Acronis TrueImage Deluxe
User's guide

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Introduction

What is Acronis TrueImage Deluxe

Acronis TrueImage Deluxe is the first title in a new generation of software for creating **exact images of hard disks** (and partitions). It will let you store an image of your disk in an archive file on a hard disk or on one of numerous removable media, such as Iomega Zip or Jaz, CD-R(W) or DVD-R(W) disc. Having an exact copy of your hard disk, you will be able to **restore its data** at anytime – in case of a system error, virus infection, or even disk malfunction.

With the help of a hard disk image and the Acronis TrueImage Deluxe software, you will be able to **deploy a system** on a new PC hard disk, i.e. install all operatings systems, applications without using installation disks/discs, and thus avoiding the re-set of all those system and program parameters.

Having created an exact hard disk image, you can be assured that all **your data**, operating systems, and applications (along with all their related settings!) are **safe**. In case of an operating system error or a virus attack, you will be able to easily restore the content of your PC hard disk, having created its exact image with Acronis TrueImage Deluxe. If you need to restore only several files, Acronis TrueImage Deluxe will let you connect the stored file as a logical drive and copy all the files you need from it.

The unique technology developed by Acronis Inc., and used in the TrueImage Deluxe software, will let you **create** exact disk images and **restore** your PC disk contents **under Windows** without rebooting.

Acronis TrueImage Deluxe makes image creation and hard disk content restoration easy for users of any level. Irrespective of their qualification and PC experience, every user can truly use this software.

The TRUE differences between Acronis TrueImage Deluxe and other back-up software:

- The opportunity to **create images** of disks (and partitions), including system partitions, **under Windows**, without rebooting your computer. No other software for storing images of partitions (and disks) in archive files allows you to perform these functions under Windows!
- The opportunity to **restore** partitions under Windows (with the except of system partitions or those containing swap files).

  At the point of partition restoration, Acronis TrueImage Deluxe will let you **change its size and location** on a disk, as well as its type and file system.

- Convenient tools for **restoration of separate files and folders** from an archive file: you can **connect a logical drive** from an archived image and simply copying files.

  Connecting a logical drive from an image file means that you will be able to browse stored and encoded partition contents like any real disk partition in Windows or in a Windows Explorer window. (see Figure 3.24 below).

- Unlike per-file back-up software, Acronis TrueImage Deluxe allows you to restore partitions even if they were deleted, formatted, had its Partition Table erased, or its disk bootsector infected by a virus!

The software combines a convenient graphical user interface with exceptional simplicity and user availability. Back-up and restoration operations can be performed in several easy steps!

Archive file

An archive file is a file containing images of partitions and disks. The images contain both data of partitions and/or disks and information, allowing you to restore a partition (disk) from the image.

Partition images include all its files and folders, irrespective of their attributes (hidden, system, etc.), Master Boot Record (MBR), File Allocation Table (FAT), and a root directory (Root).

Acronis TrueImage Deluxe software stores only the data sectors of a hard disk in its partition image.

Acronis TrueImage Deluxe software creates an archive file with a '.tib' extension. The .tib file can contain images of several partitions and/or disks.

An archive file of large disk partitions or several partitions (and disks) can become quite large. In this case Acronis TrueImage Deluxe will split the image into more than one archive volume or archive volume files. Splitting an archive into separate volumes may also be required for writing to removable media.

Computer errors

Unfortunately personal computers are not 100% reliable or foolproof – operating systems (OS) are subject to failures; application and hardware drivers can cause errors as well. The Internet brings additional information security problems such as the threat of virus infection and the computer's future inoperability. A hard disk also accumulates various «garbage» as a result of installing and removing software as well as decreases in the perfomance of your PC from continuous Internet access.

PC hard disks can encounter critical errors when executable files and applications cannot be run and operating system cannot be loaded. In many

cases this means that some system or data files are corrupt or newly updated driver are inoperable. Quite often it is extremely difficult to fix such problems, or even determine the exact software component that is causing the problem.

The necessity of software back-ups

Data files are the most critical and valuable files on your PC hard disk as they contain information of a «personal» nature. Operating system and applications can be reinstalled with disks/discs. Information in data files are unique, so it is vital to keep **back-up copies** of the most important on a hard disk as well as on other back-up removable media.

The restoration of operating system and applications with their diskettes or CD-ROMs usually takes a considerable amount of time. And do not forget the need to restore all those settings! It should be obvious that this is not the best way to restore your PC hard disk drive.

Acronis TrueImage Deluxe software offers you the most effective way to restore your PC's operability. You can quickly and easily restore system or data partitions or even whole hard disks from a previously created **partition (disk) image**. Acronis TrueImage Deluxe offers **back-up copying** of whole hard disks and their partitions, with separate partition (and disk) images stored in archive files.

General information on back-up copying

The need for system and data files back-up was realized long ago. The majority of industrial systems still feature bulky tape back-up. This type of back-up is usually performed by qualified specialists with the help of rather complex and time consuming devices.

With widespread PC use, the variety and volume of back-up data grew exponentially. At same time the need for simple back-up devices and software to help even inexperienced users became apparent.

There are two groups of software for back-up copying of individual PC users' data. They differ most in the level of work and the type of back-up copies they allow one to make. These programs back-up:

- (group 1) Separate files and folders,
- (group 2) Partitions and whole disks data.

Both groups have benefits as well as some disadvantages. But as hard disks and removable media capacity grew, and their cost decreased, it turned out that back-up copying of whole disk partitions became more effective and simple. Back-up copying of hard disk system partitions became largely available to new users. Performing back-up copying and restoration of system files and folders by means of the first group's software assumed that the user had great system and PC operating knowledge.

The usage of partition and disk back-up copying software turned out to be simpler as well as more visual. Such programs allow the user to work by means of a simple and user-friendly interface, while minimizing storing and restoring operations to several easy steps.

The purpose and capabilities of Acronis TrueImage Deluxe system

Acronis TrueImage Deluxe software is used to create exact images of hard disks (and disk partitions) that can be used to restore disk contents, deploy hard drive on new PCs, or to replace a hard disk. A disk image is stored in an archive file on a hard disk or any removable media. This file may contain images of several disks (and partitions) at once.

Restoring a disk/partition from an archive file, a user can easily select the image of a needed disk/partition; select a disk/partition to restore to, and change its size, location, and other parameters. A user can restore whole disk/partition as well as separate files from a disk image.

Acronis TrueImage Deluxe software works under Windows 9x/Me, Windows NT/2000/XP and supports **FAT16/32 and NTFS** as well as the Linux **ext2**, **ext3**, **ReiserFS** file systems.

You can install the software only under Windows, but you will be able to run Acronis TrueImage Deluxe from a bootable diskette or CD-R(W) under **any other OS** including Linux.

Acronis TrueImage Deluxe software works with **any disks** connected to your PC (including IDE, SCSI, USB, FireWire, and/or PCMCIA interfaces). An archive file can be created on a hard disk as well as on any other recording device running under an OS, such as Iomega Zip, CD-R(W) or DVD-R(W) drives, magneto-optical disk, and other media.

The software has a user-friendly graphical user interface that allows you to work with both the mouse and keyboard.

Working with the software is performed through our easy image creation and restoration **wizard**.

It takes just a few simple steps to start the disk/partition image creation procedure:

- Select the operation of partition (disk) image creation;
- Select partition(s) and/or disk(s) to create images of (store data in an archive file);
- Select type of a device for image creation (storing image in an archive file): fixed or removable. For example, a hard disk, magneto-optical disk, CD-R(W), DVD-R(W), etc.;
- Enter archive file name and specify its path;

- Select the disk/partition data compression level for archive file creation;
- Specify if you need a single file or the one split into several volumes of fixed size (for example, for creating a large disk/partition archive file on a CD-RW);
- Protect an archive file with a password if needed;
- Enter a comment for your archive file with information about stored images of disks/partitions, their data files, OS version, or any other information if needed;
- Execute the disk/partition image creation **script**, you created while working with the software **wizard**.

It takes a few simple steps as well to start disk/partition **restoration** from an image stored in archive file, or to deploy disk/partition contents onto a new PC hard disk:

- Select the operation of disk/partition restoration from a disk/partition image;
- Select an archive file on a hard disk (or removable media) that contains the image of a disk/partition to be restored;
- Select a disk and/or partition to be restored in the archive file;
- Select a partition (disk and free space) to restore a disk/partition image, stored in an archive file, to;
- Select the type of a disk/partition to be restored;
- Select the disk/partition file system;
- Change partition size and/or location as needed;
- Select the next partition to be restored to change its size and/or location as needed;
- Execute restoration script.

Procedures of disk image creation (restoration) on a hard disk (from a hard disk) and removable media (from removable media) slightly differ (these differences will be described below).

Acronis TrueImage Deluxe software runs either under Windows from the **Start** menu, or from a specially created bootable diskette or CD.

Disk operations are delayed in Acronis TrueImage Deluxe. It means that a partition or disk image creation (or restoration) script is created first, and then executed only when you are ready. Until a script is executed you can return one or a few steps back to select another disk and/or partition and image creation parameters.

Opportunities for Acronis TrueImage Deluxe usage

There are several variants of Acronis TrueImage Deluxe software usage:

1. **Creating images of and restoring** your PC's information.

   You can use Acronis TrueImage Deluxe software to create images of separate partitions of your PC hard disk, or the whole drive in an archive file on another disk or removable media. You can use our software to regularly create images of your information, applications and your operating system update.

   If new drivers, new applications, or an operating upgrade or change leads to instability of your PC, you can easily revert back to its previous state. In the same easy way you will be able to restore your system in case of a serious error or accidental destruction or deletion of files. The more you use Acronis TrueImage Deluxe software to create disk images, the higher the possibility of restoring the newest version of your data, applications, and operating systems.

Acronis TrueImage Deluxe software can be used not only to restore system in case of a critical error, but also to **revert the system** back to its previous state. For example, you may wish to restore after a perfomance falloff or instability caused by a driver update.

   Disk/partition image creation and data restoration from disk/partition images are the **main function** of Acronis TrueImage Deluxe. However you may want to use it for other purposes . . .

2. **Deploying the system** on identical PCs (**disk cloning**).

   If you have to regularly set-up many identical PCs (install and set-up the same operating systems and applications), you can utilize the disk-cloning feature implemented in Acronis TrueImage Deluxe. All you have to do is: Install and set-up an operating system and applications to a hard disk of one of identical PCs. Create a disk (system partition) image in an archive file. Boot the next PC up with a diskette containing Acronis TrueImage Deluxe, and restore the hard disk contents from the image stored in the archive file.

   If you already have a PC with installed system and applications, you will be able to clone another in just a few minutes! Create an image of the first PC's disk on any media (hard disk, CD-RW, DVD-RW), connect it to the second PC, boot it from Acronis TrueImage Deluxe diskette or CD, and restore disk contents from the image. You will save considerable time and effort with Acronis TrueImage Deluxe!

3. **Replacing a hard disk** of your PC.

   If you want to install a new higher capacity hard disk on your PC, and do not want to spend all the day re-installing operating system and

applications, and restoring their settings, simply use Acronis TrueImage Deluxe! Create an image of your hard disk in an archive file on any media, be it another hard disk or CD-R, CD-RW. Install a new disk, boot with a CD (or diskette) containing Acronis TrueImage Deluxe, and restore the old disk contents from the image to a new disk. You can also change disk partition size and location along with their type and operating system if needed.

Who Acronis TrueImage Deluxe is intended for

As everybody faces possible hardware or software failures, Acronis TrueImage Deluxe software can help the widest circle of users.

PC users get software with simple and user-friendly interfaces that will guarantee data will not be lost in case of any PC failures. And after serious malfunctions with their system, they will be able to restore in no time without help of an outside IT specialists.

More experienced users who test all new software on their PCs, will be able to restore back to an original stable operating state any time should they encounter an unsuccessful application or driver version or after any experiments with their OS settings.

Administrators in small companies will get a simple, effective, and inexpensive tool for creating images of disks (workstation and server system partitions, user data partitions). PC assemblers can use Acronis TrueImage Deluxe for quickly equipping whole PC consignments with software. The simplicity and convenience of Acronis TrueImage Deluxe allows all users, to take advantage of its unique technology and utility.

How to find the necessary information in this guide

Acronis TrueImage Deluxe user's guide contains the following main chapters:

- 1. «Installing and Starting Work with Acronis TrueImage Deluxe» - this describes how to install, run, and remove the software;
- 2. «Creating a disk/partition image on a hard disk» - this describes how to store an exact disk/partition image on a hard disk or removable media;
- 3. «Restoring a disk/partition from an image» - this describes how to restore partitions with an image stored in an archive file, and how to restore separate partition files;
- Appendix A. «General Information. Hard Disks» - this describes the construction of hard disks, installation into a PC, disk file structures, and interaction with an operating system;
- Appendix B. «Glossary» - contain a dictionary of technical terms to help you to better understand this Guide.

