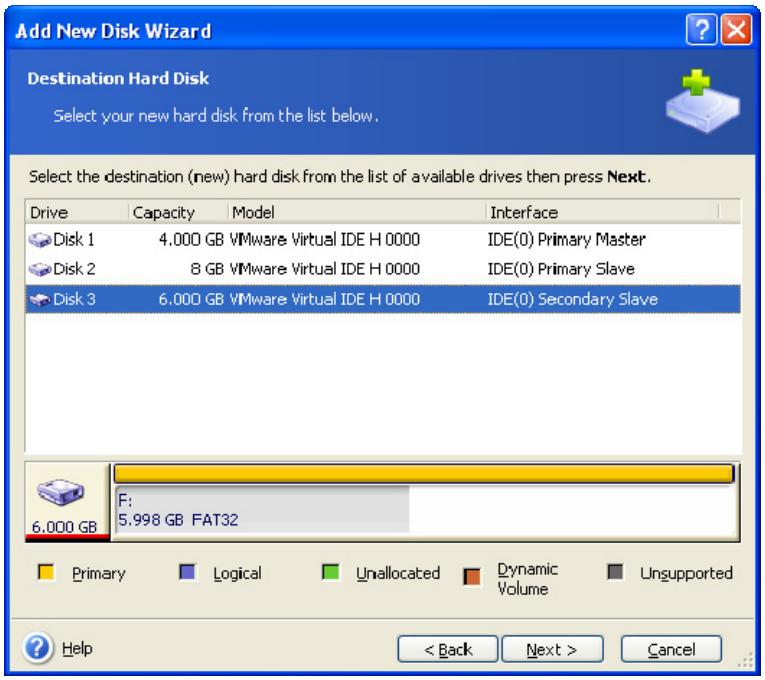
Chapter 11. Adding a new hard disk

If you don't have enough space for your data, you can either replace the old disk with a new higher-capacity one (data transfers to new disks are described in the previous chapter), or add a new disk only to store data, leaving the system on the old disk. If the computer has a bay for another disk, it would be easier to add a data disk drive than to clone a system one.

To add a new disk, you must first install it in your computer.

11.1 Selecting a hard disk

Select the disk that you've added to the computer.



This window might be bypassed if the program detects the new disk itself. In this case, you will immediately proceed to the new partition creation.

If there are any partitions on the new disk, they must be deleted first.

Select **Delete partitions on the destination hard disk** and click **Next** to continue.

11.2 Creating new partitions

Next you will see the current partition layout. Initially, all disk space will be unallocated. This will change after you add new partitions.

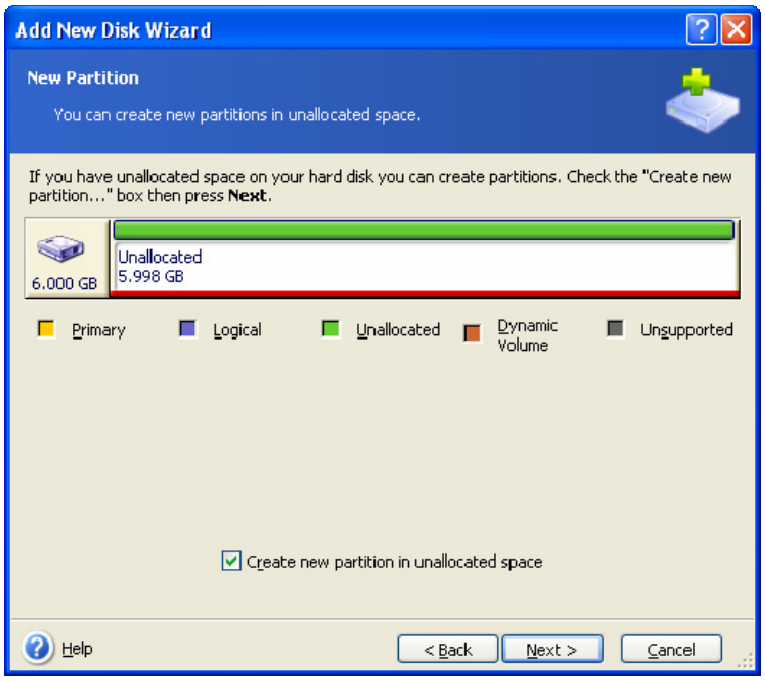
To create a partition, select **Create new partition in unallocated space** and click **Next** to perform steps required by the partition creation wizard.