Legend

Designation	Meaning
`Courier New font`	Strings displayed or entered by a user.
• Enumeration	Enumeration item.
1. Press a button…	A procedure step performed by a user.
	Information we recommend you pay very close attention to.
Operation selection	Dialog boxes and their element names.
`Quit`	Button and key names.

Hardware and software requirements

To take full advantage of Acronis TrueImage Deluxe one should have:

- A PC-compatible computer with a Pentium CPU or similar,
- 32 MB RAM,
- A floppy or a CD-RW drive,
- VGA monitor,
- A mouse (recommended),
- Free disk space for archive files.

Software usage conditions

The conditions for Acronis TrueImage Deluxe software usage are described in the «License agreement», included with this package. The supplied registration card is the confirmation of your legal purchase and usage of Acronis TrueImage Deluxe on your system. Each registration card has its own unique registration number.

Under current legislation the «License agreement» is considered a contract between a user (you) and a software manufacturer (Acronis Inc.). The contract has legal effect and its violation may entail a court examination.

Illegal use and/or distribution of this software will be prosecuted.

Technical support

Users of legally purchased and registered copies of Acronis TrueImage Deluxe receive free technical support from Acronis Inc. In case you have problems with installation or use that cannot be solved with this guide or read-me file, please visit our support web-site or e-mail our support department at the addresses shown below. You must also send us the registration number of your Acronis TrueImage Deluxe copy. This number is written on a registration card supplied with this product.

Support URL: http://www.acronis.com/support/

E-mail: support@acronis.com

1. Installing and Starting Work with Acronis TrueImage Deluxe

1.1 Acronis TrueImage Deluxe system package

Acronis TrueImage Deluxe system package includes:

- An installation disc,
- This guide,
- License agreement,
- Registration card,
- Advertising materials.

1.2 Installation

You can purchase the Acronis TrueImage Deluxe program on a compact disc (CD-ROM) or download it from the Internet.

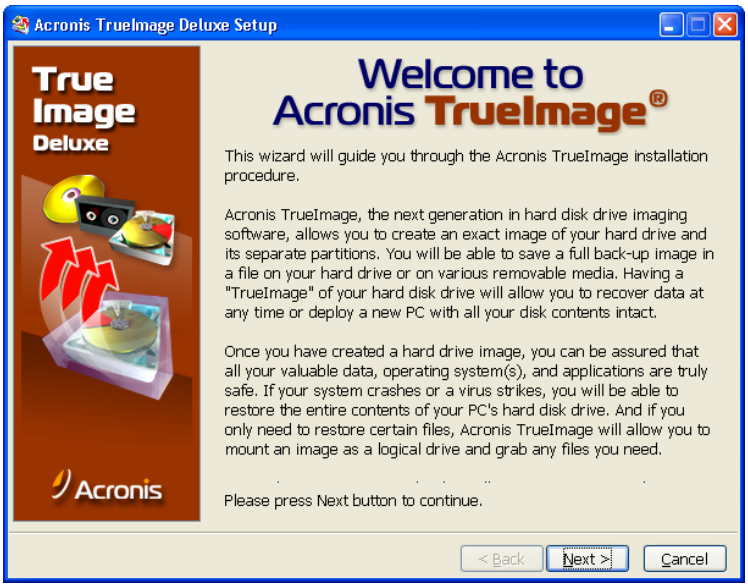
The CD-ROM contains an installer that can be run in Windows 9x/ and Windows NT/2000/XP operating systems.

If you purchased TrueImage Deluxe on CD-ROM, to run it do the following:

1. Insert the compact disc into CD-ROM drive.

   If you have the Windows operating system installed, run the Windows Explorer and click the CD-ROM drive with the mouse. You will now see the set-up.exe executable on the compact disc. Double-click it to run the installation program.

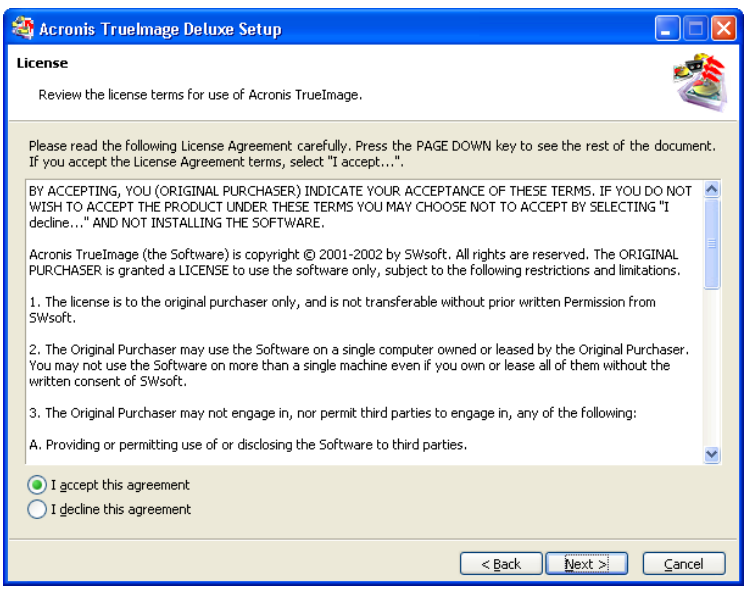
The executable will then be loaded into the computer memory and the following window will appear on the screen:



Click Next button to continue.

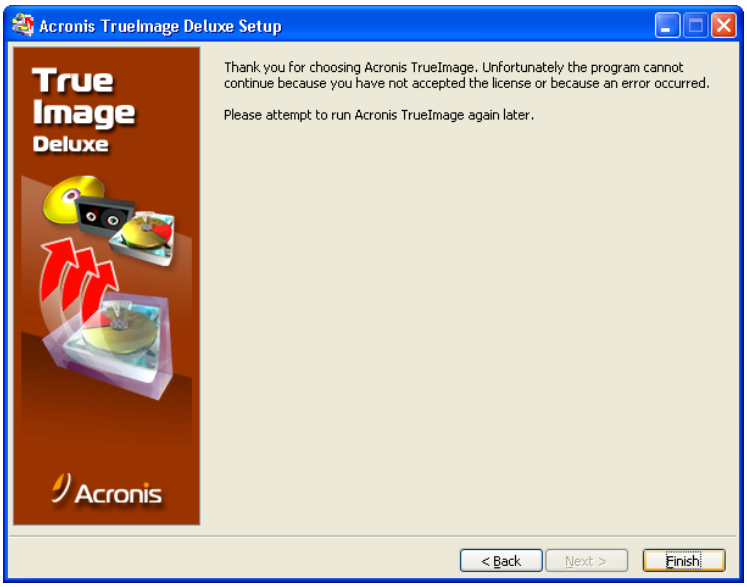
2. To continue working with the software you will need to accept the conditions of the license agreement between you (the user) and the software developer.

   For this purpose set the switch in the lower part of the window to **I accept this agreement** position.

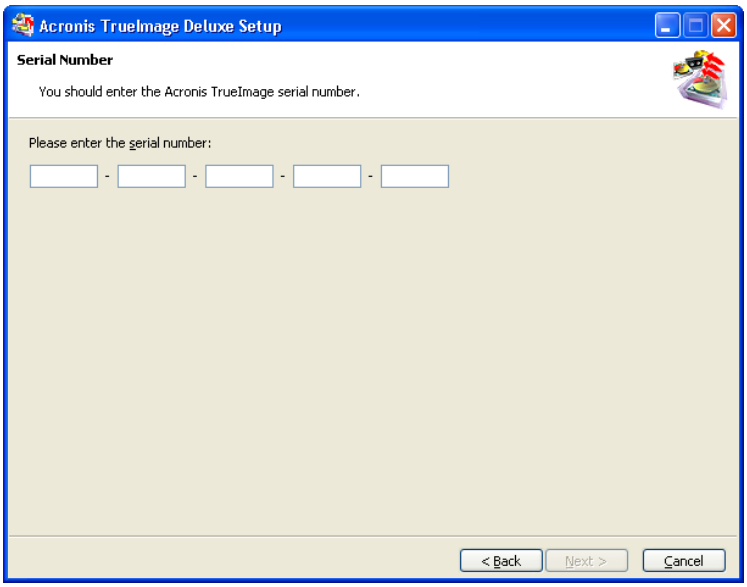


Click the Next button to continue.

3. If you disagree with the agreement conditions, set the switch to **I decline this agreement** position and click the Next button. In this case you will be thanked for the interest in the software, and the program will terminate.

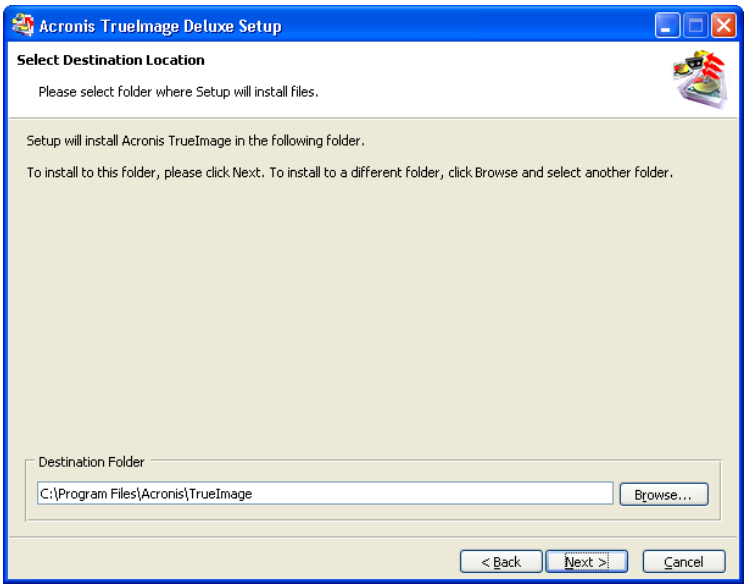


4. In the next window you will need to enter the product **serial number** that you will find on the Acronis TrueImage Deluxe registration form – AND DON'T FORGET TO REGISTER YOUR SOFTWARE TOO!

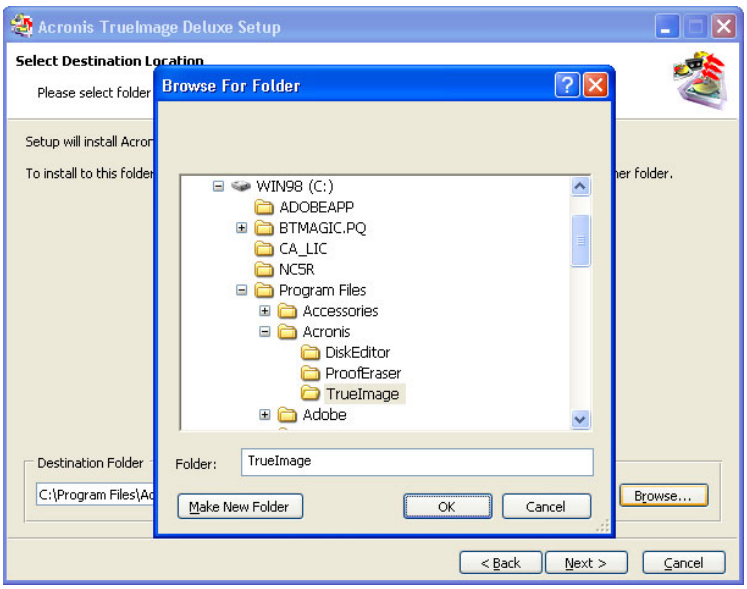


Click the Next button after entering the serial number.

5. In the next page you should specify a folder to install TrueImage Deluxe program to. The default folder is C:\Program Files\Acronis\TrueImage. If you agree with it, click Next. If you want to install the program to a different folder, enter its name and path into the appropriate field. If there is no such folder on a disk, it will be created during installation.

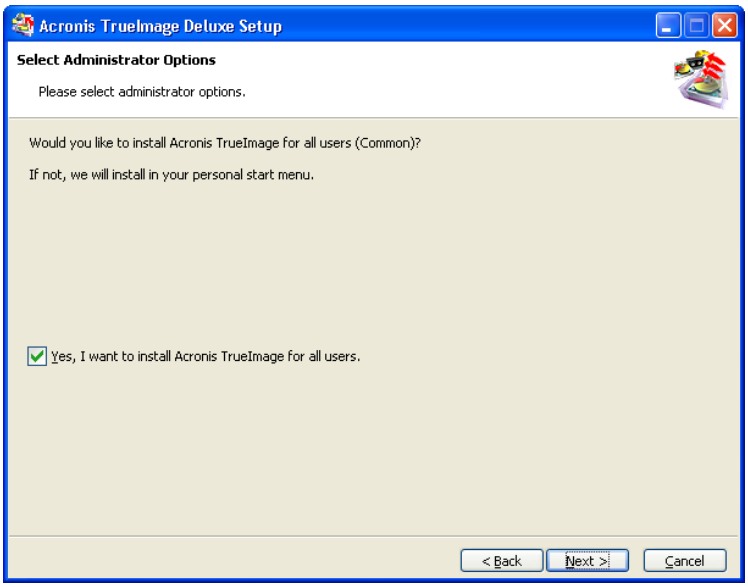


You can choose a folder for program installation by clicking Browse... You will see a folder tree of your hard disk. Select a folder with mouse and click OK. (You can select any computer disk for installation.)



After selecting a folder, click Next to continue.

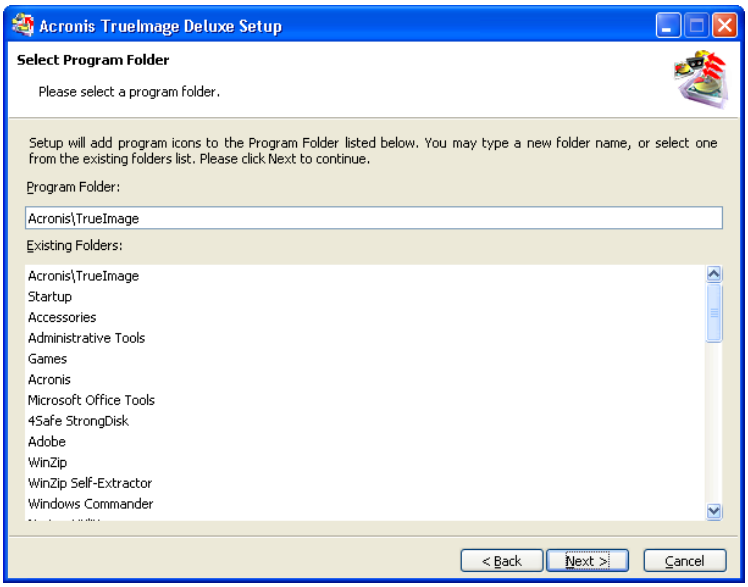
6. On the next page you will be offered to make TrueImage Deluxe available to all users of the computer or only to the current user. If you want to make the program available to all users, check the **Yes, I want to install Acronis TrueImage Deluxe for all users** box. (This page of InstallationWizard is specificial for Windows NT/2000/XP operating systems.)



If you use Windows 9x/Me family operating system the above page of the wizard will be omitted.

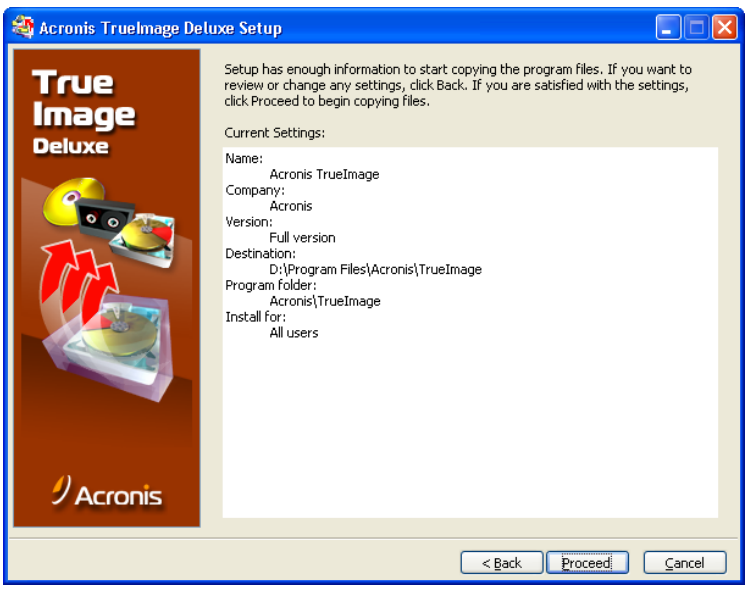
Click Next to continue.

7. In the next page you will be offered to create a new program group for Acronis TrueImage Deluxe program or to select an existing. If you agree to create a new group just click Next. If you want to use one of the existing program groups, select it by clicking it with the mouse.

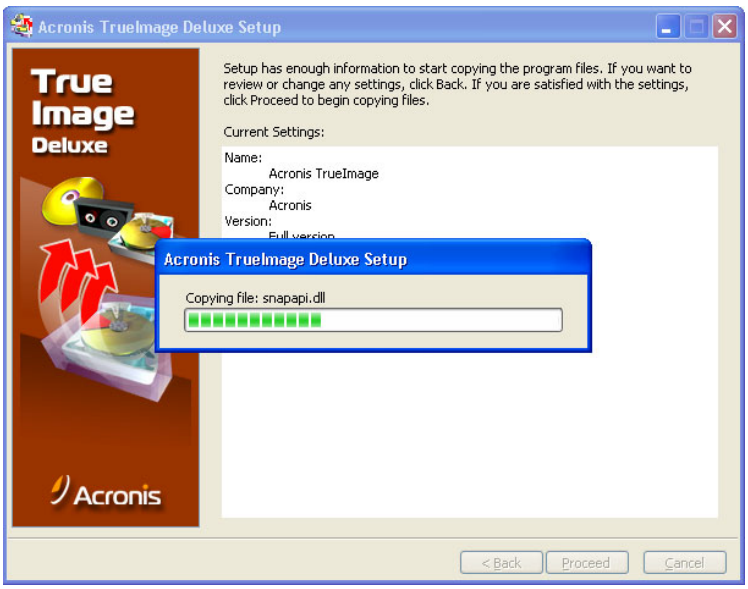


After selecting a program group, click Next to continue.

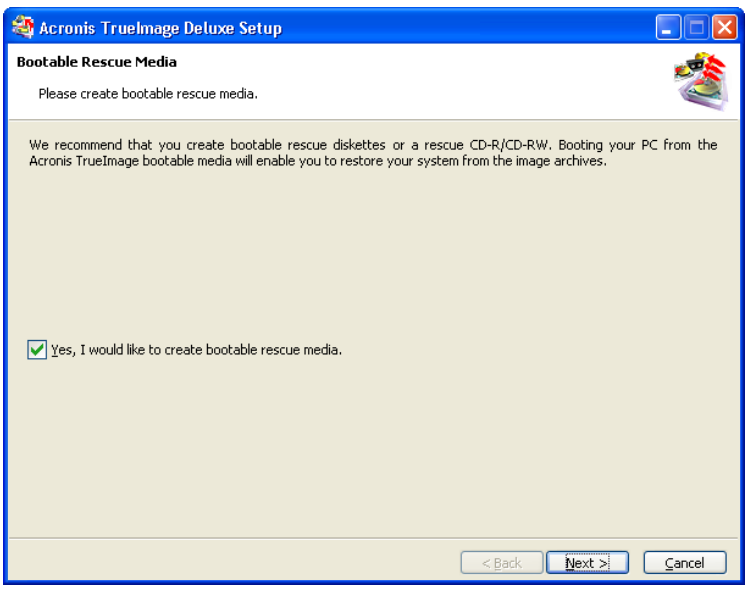
8. After selecting program group the installation program will show you the generated installation script. Before you click the Proceed button you can change any of its parameters: disk and folder, program group, or for example, make the program accessible only for yourself.



9. If you are sure all installation parameters are correct, click the Proceed button. The process of copying of Acronis TrueImage Deluxe files on your computer will be executed and shown in a special window.

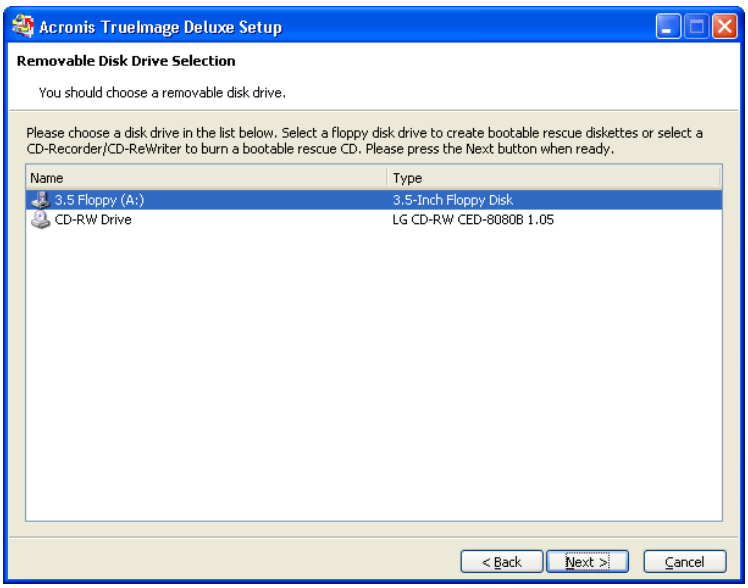


10. On the next page you will be asked to create a **bootable diskette or CD-R(W)** for Acronis TrueImage Deluxe. This is very important as the disk partition data restoration software can only be run from a bootable diskette or CD-R(W). Therefore it is strongly recommended you create either of them. You can also create the bootable diskette or CD-R(W) when the set-up process is finished.



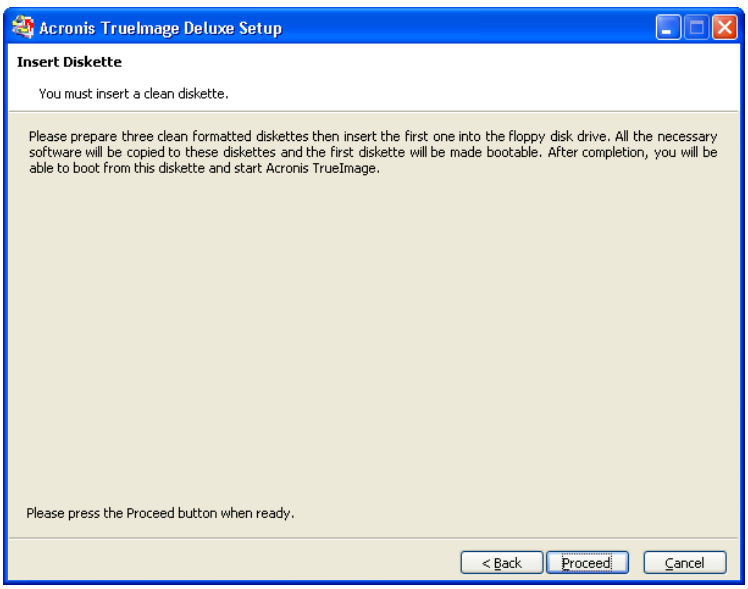
If you wish to create a bootable disk/disc, check the **Yes, I would like to create bootable rescue media** box and press Next.

In next window you will select a device for bootable media creation.

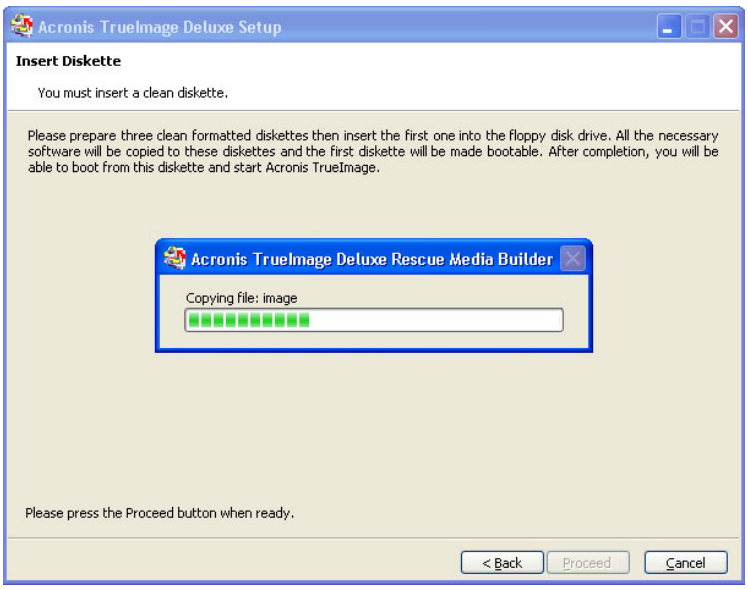


Acronis TrueImage Deluxe allows you to create either a bootable diskette or a CD-R(W) disc. Select the preferred device from the list.