You will be prompted to set the new partition location and size. You can do this both by entering values to **Unallocated space before, Partition size, Unallocated space after** fields, and by dragging partition borders or the partition itself.

If the cursor turns into two vertical lines with left and right arrows, it is pointed at the partition border and you can drag it to enlarge or reduce the partition size. If the cursor turns into four arrows, it is pointed at the partition, so you can move it to the left or right (if

there is unallocated space near it). Having provided the new partition location and size, you can input a label for the new partition.

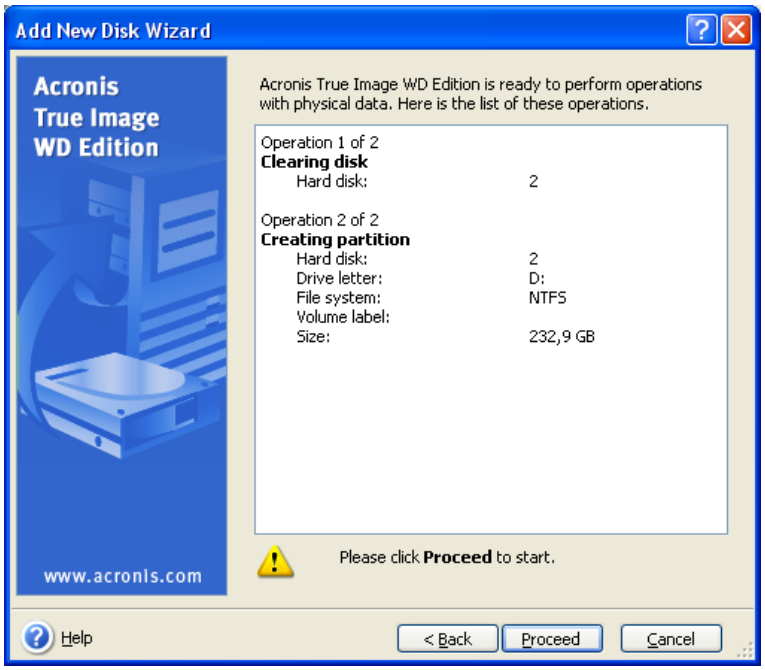
If you make a mistake at partitioning, click **Back** to redo the process.



Finally, you will be taken back to the partition layout screen. Check the resulting partitions layout and start creating another partition or move on by unchecking **Create new partition in unallocated space** and clicking **Next**.

11.3 Disk add summary

The disk add summary contains a list of operations to be performed on disks.



After you click **Proceed**, Acronis True Image WD Edition will start creating new partitions, indicating the progress in a special window. You can stop this procedure by clicking **Cancel**. You will then have to repartition and format the new disk or repeat the disk add procedure.

Chapter 12. Acronis DriveCleanser

Acronis True Image WD Edition includes a utility for secure destruction of data on an entire hard disk drive, individual partitions.

Many operating systems do not provide users with secure data destruction tools, so deleted files can be restored easily by using simple applications. Even a complete disk reformat can't guarantee permanent confidential data destruction.

Acronis DriveCleanser solves this problem with guaranteed and permanent data destruction on selected hard disks and/or partitions. It allows you to select from a number of data destruction methods depending on the importance of your confidential information.

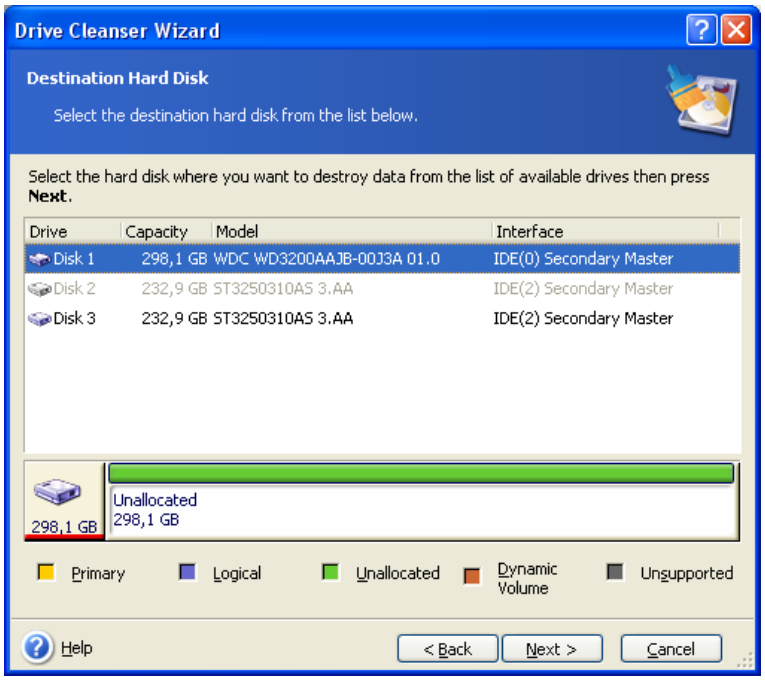
To launch Acronis DriveCleanser, select the **Disk Utilities** category in the main program window, then click **Acronis DriveCleanser**. Acronis DriveCleanser allows you to perform the following:

- clean up selected hard disks or partitions using preset methods;
- create and execute custom user methods of hard disk clean-up.

Acronis DriveCleanser is based on a **wizard** that **scripts** all hard disk operations, so no data destruction is performed until you click **Proceed** in the wizard's final window. At any moment, you can return to the previous steps to select other disks, partitions or data destruction methods.

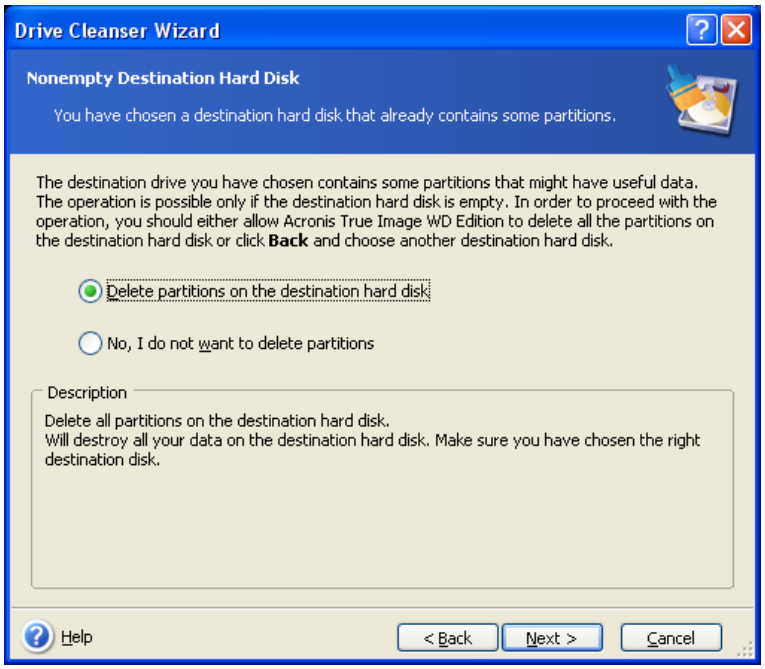
12.1 Selecting destination hard disk

First, you must select the hard disk where you want to destroy data.



The destroying operation is possible only if the destination hard disk is empty.

If the selected hard disk contains several partitions that might have useful data, Acronis True Image WD Edition will ask whether you want to delete those partitions or cancel the operation. Click **Back** to choose another destination hard disk.



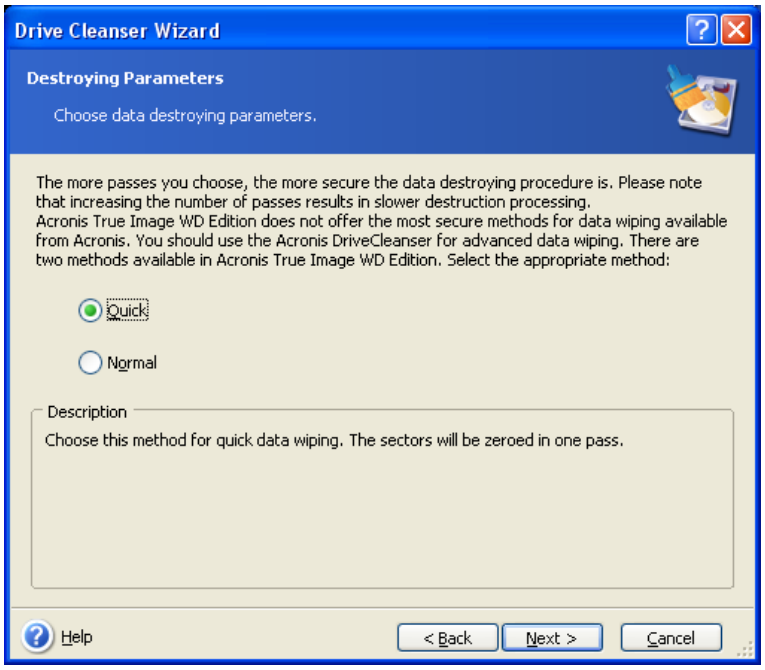
12.2 Destroying parameters

In this step choose data destroying parameters. The more passes you choose, the more secure data will be destroyed.