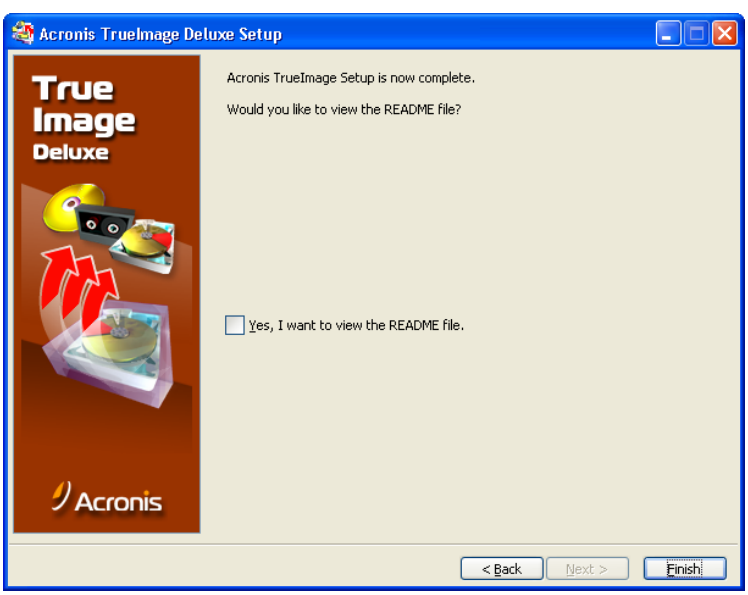
Having chosen a device and pressed `Next`, you will see the next window asking you to insert a diskette or a disc into the appropriate device.



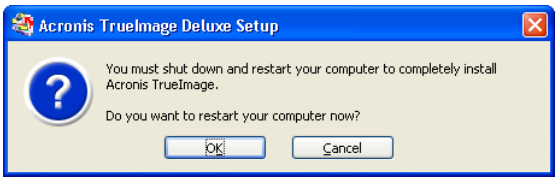
Having prepared a diskette or CD-R(W) and inserted it into the appropriate device, press Proceed. It will take some time to copy the necessary files to load Acronis TrueImage Deluxe. The copying process will be shown in the following window:



11. The installation process will be completed and you will be offered the opportunity to read the README file.



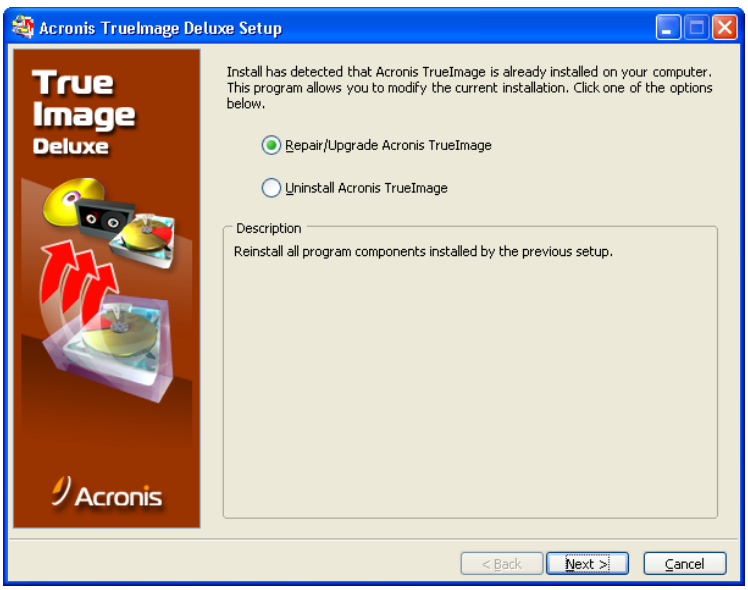
After installation of Acronis TrueImage Deluxe is completed, you should restart your computer.



12. Having opened Programs menu, you will find the Acronis program group containing the Acronis TrueImage Deluxe program. This menu will look like:

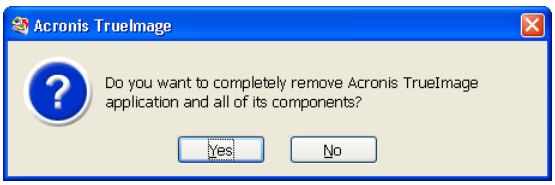
1.3 Repairing Acronis TrueImage Deluxe

If a bootable diskette or compact disc is spoiled, please create a new one. If you get an error message on trying to create a diskette or compact disc by selecting the **Bootable Rescue Media Builder** menu item, start the TrueImage Deluxe installation program again. It will determine that TrueImage Deluxe was already installed on your computer and will ask you if you want to restore (update) the program or completely remove it from disk.



1.4 Removing the software

To remove the software select Acronis -> TrueImage -> Uninstall Acronis TrueImage Deluxe from the Programs menu. You will see a dialog box asking if you really want to remove the software from your PC hard disk.



Press Yes to confirm removal. Acronis TrueImage Deluxe software will be completely removed.

1.5 User Interface

1.5.1 Terminology

In these paragraphs you will find information about the Acronis TrueImage Deluxe user interface, its main features and controls.

If you work with Windows, X Window, or OS/2 applications on a regular basis, you will have no problems understanding and using Acronis TrueImage Deluxe interface. However, for the sake of users that are not accustomed to standard user interfaces and for the fullness of description, here we provide a relatively detailed description of it.

1.5.2 User interface basics

Managing Acronis TrueImage Deluxe software

Acronis TrueImage Deluxe software works under the Windows operating system. It has a graphical user interface, controlled by mouse or Tab, Shift+Tab, Left, Right, Up, Down, Space, Enter, and Escape keys, and represents an application of a **Wizard** type, widespread in this OS environment.

While working with a partition store and restore wizard, a user sees a sequence of Wizard **pages**, on each of which he (she) selects from several available actions, and thus sets switches to the desired state.

The switches can be set with the mouse or keyboard.

Each dialog box contains detailed text comments for the dialog's purpose and switches (control elements) as well as for each switch state.

User interface elements and use are described further.

Using the Mouse

Acronis TrueImage Deluxe window interface performs best when using a mouse. Of course it is possible to do everything without one, but it is much less convenient.

In this guide we use «click the … button» expression instead of «place the mouse pointer on the button (object) and click the left mouse button (press and release the left mouse button)».

The mouse is used to check checkboxes, press buttons, select items (lines) from a list, etc.

Using the Keyboard

Everything that can be done with the help of a mouse can also be performed with the keyboard.

Switching between controls is done with `Tab` or `Shift+Tab` keys. The active control that has focus at the moment is marked with a dash line around it or along its perimeter (for screen buttons).

(Un)checking a checkbox (or selecting a radio button position) is done with the `Space` key.

Switching between dialog pages is done by pressing the `Next` (switching to the next page) and `Back` (to the previous one) buttons.

To quit the program press the `Escape` key or the `Cancel` button**.**

1.5.3 Windows

All actions that the user performs in Acronis TrueImage Deluxe are displayed in windows. A window is a rectangle screen area that has a title and a border.

Window border

A border is a line confining the rectangle of a window. All the contents of the window lie within this line.

If a window is resizable, you can resize it using its border. Point the mouse cursor at the border so that it changes to a double-headed arrow, press and hold the left mouse button, move the mouse until you get the desired window size, and then release the button. The lower border is used to change the height of a window, and the left and right borders allow changing its width.

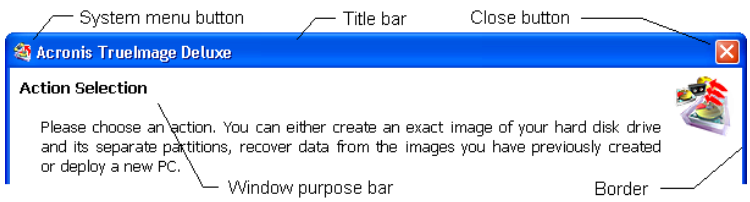
You can change the position of dialogs on the screen with help of their borders. Point the mouse cursor at the border so that it changes to a hand,

press and hold the left mouse button, move the mouse until you are satisfied with the position of the dialog, and release the button.

Window Titlebar

Titlebar is located on the top of a window and contains a text string that describes the window (the title itself) and minimize/maximize and close buttons.

The titlebar can also be used to change the position of a window on the screen. Point the mouse cursor at the titlebar so that it changes to a hand, press and hold the left mouse button, move the mouse until you are satisfied with the position of the dialog, and release the button.



Double-clicking the titlebar of a resizable window maximizes the window or reverts the maximized window to its original size.

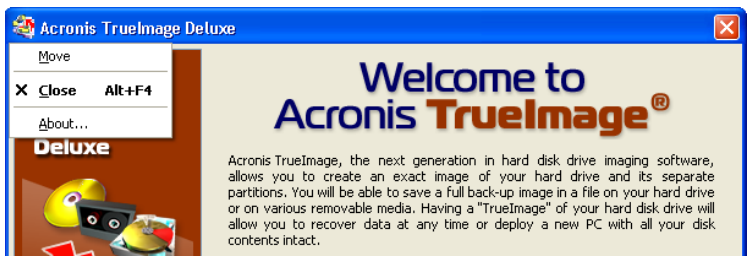
Window Purpose Bar

Window purpose bar is right below the titlebar and is supposed to inform the user about what action he/she has to perform on the given upgrade Wizard page, for example, check a checkbox, select an item from a list, or enter a value into a field.

Controls are located below the purpose bar.

System Menu

Clicking the , button in the upper left corner of a window opens the system menu for the window.



The system menu of Acronis TrueImage Deluxe windows contains the following items:

- Move – moves window along with mouse cursor;
- Close – closes the window.

Same result can be obtained by pressing the  .

1.5.4 Dialogs and Controls

A dialog box (dialog window, dialog) is a window that allows browsing and editing various information. Size of a dialog is usually fixed.

The user interacts with a dialog via **controls**. There can be the following controls in a dialog:

- Checkbox;
- Radio button;
- Edit field;
- Spinner – a special type of edit field: 

;
- List;
- Memo field;
- Slider;
- Button.

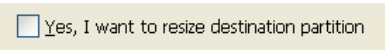
All these controls can be accessed both via the mouse and via the keyboard.

All controls of a dialog are grouped in a looped list. One of the controls is current (has **focus**) and reacts to the keyboard. Focus can be cyclically moved along the list forward (`Tab` key) and backward (`Shift+Tab` keys). Arrow keys also move the focus if they are not allocated in the current control for other purposes; they move the focus not cyclically, but according to actual position in the dialog.

Some controls can be blocked. In this case they are grayed and cannot be accessed either via the mouse or via the keyboard.

Checkbox

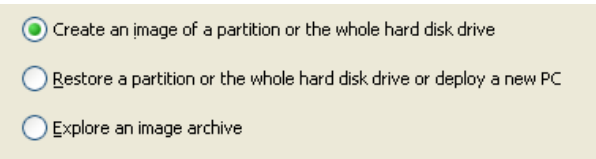
A checkbox is a control that can be in two states: on or off. If it is off, it is a blank square, if it is on, it has a tick (or a cross in text mode) inside it. To the right from the square there is a description of the checkbox. You can toggle the state of a checkbox either by clicking the square or its description, or by pressing the Space key when the checkbox has focus.



The description of a checkbox sometimes has an underlined letter in it. In this case pressing the underlined letter (if it is not allocated in the current control for other purposes) or pressing it together with the Alt key moves focus to the checkbox and toggles it.

Radio button

Like a checkbox, a radio button is a control with two possible states. If it is on the circle is filled, otherwise it is empty. Unlike checkboxes, radio buttons are arranged in groups, and one and only one radio button can be on in each group. Clicking the circle or the description of the radio button or pressing the Space key when the radio button has focus turns it on (and turns off all the radio buttons in the same group).

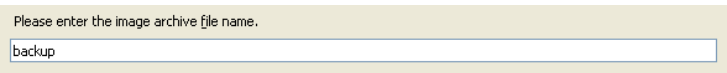


Acronis TrueImage Deluxe software uses radio buttons for:

- Selecting operations (creating, restoring images, etc.);
- Selecting a device for image creation (a hard disk or removable media);
- Selecting a type of partition (disk) image creation: as a single file or split into separate volumes;
- Selecting a type of a partition to be restored (primary / logical);
- Selecting a file system of a partition to be restored (FAT16 / FAT32).

Edit Field

The purpose of an edit field is to browse and edit information in the form of a text string.



A text string can be edited only via the keyboard. Clicking the mouse moves the focus to the edit field. When an edit field gets the focus, the string in it becomes highlighted. Typing anything over a highlighted string removes the old contents of the field and replaces it with newly typed characters. You can cancel highlighting by pressing the Left or Right arrow keys, and then you can edit the contents of the field. Current editing position is marked with a rectangular cursor. Aside from Left and Right arrow keys and the mouse you can use the following keys when editing a string:

- Home moves the cursor to the beginning of the string;
- End moves the cursor to the end of the string;
- Backspace deletes a character to the left from the cursor;
- Del deletes the character under the cursor.

Acronis TrueImage Deluxe software uses edit field for:

- Entering an archive filename as well as its full path;
- Entering a password and its confirmation.

Spinner

A spinner is a special type of field:

Its special feature is that you can either enter the desired value manually or use the up and down arrows in the right part of the spinner to scroll the value of the field. While you keep one of these buttons pressed (by holding the left mouse button pressed above the arrow) the contents of the field will either decrease or increase.

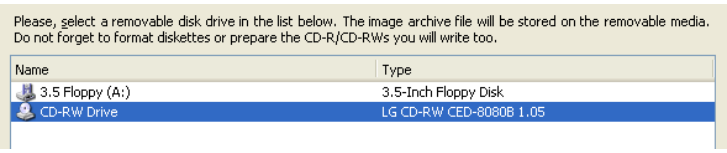
Acronis TrueImage Deluxe software uses spinners for:

- Entering volume size of an archive file,
- Changing partition size and location at its restoration.

List

Lists are used in dialogs to select one item from a group (which can be quite large) or to perform some actions with the item (delete it from the group, edit it, etc) or with the group itself (add an item, change the order of items, etc).

A list is a rectangle with several lines, each designated to one item. If the items do not fit into the rectangle horizontally or vertically, horizontal and/or vertical scrollbar appears.



Acronis TrueImage Deluxe software uses lists for presenting available removable media connected to your PC, and also for selecting certain media for back-up copying.

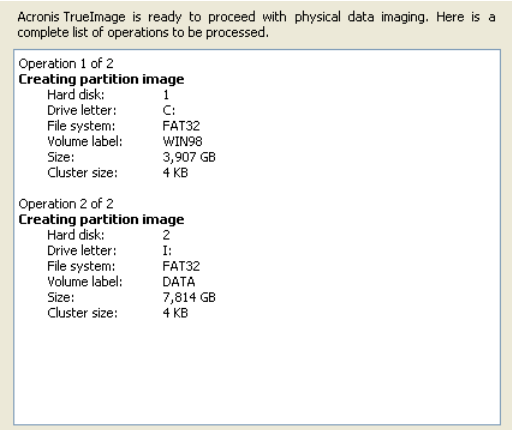
The following keys are active in a list:

- Up and Down keys move the cursor one line up or down respectively;
- Left and Right keys scroll the contents of the list left or right if the list does not fit into the rectangle horizontally;
- PgUp and PgDn keys move the cursor one page up or down respectively;
- Home and End keys move the cursor to the beginning or the end of the list respectively;
- Enter key can be allocated to perform some action with the selected item, e.g. opening the properties dialog for example.

Same actions can be performed on the list with the help of the mouse. Clicking an item moves the cursor to it. Vertical (one line/page up or down)/horizontal scrolling is done with the vertical/horizontal scrollbars. Double-clicking an item is usually equivalent to pressing the Enter key on it.

Memo Field

A memo field is a rectangle in which a text is displayed. If the text does not fit into the rectangle, scrollbars appear.



The following keys are active in a memo field:

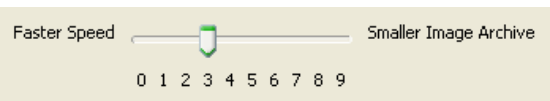
- Up and Down keys scroll the text one line up or down respectively;
- Left and Right keys scroll the text left or right if it does not fit into the rectangle horizontally;
- PgUp and PgDn keys move the cursor one page up or down respectively;
- Home and End keys move the cursor to the beginning or the end of the text respectively.

Some actions can be performed on the memo field with the help of the mouse. Vertical (one line/page up or down)/horizontal scrolling is done with the vertical /horizontal scrollbars.

Acronis TrueImage Deluxe uses view fields for viewing generated image creation or partition restoration script as well as for representing a script in back-up copying and restoration processes.

Slider

A slider is a graphic interface element for setting software parameters that change from the minimum to maximum continuously or stepwise (for example, a sound volume slider under the Windows OS). Acronis TrueImage Deluxe software uses sliders for setting partition data compression level of an image.



Button, Default Button

A button is a control that is most frequently used in dialogs. One can tell from its name that the main action one can perform with a button is press it.

You can press a button either with the mouse by clicking it or with the keyboard (by pressing Enter or Space key when the button has focus, or by

pressing the Alt key together with the letter that is underlined on the button).

A dialog usually has a default button. It differs from usual buttons, because double-clicking the mouse or pressing the Enter key (if they are not allocated for other purposes in the current control) is equivalent to pressing the default button. Unlike other buttons, the default button is highlighted.

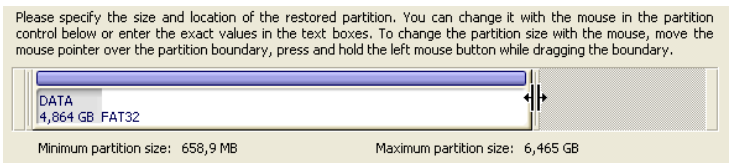
Acronis TrueImage Deluxe software uses buttons for transitions between image creation and restoration wizard pages, exiting the program, and also for executing scripts.

Resizing and Positioning a Partition Graphically

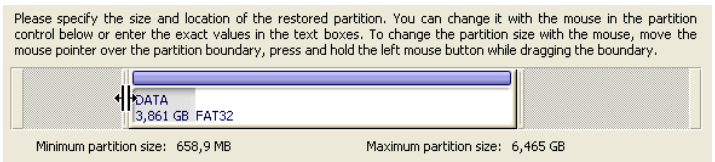
A special graphical control that is shown below is used to graphically resize and position partitions on the hard disk.

This control is a rectangle that represents a partition of a hard disk. You can «grab» the left or right side of this rectangle and move/resize the rectangle.

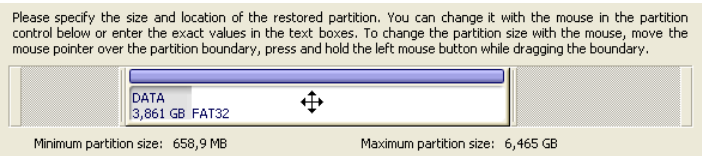
Point the mouse at the vertical «engraved» line on the right side of the rectangle, and the mouse cursor will change to two vertical lines with two arrows (left and right) around them. Click and hold the left mouse button and move it to the left. You will see that the right side of the rectangle also moves to the left, and the size of the rectangle changes.



The same is true for the left side of the rectangle, and you can change its position with respect to the left side of the window.



Finally, you can change the position on the disk (move it as a whole). Click and hold the left mouse button on the rectangle symbolizing the partition (the mouse pointer changes to a hand), and move it to the left or to the right. The rectangle will move along with the pointer.



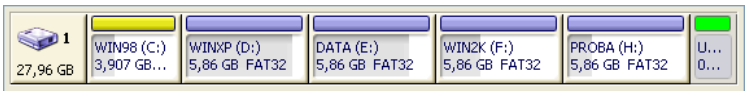
The program will remember the position and the size of the partition that you have entered this way and will use them when creating the transformation scenario.

1.5.5 Informative Elements

Aside from controls TrueImage Deluxe uses elements that inform you about some parameters of hard disk structure and the actions the program performs.

Hard Disk and Partition Parameters

On the picture you can see the parameters of a hard disk as they are displayed by the TrueImage Deluxe program.

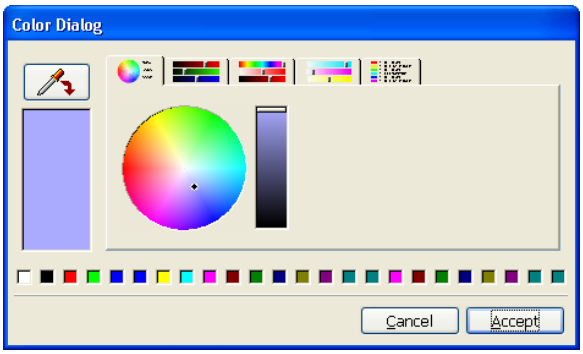


Here you can see the structure of hard disk #1; its capacity is 27.96 GB. There is one primary partition on the disk (yellow; color codes are explained in the bottom part of the picture) with FAT32 file system and SYSTEM partition label and set of logical partitions. Some disk space is unallocated.

The above-described presentation of hard disk structures is used in Wizard pages that prompt you to select source and destination disks.

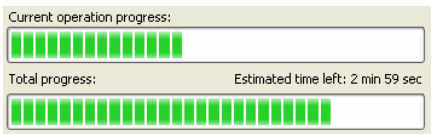
The colors that show primary and extended partitions, and unallocated disk space can be changed. Click the desired element (or move focus to it by pressing the Tab or Shift+Tab keys, and press the Enter key afterwards).

Color setting dialog opens. Here you can either select the desired color from the samples in the lower part of the window by clicking the color you like and pressing the Accept button (you can also select the desired sample by moving focus to it with Tab or Shift+Tab keys and pressing the Enter key), or create your own color by moving the Red, Green, and Blue sliders in the upper part of the window until the color in the rectangle to the right suits you. Press the Accept button to finish color selection.



Progress Bar

A progress bar is a purely informative dialog element (it is not a control). It is used to display the current state of some lengthy process (copying a partition etc.).



1.5.6 Special Dialog Types

Wizard

A Wizard is a dialog that allows displaying and editing information in several pages, like the properties dialog. Unlike the latter you can move along the Wizard's pages only in a one-after-another fashion. This makes it possible to make the contents of later pages not fixed, but adjustable to the actions you perform on earlier pages.

In the lower part of a Wizard page there always are 3 buttons:

- <Back moves you to the previous page. This button is disabled on the first page.
- Next> takes you to the next page. On some pages this button can have other names. On the last page this button finishes the Wizard and starts the actions that you have chosen in it.
- Cancel exits the Wizard and negates all actions you were going to perform. On some pages this button can have other names.

There is no Help button on Wizard pages. It is unnecessary because on each page there is detailed information about the purpose of the page and its controls. Moreover, there is detailed information about what possibilities you get if you select any of controls in any possible state.

Almost all Acronis TrueImage Deluxe windows are Wizard pages.

1.6 Running Acronis TrueImage Deluxe software

Acronis TrueImage software runs in different modes during disk/partition image creation or restoration, in case of a serious system malfunction or disk filing structure damage.

To create a disk/partition image under Windows, select Start -> Programs -> Acronis -> TrueImage -> Acronis TrueImage Deluxe. You will immediately see a welcome window containing the partition (disk) image creation and restoration wizard.

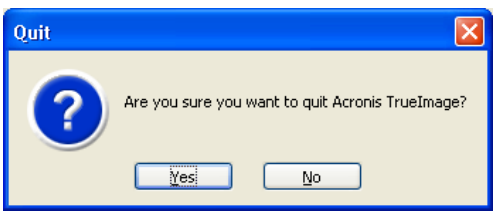
If your system is damaged and you are unable to boot the PC from its system partition, you should use the bootable diskette or CD-R(W) that you previously created, selecting Start -> Program -> Acronis -> TrueImage -> Bootable Rescue Media Builder.

1.7 Finishing the work with Acronis TrueImage Deluxe software

You can exit Acronis TrueImage Deluxe software anytime simply by clicking `Cancel` or pressing `Escape`.

Clicking  window close button, selecting `Close` in the window's system menu, or pressing `Alt+F4` will produce the same result.

In any of these cases, the program will always ask if you really want to quit, as shown in the following dialog box:



Press `Yes` to quit the program.

2. Creating disk/partition images

2.1 Creating a disk/partition image on a hard disk

2.1.1 Welcome page

Acronis TrueImage Deluxe software starts with the welcome page (Figure 2.1). It enumerates all the main software capabilities, described in the Introduction.

Let's shortly revise them once again. The software allows to create images of hard disk partitions or the whole disks and store them in an archive file. This file can be created on any hard disk or removable media (Acronis TrueImage Deluxe software allows to create archive files using CD-R, CD-RW, Iomega Zip, an other devices). Any partition can be further restored from an image, stored in an archive file.

While working with whole partitions and hard disks, Acronis TrueImage Deluxe software still allows to restore separate files from an image. For this purpose Acronis TrueImage Deluxe has image contents viewing tools for representing partition images as usual logical drives. You can work with this connected drive with any file manager like with a usual hard disk. Acronis TrueImage Deluxe allows to disconnect the disk after necessary files and/or folders are restored from it by simple copying.

All above functions allow to organize data back-up copying and restoration (or to revert a system back) on a PC or several PCs in a small office. Besides, an archive file can be used for deploying systems on identical computers (hard disk cloning), and also for replacing PC hard disks.

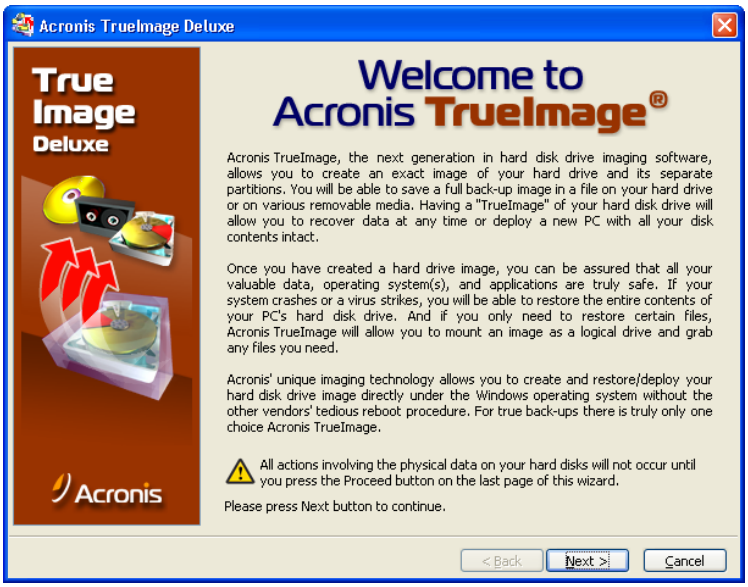


Figure 2.1. Wizard Welcome window

Press Next to begin working with Acronis TrueImage Deluxe software.