Acronis True Image WD Edition provides two methods:

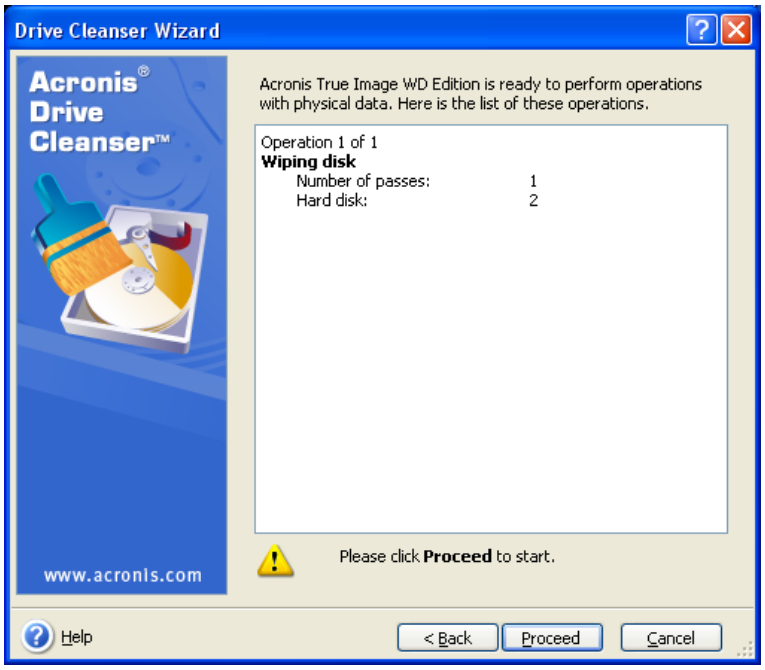
- **Quick** – choose this method for fast data wiping. The sectors will be zeroed in one pass.
- **Normal** – choose this method for normal data wiping.

Please note that increasing the number of passes results in slower destruction processing.



12.3 DriveCleanser summary

The DriveCleanser summary contains a list of disks to be wiped and a number of passes.



After you click **Proceed**, Acronis True Image WD Edition will start wiping hard disks, indicating the progress in a special window. You can stop this procedure by clicking **Cancel**.

Appendix A. Partitions and file systems

A.1 Hard disk partitions

The mechanism that allows you to install several operating systems on a single PC or to carve up a single physical disk drive into multiple "logical" disk drives is called **partitioning**.

Partitioning is performed by special applications. In MS-DOS and Windows, these are FDISK and Disk Administrator.

Partitioning programs perform the following:

- create a primary partition
- create an extended partition that can be split into several logical disks
- set an active partition (applied to a single primary partition only)

Information about partitions on a hard disk is stored in a special disk area – in the 1st sector of cylinder 0, head 0, which is called the partition table. This sector is called the master boot record, or MBR.

A physical hard disk might contain up to four partitions. This limit is forced by the partition table that is suitable for four strings only. However, this does not mean you can have only four operating systems on your PC! Applications called disk managers support far more operating systems on disks. For example, Acronis OS Selector, a component of Acronis Disk Director Suite, enables you to install up to 100 operating systems!

A.2 File systems

An operating system gives user the ability to work with data by supporting some type of **file system** on a partition.

All file systems are made of structures that are necessary to store and manage data. These structures are usually composed of operating system boot sectors, folders and files. File systems perform the following basic functions:

- track occupied and free disk space (and bad sectors, if any)
- support folders and file names
- track physical location of files on disks

Different operating systems use different file systems. Some operating systems are able to work with only one file system while others can use several of them. Here are some of the most widely used file systems:

A.2.1 FAT16

The FAT16 file system is widely used by DOS (DR-DOS, MS-DOS, PC-DOS, PTS-DOS. and other), Windows 98/Me, and Windows NT/2000/XP/Vista operating systems and is supported by most other systems.