2.1.2 Selecting an action

The next wizard window will offer you to select an **action** to perform with the help of Acronis TrueImage Deluxe (Figure 2.2). There are **three** actions available:

- Create an image of a disk partition and/or the whole hard disk drive (a group of partitions, several partitions);
- Restore a partition (disk) from an image file, stored in an archive file;
- Connect an image, stored in an archive file, as a temporary logical drive to restore separate files and/or folders.

A connected disk can be unplugged by calling **Unplug** function from its context menu or from Acronis TrueImage Deluxe itself. Running the software with a disk connected causes the additional **Unplug back-up archive logical drives** switch to appear in the **Action Selection** window (see 3.4.3 «Disconnecting a drive»). Still it's not necessary to unplug the disk, as it will automatically disappear after reboot.

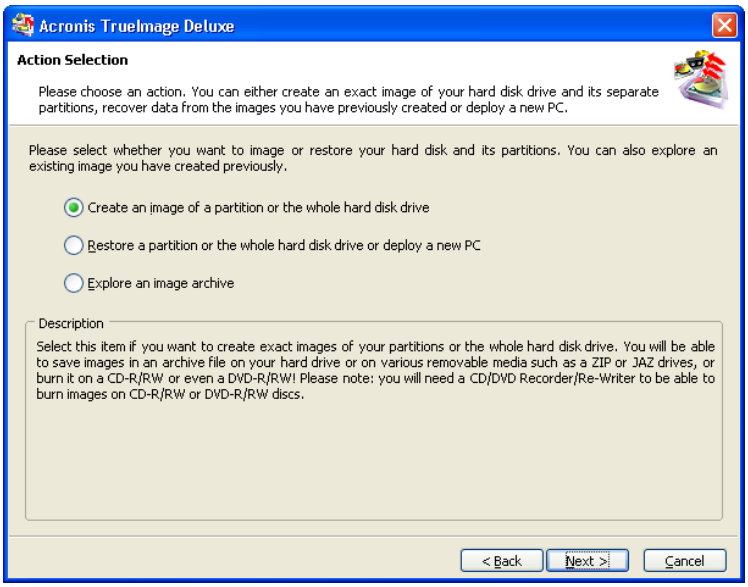


Figure 2.2. Action Selection window

Set the switch to **Create an image of a partition or the whole hard disk drive** position. Click Next to continue.

2.1.3 Selecting partitions for image creation

In the next **Selecting Partitions to Image** window (Figure 2.3) you will see the structure of the disks connected to your PC. Click a rectangle representing a partition to select it. As a result this rectangle will become underlined red. You'll be able to consequently select several hard disk partitions and/or different disks. Click a rectangle representing the whole hard disk (with an icon, disk number and capacity) to select it for image creation. As a result all disk's partitions will become underlined red. You'll be able to select one or several disks as well as a random serie of partition and disks for image creation.

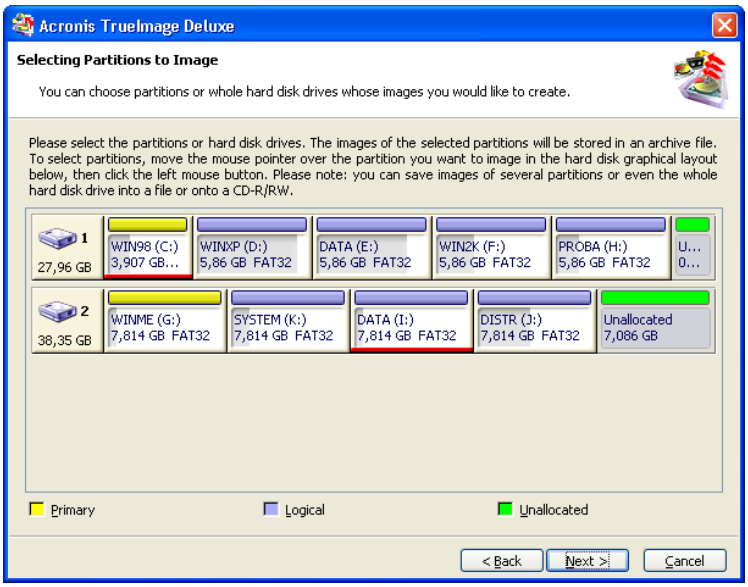


Figure 2.3. Selecting Partitions to Image window

Having chosen the partitions and/or disks, click Next to continue. Have in mind that this button will be disabled until none of partitions and disks is selected.

2.1.4 Image archive location

In the next **Image Archive Location** window you'll need to select a **type of a device** to create a disk/partition image on (Figure 2.4). Acronis TrueImage supports only two device types:

- Any hard disks,
- Removable media – CD-R, CD-RW, Iomega Zip, Iomega Jaz, magneto-optical, and other drives.

Acronis TrueImage Deluxe software is intended for individual PC users and small offices, therefore this guide describes only drives available to these categories of consumers.

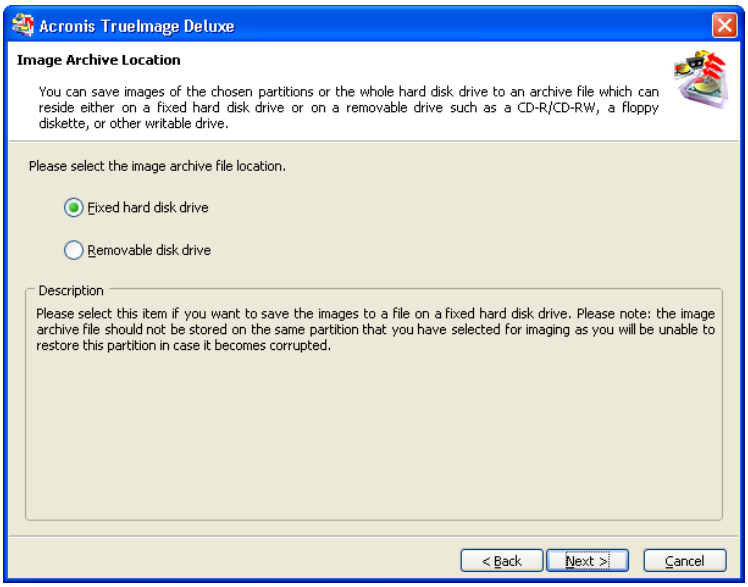


Figure 2.4. Selecting Image Archive location

Let's assume you have chosen a hard disk as an image creation device. Click `Next` to continue.

Creating an image on a removable media will be described in the next section of this chapter; see 2.2 «Creating a disk/partition image on removable media».

2.1.5 A disk/partition archive file

In the next **Image Archive Creation** window you'll need to provide an archive filename to store images of chosen partitions (disks) to as well as its full path (Figure 2.5). Enter a filename to the **File name** field.

You can also use a connected disks tree in the left part of the window to find archive files (if previously created) and their locations.

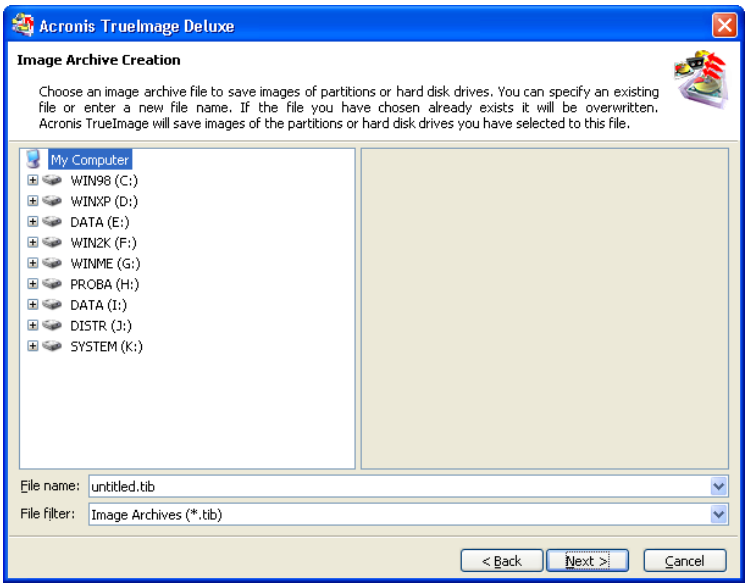


Figure 2.5. The list of devices, connected to the PC

Select a hard disk and click the "+" sign to the left of its icon to browse a list of files and folders of this disk (Figure 2.6). Select a necessary file from the list.

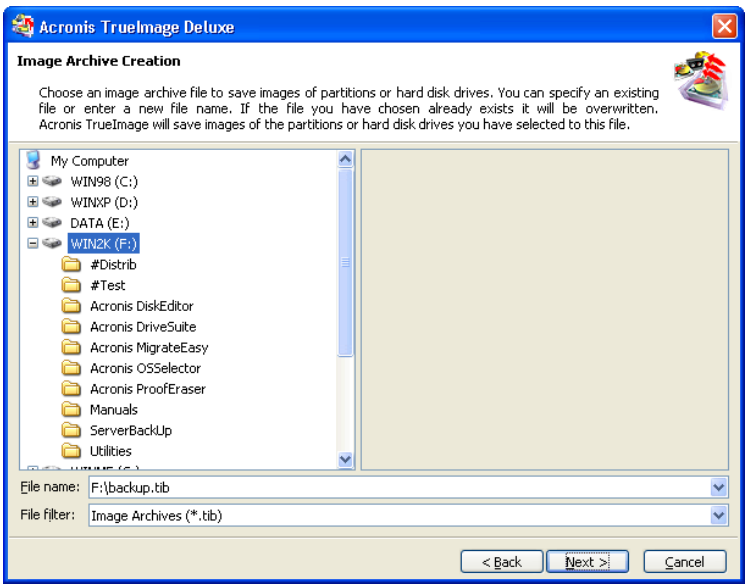


Figure 2.6. Selecting a folder and an archive file name

You can assign a filename along with its path in the appropriate field, for example, F:\backup\backup1.tib. The disks and folders tree will be set to correspond the entered filename and the path, i.e. this file will become a current selection on the figure.

A filename on a hard disk can contain up to 255 symbols. If the F:\backup folder is already exists on the F:\ disk, an archive file will be created inside it.

If there's no F:\backup folder on the F: disk, it will be created along with an archive file inside it.

If an archive file with the entered filename already exists in the chosen folder, you'll be prompted about it by Acronis TrueImage with a question if you want to create a new file with the same name, that is to delete an old archive file and create a new one instead (Figure 2.7).

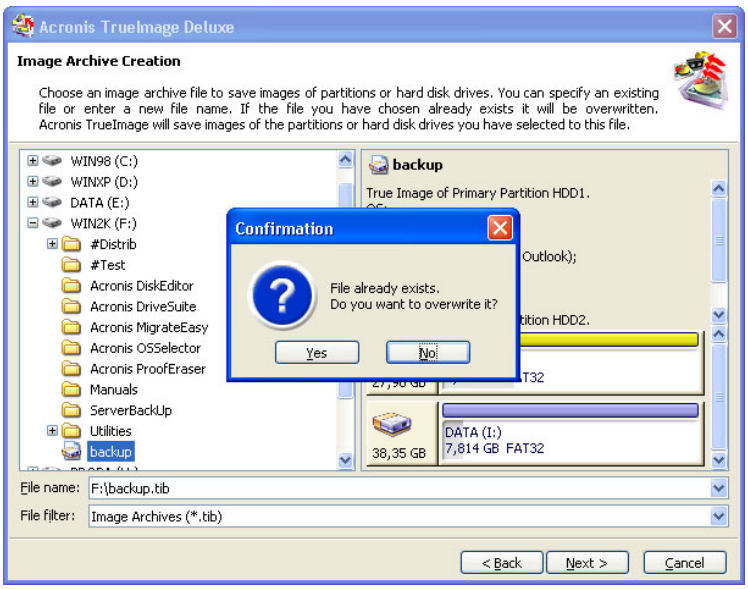


Figure 2.7. An archive file with the filename entered is already exist.

If you click Yes, an old archive file will be deleted and replaced by a new one.

You can store images of several partitions or even disks in a single archive file, but you can't **append** images to an existing archive file. You can also create an archive file with an image of the partition (disk) **on the same partition** (disk), included into an archive, if there's enough free space.

An archive file can be created on a **network** disk. You might need to regularly create images of a partition with an accounting database, for example. It's most efficient to keep partition images on a server or to create an image library on a CD-R(W). To speed up the process you can create a multivolume archive on a hard disk and then move archive volumes to a CD-R(W).