Main features of FAT16 are the file allocation table (FAT) and clusters. FAT is the core of the file system. To increase data safety, it is possible to have several copies of the FAT (there are usually two of them) on a single disk. A cluster is a minimum data storage unit in FAT16 file system. One cluster contains a fixed number of sectors. FAT stores information about what clusters are free, what clusters are bad, and also defines in which clusters files are stored.

The FAT16 file system has a 2GB limit that permits a maximum 65,507 clusters that are 32KB in size. (Windows NT/2000/XP/Vista support partitions up to 4GB with up to 64KB clusters). Usually the smallest cluster size is used to make the total cluster amount within the 65,507 range. The larger a partition is, the larger its clusters are.

Usually the larger the cluster size, the more disk space is wasted. A single byte of data could use up one cluster, whether the cluster size is 32KB or 64KB.

Like many other file systems, the FAT16 file system has a root folder. Unlike others, however, its root folder is stored in a special place and is limited in size (standard formatting produces a 512-item root folder).

Initially, FAT16 had limitations on file names. They could only be eight characters long, plus a dot, plus three characters of name extension. However, long-name support in Windows 95 and Windows NT bypassed this limitation. The OS/2 operating system also supports long names, but does so in a different way.

A.2.2 FAT32

The FAT32 file system was introduced in Windows 95 OSR2. It is also supported by Windows 98/Me/2000/XP/Vista. FAT32 is an evolved version of FAT16. Its main differences from FAT16 are 28-bit cluster numbers and a more flexible root, whose size is unlimited. The reasons FAT32 appeared are the support of large hard disks (over 8GB in capacity) and the impossibility of implementing any more complex file system into MS-DOS, which is still the basis for Windows 98/Me.

The maximum FAT32 disk size is 2 terabytes (1 terabyte, or TB, is equal to 1024 gigabytes, or GB).

A.2.3 NTFS

NTFS is the main file system for Windows NT/2000/XP/Vista. Its structure is closed, so no other operating system is fully supported. The main structure of NTFS is the MFT (master file table). NTFS stores a copy of the critical part of the MFT to reduce the possibility of data damage and loss. All other NTFS data structures are special files. NTFS stands for NT File System.

Like FAT, NTFS uses clusters to store files, but cluster size does not depend on partition size. NTFS is a 64-bit file system. It uses unicode to store file names. It is also a journaling (failure-protected) file system, and supports compression and encryption.

Files in folders are indexed to speed up file search.

Appendix B. Hard disks and BIOS setup

The appendices below provide you with extra information on the hard disk organization, how information is stored on disks, how disks should be installed in the computer and plugged into the motherboard, configuring disks with BIOS, partitions and file systems, and how operating systems interact with disks.

B.1 Installing hard disks in computers

B.1.1 Installing a hard disk, general scheme

To install a new IDE hard disk, you should do the following (**we will assume you have powered OFF your PC before you start!**)**:**

1. Configure the new hard disk as **slave** by properly installing jumpers on the board of its controller. Disk drives generally have a picture on the drive that shows the correct jumper settings.

2. Open your computer and insert the new hard disk into a 3.5" or 5.25" slot with special holders. Fasten down the disk with screws.

3. Plug the power cable into the hard disk (four-threaded: two black, yellow and red; there is only one way you can plug in this cable).

4. Plug the 40- or 80-thread flat data cable into sockets on the hard disk and on the motherboard (plugging rules are described below). The disk drive will have a designation on the connector or next to it that identifies Pin 1. The cable will have one red wire on an end that is designated for Pin 1. Make sure that you place the cable in the connector correctly. Many cables also are "keyed" so that they can only go in one way.

5. Turn your computer on and enter BIOS setup by pressing the keys that are displayed on the screen while the computer is booting.

6. Configure the installed hard disk by setting the parameters **type**, **cylinder**, **heads**, **sectors** and **mode** (or **translation mode**; these parameters are written on the hard disk case) or by using the IDE autodetection BIOS utility to configure the disk automatically.

7. Set the boot sequence to A:, C:, CD-ROM or some other, depending on where your copy of Acronis True Image WD Edition is located. If you have a boot diskette, set the diskette to be the first; if it is on a CD, make the boot sequence start with CD-ROM.

8. Quit BIOS setup and save changes. Acronis True Image WD Edition will automatically start after reboot.

9. Use Acronis True Image WD Edition to configure hard disks by answering the wizard's questions.

10. After finishing the work, turn off the computer, set the jumper on the disk to the **master** position if you want to make the disk bootable (or leave it in **slave** position if the disk is installed as additional data storage).

B.1.2 Motherboard sockets, IDE cable, power cable

There are two slots on the motherboard to which the hard disks can be connected: **primary IDE** and **secondary IDE**.

Hard disks with an IDE (Integrated Drive Electronics) interface are connected to the motherboard via a 40- or 80-thread flat marked cable: one of the threads of the cable is red.

Two IDE hard disks can be connected to each of the sockets, i.e. there can be up to four hard disks of this type installed in the PC. (There are three plugs on each IDE cable: two for hard disks and one for the motherboard socket.)

As noted, IDE cable plugs are usually designed so that there is only one way to connect them to the sockets. Usually, one of the pinholes is filled on the cable plug, and one of the pins facing the filled hole is removed from the motherboard socket, so it becomes impossible to plug the cable in the wrong way.

In other cases, there is a jut on the plug on the cable, and an indentation in the socket of the hard disk and of the motherboard. This also ensures that there only one way to connect the hard disk and the motherboard.

In the past, this design of plug did not exist, so there was an empirical rule: **the IDE cable is connected to the hard disk socket so that the marked thread is the closest to the power cable**, i.e. the marked thread connected to pin #1 of the socket. A similar rule was used for connecting cables with the motherboard.

Incorrect connection of the cable with either the hard disk or the motherboard does not necessarily damage the electronics of the disk or the motherboard. The hard disk is simply not detected or initialized by BIOS.

There are some models of hard disks, especially the older ones, for which incorrect connection damaged the electronics of the drive.

We will not describe all the types of hard disks. Currently the most widespread are those with IDE or SCSI interfaces. Unlike IDE hard disks, there can be from six to 14 SCSI hard disks installed in your PC. However, you need a special SCSI controller (called a host adapter) to connect them. SCSI hard disks are not usually used in personal computers (workstations), but are found mostly in servers.

Aside from an IDE cable, a four-thread power cable must be connected to the hard disks. There is only one way to plug in this cable.

B.1.3 Configuring hard disk drives, jumpers

A hard disk drive can be configured in a computer as **master** or as **slave**. The configuring is done using special connectors (called jumpers) on the hard disk drive.

The jumpers are either located on the electronic board of the hard disk or a special socket that provides for the connection of the hard disk and the motherboard.

There is usually a sticker on the drive that explains the markings. Typical markings are **DS**, **SP**, **CS** and **PK**.

Each jumper position corresponds to one hard disk(s) installation mode:

- **DS – master/factory default**
- **SP – slave (or no jumper required)**
- **CS – cable select for master/slave**: the purpose of the hard disk is determined by its physical position with respect to the motherboard
- **PK – jumper parking position**: the position where one can put the jumper if it is not necessary in the existing configuration

The hard disk with the jumper in **master** position is treated by the basic input/output system (BIOS) as bootable.

The jumpers on hard disks that are connected to the same cable can be in the **cable select for master/slave** position. In this case, BIOS will deem as "master" the disk that is connected to the IDE cable closer to the motherboard than the other one.

Unfortunately, hard disk markings were never standardized. You might well find that markings on your hard disk differ from the ones described above. Moreover, for the old types of hard disks, their purpose could be defined by two jumpers instead of one. You should study the markings carefully before installing your hard disk in the computer.

It is not enough to physically connect the hard disk to the motherboard and set the jumpers properly for the hard disk to function — hard disks have to be properly configured with the motherboard BIOS.

B.2 BIOS

When you turn on your computer, you often see a number of short text messages before you see the splash screen of your operating system. These messages are from the POST (power-on self test) program that belongs to BIOS and is executed by the processor.

BIOS, or the basic input/output system, is a program that resides in the permanent memory chip (ROM or flash BIOS) on the motherboard of your computer and is its key element. The version of BIOS that you use "knows" all the peculiarities of all the components of the motherboard: processor, memory, integrated devices. BIOS versions are provided by the manufacturers of motherboards.

Main BIOS functions are:

- POST checking of processor, memory and I/O devices
- initial configuring of all software-manageable parts of the motherboard
- initialization of operating system (OS) booting process

Among numerous components of the computer, initial configuration is necessary for the external memory subsystem that controls hard disk drives, floppy disk drives, CD-ROM drives, DVDs, and other devices.