Having chosen (or entered) a filename and its path, click Next to continue.

2.1.6 Image's data compression level

In the next **Compression level** window you'll need to select a data compression level of a partition image. A compression level can be selected by moving the slider (Figure 2.8). If you select zero compression, files will be obviously moved to an archive file without any compression, which is inefficient. On the other hand the work speed might drop and image creation time might increase, if you select the maximal compression. Certainly, the optimal compression level depends on the type of files, stored on a disk/partition, and can only be determined empirically.

For example, we chose the primary hard disk partition with the Windows 98 operating system installed. The partition size was 3.89 GB, actually occupied space – 683 MB, so the largest part of the partition was free. We chose the 3rd compression level for image creation. The resulting file turned out to be 267 MB. As you can see, the given partitions were actually compressed by 2.6 times, but you shouldn't highlight it much, as these values are very rough, because different files are differently compressed.

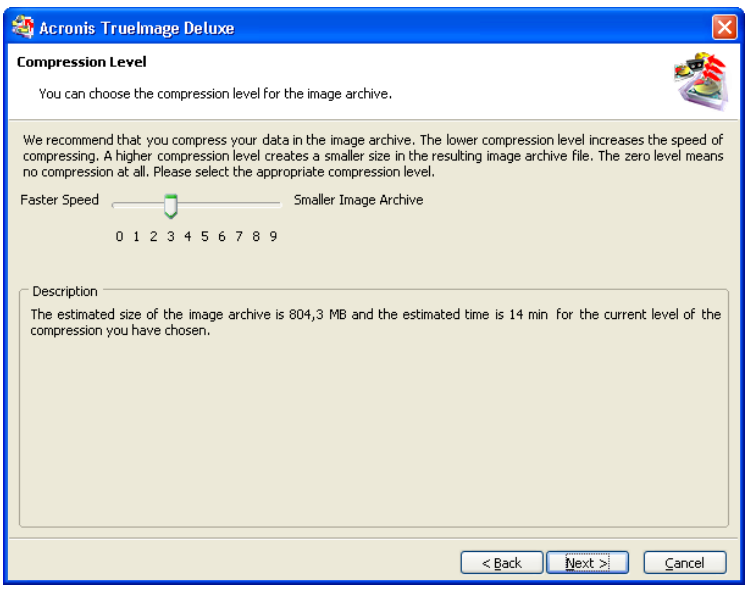


Figure 2.8. Image's data compression level

Having chosen the compression level, click Next to continue.

2.1.7 Creating archive volumes

In the next **Image Archive Splitting** window you'll be able to select if the software should create a single archive file or split it into a number of **volumes**. If you set the switch to **Automatic**, Acronis TrueImage Deluxe will try to determine settings for certain situations itself. If there's enough space on a hard disk that you've chosen for locating an image on, the software will create a **single** archive file. If there's not enough space, Acronis TrueImage Deluxe will prompt you a **warning** and wait for your actions. You'll be able to

try to and free some additional space on the partition, where an archive file is being created, and then continue the image creation. But you will also be able to terminate Acronis TrueImage Deluxe, prepare a partition for image creation, and run the process anew.

FAT16 and FAT32 limit file sizes. In particular, the maximal file size of FAT16 and FAT32 is 4 GB. FAT32 file system is currently the most widespread in individual users' PCs. At the same time modern hard disks have 20 GB, 40 GB, and higher capacities! Hence the maximal file size can be easily exceeded at creating an archive file. In this case Acronis TrueImage Deluxe will automatically split an archive file into separate volumes.

If you are creating an archive file on CD-R, CD-RW disks in **Automatic** mode, Acronis TrueImage Deluxe will simply pause and prompt you to insert a new disk into the drive, if the current disk space is fully occupied.

If you set the switch to **Fixed Size** and set the volume size in megabytes (MB), then, for example, having 4 GB partition size, 3.2 GB of which are actually occupied with data, and 600 MB volume size, it will be possible to create backup.tib, backup1.tib,... backup4.tib volumes on a hard disk. The actual quantity of volumes depends on data files, stored on a partition, and their possible compression level. If there are mostly text files, they will be compressed very well, and you'll get some three or four archive volumes, for example. But if there are graphic files, they'll be compressed to a lesser degree, and you'll get some five volumes, for example.

Splitting an archive file into separate fixed size volumes makes sense when storing it on a hard disk as well, as you'll be able to move archive volumes to CD-R, CD-RW disks in the future. Creating an archive file directly on a CD-R, CD-RW disk would have taken much longer time then in case of a hard disk.

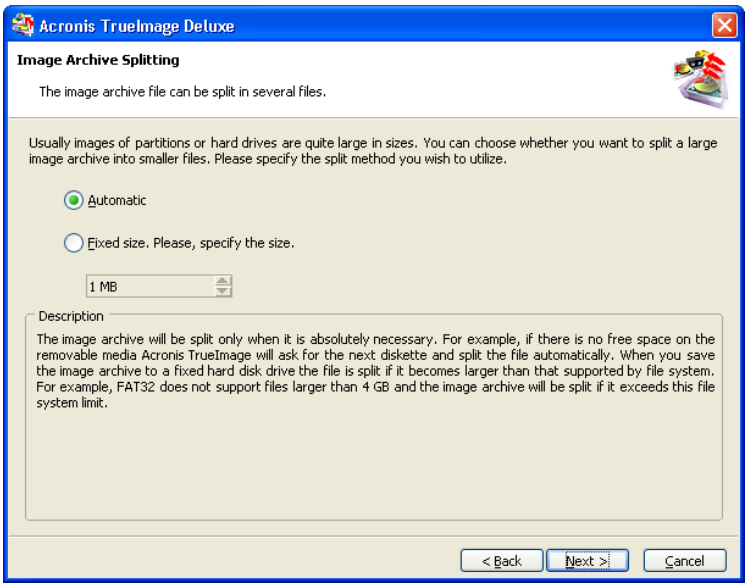


Figure 2.9. Splitting an archive file into separate volumes

Having set the image creation mode (**Automatic** or **Fixed size**) and entered an archive volume size if needed, click Next to continue.

2.1.8 Protecting an archive file with a password

An archive file with a partition (disk) image can be protected with a password. If you think a partition (disk), you create an image of, shouldn't be restored by anybody except you, enter a **password** and its confirmation into the text fields of the next **Image Archive Protection** window (Figure 2.10). A password should consist of at least 8 symbols and contain both letters (in the upper and lower cases desirably), and numbers. (So it would be harder to hack it.)

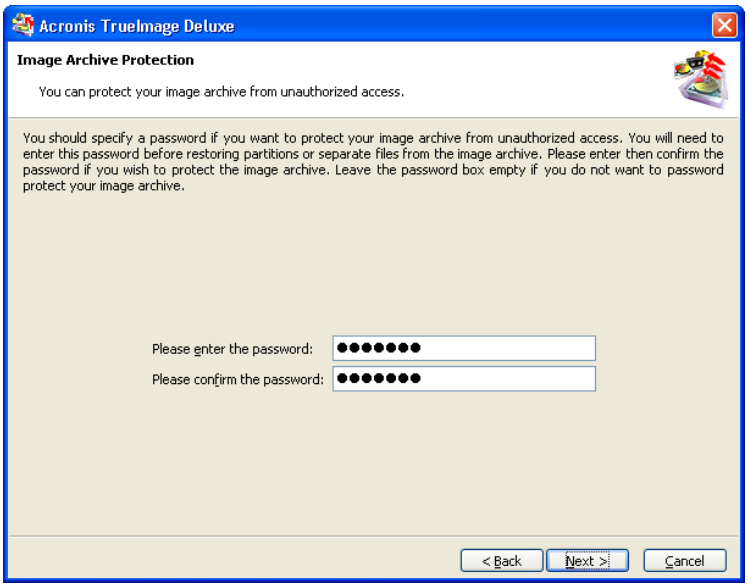


Figure 2.10. Protecting an archive file with a password

When you try to restore a password protected partition (disk) from an image, stored in an archive file, Acronis TrueImage Deluxe will prompt you to enter it into the appropriate window and won't allow restoring it by a person without this password.

Click Next to continue.

2.1.9 Commenting an archive file

In the next window you'll be able to provide an archive file with any comment that may include any information on the PC and its user, the hard disk, partition data, image creation time, and any peculiarities and conditions (Figure 2.11). For example:

```
True Image of Primary Partition HDD1.
OS:
    Windows 98SE.
Applications:
    Office 97 (Word, Excel, Outlook);
    Adobe Photoshop
    Adobe PageMaker
    Adobe Acrobat
True Image of Primary Partition HDD2.
    Financial Database.
24.02.2002
```

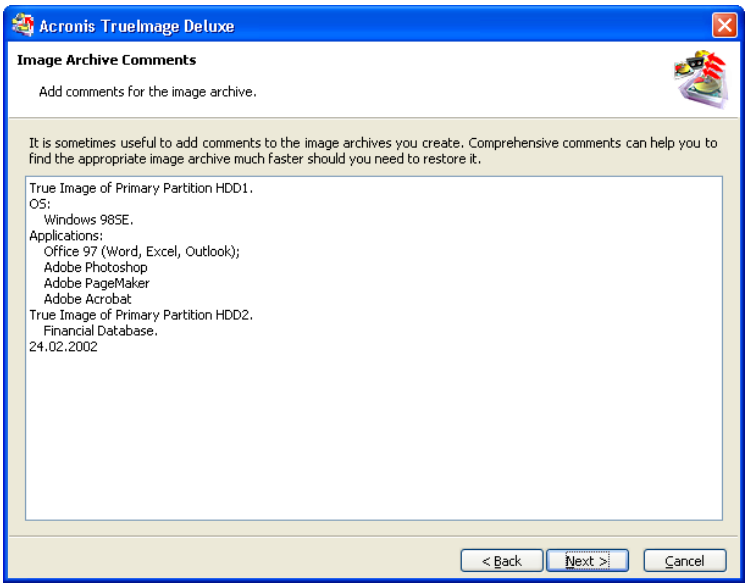


Figure 2.11. Commenting an archive file

Click Next to continue.

2.1.10 Image creation script

In the next window you'll see a partition (disk) image creation script (several images, perhaps). It will contain a list of operations to be performed on partitions (disks) along with their main features.

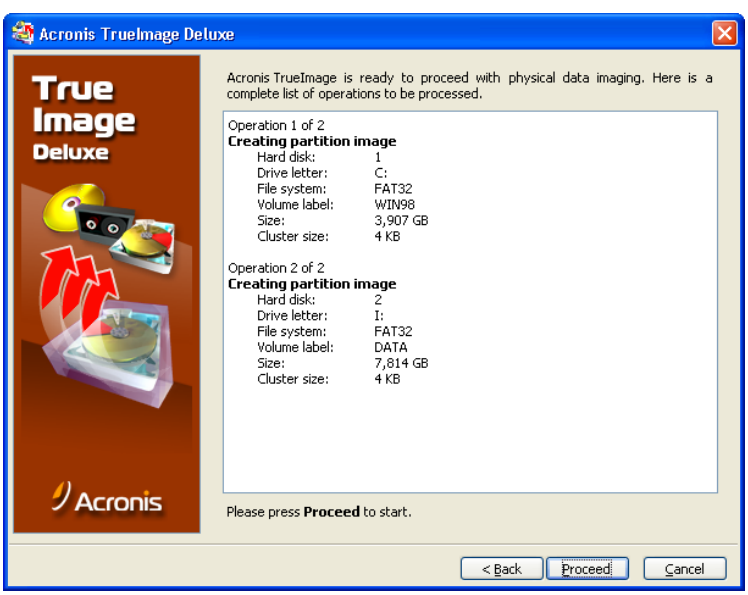


Figure 2.12. An archive file creation script

All operations of a partition (disk) image creation in an archive file are delayed in Acronis TrueImage Deluxe. A partition (disk) image creation script is created first, and then it's executed.

Script creation includes the following steps, as you've seen before:

- Selecting partitions (one or several) and/or disks,
- Selecting a device type to create an archive file with a partition and/or disk image on,
- Selecting a file or entering an archive file name,
- Selecting a data compression level of an archive file,
- Selecting an archive type (single or multivolume),
- Protecting an archive file with a password,
- Commenting a partition and/or disk archive file.

Now Acronis TrueImage Deluxe software is ready to perform a procedure of image creation in an archive file. If you click `Back`, you'll be able to select other partitions and/or disks for image creation, other compression level, etc. You will be able to change any image creation parameters until you click `Proceed`. By clicking this button, you execute an image creation script.

Click `Proceed` to execute a partition and/or disk image creation script.

2.1.11 Creating an image

You will see the image (several images, perhaps) creation script progress window.