B.2.1 Setup utility

BIOS has a built-in setup utility for initial computer configuration. To enter it, you have to press a certain combination of keys (**Del, F1**, **Ctrl+Alt+Esc**, **Ctrl+Esc**, or some other, depending on your BIOS) during the POST sequence that starts right after you turn your computer on. Usually the message with the required combination of keys is displayed during the startup testing. Pressing this combination takes you to the menu of the setup utility that is included in your BIOS.

The menu can differ in appearance and sets of items and their names, depending on the BIOS manufacturer. The most widely known BIOS makers for PC motherboards are Award/Phoenix and AMI. Moreover, while items in the standard setup menu are mostly the same for various BIOSes, items of the extended setup heavily depend on computer and BIOS version.

Below we describe the general principles of initial hard disk configuration.

Large PC manufacturers like Dell and Hewlett-Packard produce motherboards themselves, and develop their own BIOS versions. You should always refer to the documentation that came with your computer for instructions on proper BIOS configuration.

B.2.2 Standard CMOS setup menu

Parameters in the standard CMOS setup menu usually define the geometry of the hard disk. The following parameters (and values) are available for each hard disk installed in your PC:

Parameter	Value	Purpose
Type	1-47, Not Installed, Auto	Type 0 or Not Installed is used when there is no hard disk installed (to uninstall it). Type 47 is reserved for user-defined parameters or for parameters detected by the IDE Auto detection utility. Auto value allows for automatic detection of IDE disk parameters during the boot sequence.
Cylinder (Cyl)	1-65535	The number of cylinders on a hard disk. For IDE disks, a logical number of cylinders is specified.
Heads (Hd)	1-16	The number of heads on a hard disk. For IDE disks, a logical number of heads is specified.
Sectors (Sec)	1-63	The number of sectors per track of a hard disk. For IDE disks, a logical number of sectors is specified.
Size (Capacity)	MBytes	The capacity of the disk in megabytes. It is calculated according to the following formula: Size=(Cyl x Hds x Sec x 512) / 1024 / 1024.
Mode (Translation Method)	Normal/ LBA/ Large/Auto	Method of translation of sector addresses.

For example, to demonstrate the main features of Acronis True Image WD Edition, we used a Quantum™ Fireball™ TM1700A hard disk as one of the disks in our examples. Its parameters have the following values:

Parameter	Value
Type	Auto
Cylinder (Cyl)	827
Heads (Hd)	64
Sectors (Sec)	63
Mode	Auto
CHS	1707 MB
Maximum LBA Capacity	1707 MB

In BIOS setup, you can set the Type parameter to User Type HDD (user-defined type). In this case, you also have to specify the value of the translation mode parameter, which can be Auto/Normal/LBA/Large.

Translation mode is how sector addresses are translated. This parameter appeared because in BIOS versions, there were limitations to the maximum address capacity of disks, which is 504 MB (1024 cylinders x 16 heads x 63 sectors x 512 bytes). There are two ways to bypass this limitation: (1) switch from physical to logical sector addresses (LBA), (2) use mathematics to reduce the number of addressed sectors (cylinders) and increase the number of heads; this method is called Large Disk (Large). The simplest decision is to set the value of this parameter to Auto.

If there are several hard disks connected to your motherboard, but you do not want to use some of them at the moment, you have to set the Type of these disks to Not Installed.

Parameters of hard disks can be set manually with the help of information provided by the hard disk manufacturer on its case, but it is easier to use the IDE autodetection utility that is usually included in modern BIOS versions.

The utility is sometimes a separate BIOS menu item and sometimes is included in the standard CMOS setup menu.

Please note that in "Appendix B. Hard disks and BIOS setup", we have described the general details of **physical** hard disk structure. Built-in IDE hard disk controls mask the physical disk structure. As a result, the BIOS of the motherboard "sees" **logical** cylinders, heads and sectors. We are not going to elaborate on this issue here, but knowing about this can sometimes be useful.

B.2.3 Arranging boot sequence, advanced CMOS setup menu

Aside from standard CMOS setup, BIOS menu usually has an **advanced CMOS setup** item. Here you can adjust the **boot sequence**: C:; A:; CD-ROM:.

Please note that **boot sequence** management differs for various BIOS versions, e.g. for AMI BIOS, AWARDBIOS, and brand-name hardware manufacturers.

Several years ago, the operating system boot sequence was hard-coded into the BIOS. An operating system could be booted either from a diskette (drive A:), or from the hard disk C:. That was the sequence in which the BIOS queried external drives: if drive A: was ready, BIOS attempted to boot an operating system from a diskette. If the drive was not ready or there was no system area on diskette, BIOS tried to boot an operating system from hard disk C:.

At present, BIOS allows booting operating systems not only from diskettes or hard disks, but also from CD-ROMs, DVDs, and other devices. If there are several hard disks installed in your computer labeled as C:, D:, E:, and F:, you can adjust the boot sequence so that an operating system is booted from, for example, disk E:. In this case, you have to set the boot sequence to look like E:, CD-ROM:, A:, C:, D:.

This does not mean that booting is done from the first disk in this list; it only means that the **first attempt** to boot an operating system is to boot it from this disk. There may be no operating system on disk E:, or it may be inactive. In this case, BIOS queries the next drive in the list. Errors can happen during booting, see B.2.4 "Hard disk initialization errors".

The BIOS numbers disks according to the order in which they are connected to IDE controllers (primary master, primary slave, secondary master, secondary slave); next go the SCSI hard disks.

This order is broken if you change the boot sequence in BIOS setup. If, for example, you specify that booting has to be done from hard disk E:, numbering starts with the hard disk that would be the third in usual circumstances (it is usually the secondary master).

After you have installed the hard disk in your computer and have configured it in BIOS, one can say that the PC (or the motherboard) "knows" about its existence and its main parameters. However, it is still not enough for an operating system to work with the hard disk. In addition, you have to create partitions on the new disk and format the partitions using Acronis True Image WD Edition. See *Chapter 11. Adding a new hard disk*.

B.2.4 Hard disk initialization errors

Devices are usually initialized successfully, but sometimes errors can happen. Typical errors related to hard disks are reported by the following messages:

```
PRESS A KEY TO REBOOT
```

This error message is not directly related to errors during hard disk initialization. However, it appears, for example, when the boot program finds no operating system on the hard disk, or when the primary partition of the hard disk is not set as active.

```
DISK BOOT FAILURE,
INSERT SYSTEM DISK AND
PRESS ENTER
```

This message appears when the boot program finds no available boot device, be it a floppy or a hard disk, or a CD-ROM.

```
C: DRIVE ERROR
C: DRIVE FAILURE
ERROR ENCOUNTERED
INITIALIZING HARD DRIVE
```

This message appears when it is not possible to access the C: disk. If the disk is known to be functional, the reason for this error message is probably incorrect settings/connections of:

- hard disk parameters in BIOS setup
- jumpers on the controller (master/slave)
- interface cables

It is also possible that the device is out of order, or the hard disk is not formatted.

Appendix C. Startup Parameters

Additional parameters that can be applied prior to booting Linux kernel

Description

The following parameters can be used to load Linux kernel in a special mode:

- **acpi=off**

  Disables ACPI and may help with a particular hardware configuration.

- **noapic**

  Disables APIC (Advanced Programmable Interrupt Controller) and may help with a particular hardware configuration.

- **nousb**

  Disables USB modules loading.

- **nousb2**

  Disables USB 2.0 support. USB 1.1 devices still work with this option. This option allows using some USB drives in USB 1.1 mode, if they do not work in USB 2.0 mode.

- **quiet**

  This parameter is enabled by default and the startup messages are not displayed. Deleting it will result in the startup messages being displayed as the Linux kernel is loaded and the command shell being offered prior to running the very Acronis program.

- **nodma**

  Disables DMA for all IDE disk drives. Prevents kernel from freezing on some hardware.

- **nofw**

  Disables FireWire (IEEE1394) support.

- **nopcmcia**

  Disables PCMCIA hardware detection.

- **nomouse**

  Disables mouse support.

- **[module name]=off**

  Disables the module (e.g. **sata_sis=off**).

- **pci=bios**

Forces to use PCI BIOS, not access the hardware device directly. For instance, this parameter may be used if the machine has a non-standard PCI host bridge.

- **pci=nobios**

  Disallows use of PCI BIOS; only direct hardware access methods are allowed For instance, this parameter may be used if you experience crashes upon boot-up, probably caused by the BIOS.

- **pci=biosirq**

  Uses PCI BIOS calls to get the interrupt routing table. These calls are known to be buggy on several machines and they hang the machine when used, but on other computers it is the only way to get the interrupt routing table. Try this option, if the kernel is unable to allocate IRQs or discover secondary PCI buses on your motherboard.