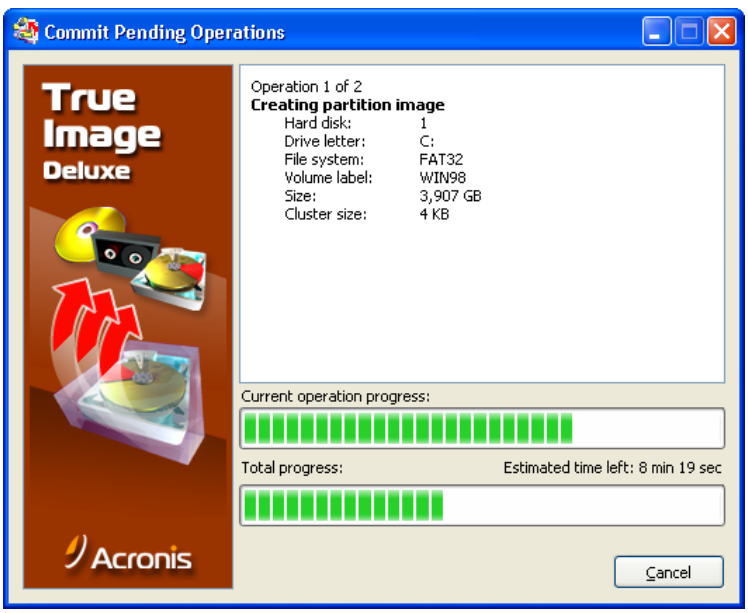


Figure 2.13. Image creation process

This window will contain the estimated time of image creation in addition to the main partition (disk) features, which image is being created.

2.1.12 Finishing image creation

Image creation procedure finishes by way of such a message:

Figure 2.14. Finishing image creation

Clicking Exit closes Acronis TrueImage Deluxe.

In this certain case a partition with 689 MB of data was compressed to a 267 MB archive file. It took 3 minutes to create it. (We remind that these values are very rough, as files of different types can be compressed very differently.)

2.2 Creating a disk/partition image on removable media

2.2.1 Selecting a partition and an action

The initial stages of working with Acronis TrueImage Deluxe software, when creating a partition and/or disk image on **removable media**, are the same as when creating it on a hard disk. It is started with the welcome window (Figure 2.1); then you select an action to be performed (**Create image of a partition or the whole hard disk drive**; Figure 2.2); then you select partition(s) and/or disk(s) to create images of (Figure 2.3). Now you should set the switch to **Removable disk drive** in the **Image Archive Location** window (Figure 2.4).

2.2.2 Selecting a removable disk drive

Having clicked Next, you'll see a list of removable media drives, connected to your PC, in the next window (Figure 2.15). The most popular devices of

this type include Iomega Zip, CD-R, CD-RW drives, DVD-R, DVD-RW, magneto-optical drives, and some other. Anyway, all removable media drives, connected to your PC, will be enumerated in this list. In the given case there's only LG CD-RW 8080B (8x/4x/32x) recorder in it, except a usual 3.5'' floppy drive.

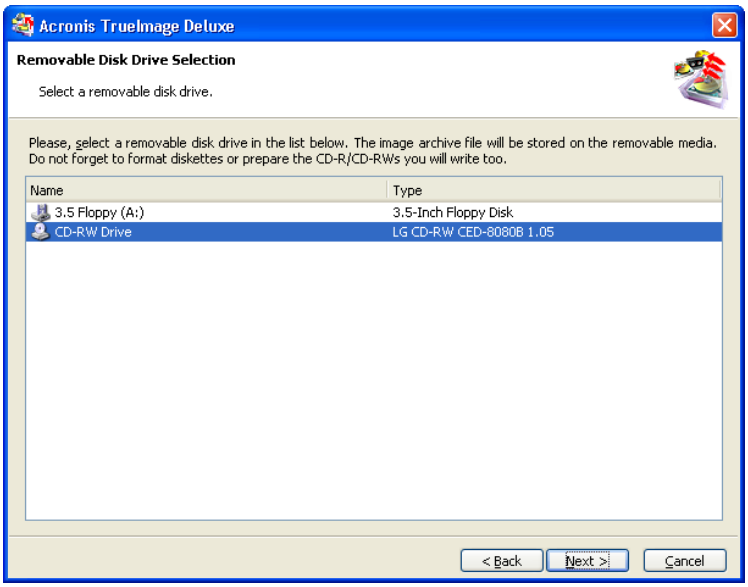


Figure 2.15. Available removable media drives

Click a drive you want to create a partition and/or disk image on. Click `Next` to continue.

2.2.3 The following actions

In the next window you'll be asked an archive file name (Figure 2.16). It's completely the same as the window on the figure above. However, creating images in archive files on a CD-R or CD-RW differs from creating images in archive files on a hard disk:

- A filename length can't exceed 24 symbols (including a dot and three extension symbols);
- A file is created in the root of a CD;
- No need to enter a file path, i.e. a filename isn't entered like, for example, G:\back-up1.tib (where G: is a recorder drive), but simply like back-up1.tib, as you have chosen a drive in the previous window;
- If Acronis TrueImage will find a file with the entered name on a CD-RW disk, it will replace it with a new one.

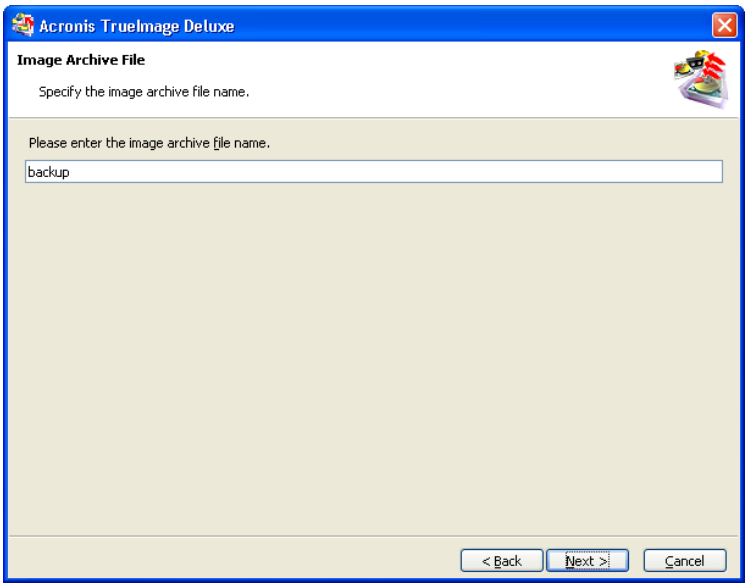


Figure 2.16. An archive file name for CD-R(W) recording

If a CD-RW disk already has an archive file, created earlier by Acronis TrueImage Deluxe, the software will be able to append one (or several) more archive files to the disk, having enough free space. If a CD has been recorded by another software, Acronis TrueImage Deluxe won't be able to record an archive file to it, even having enough free space.

Click Next to continue.

All the following pages of the partition (disk) image creation wizard are completely the same as the above (Figure 2.8 – Figure 2.11) including:

- Selecting a compression level,
- Splitting an archive file into volumes,
- Protecting an archive file with a password,
- Commenting an archive file,

and finish with the script window.

When creating an image in an archive file on removable media (CD-RW), you can leave the default **Automatic** setting in the **Image Archive Splitting** window. Working with removable media, Acronis TrueImage Deluxe software will automatically determine the number of CD-RW disks, needed to create an image, and will prompt you to insert a new disk into the drive if needed. CD-R, CD-RW recording begins with a prompt to insert the first disk into the drive (Figure 2.18).

2.2.4 The script window

Having commented an archive file, you'll get to the script window of image creation in an archive file on removable media (Figure 2.17).

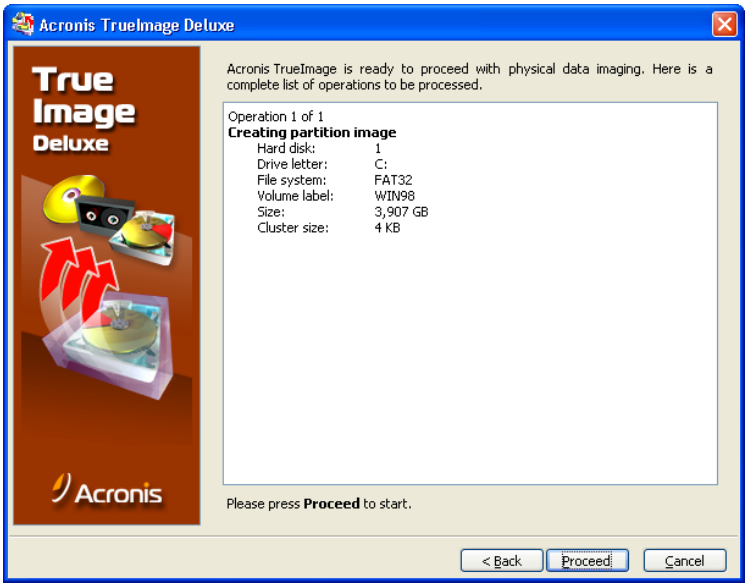


Figure 2.17. The script window of image creation in an archive file on removable media

As you can see, the script window of image creation in an archive file on removable media is the same as the script window of image creation in an archive file on a hard disk (Figure 2.12).

We'll remind that has been already said about creating an image on a hard disk: now Acronis TrueImage Deluxe software is ready to execute the partition image creation procedure. If you click `Back`, you'll be able to select other partitions and/or disks for image(s) creation, etc. You'll be able to change any image creation parameters, until you click `Proceed`. By clicking it, you'll execute the image creation script.

So, click `Proceed` to continue.

2.2.5 The script progress

Having clicked `Proceed`, you'll see the script progress window. As the image is being created in an archive file on removable media, you'll be prompted to insert a new disk into the drive.

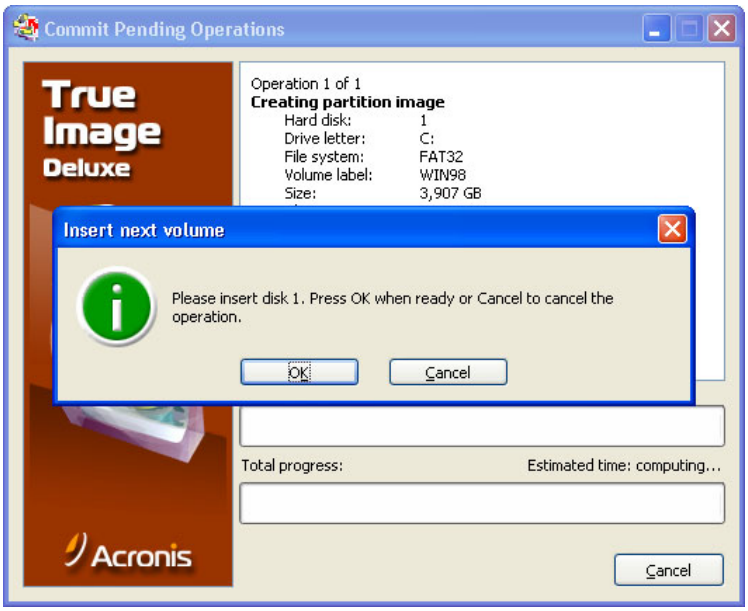


Figure 2.18. Insert a disk into the recorder

Having inserted a disk, click OK. The procedure of recording an archive file to CD-R or CD-RW recorder will begin.

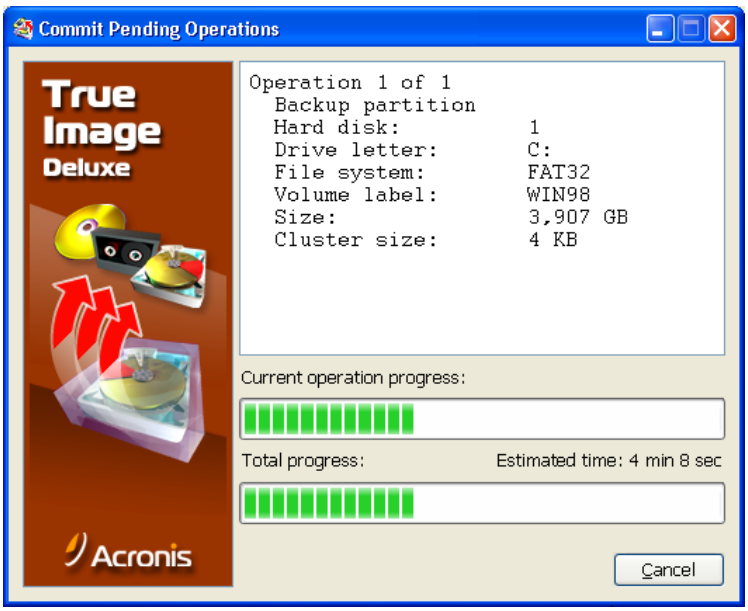


Figure 2.19. Image creation progress

If an archive file can't be recorded to a single CD-R (or CD-RW) disk, Acronis TrueImage Deluxe software will pause image creation and prompt you to insert another disk into the drive.

The image creation procedure finishes with a message window completely the same as on the figure above (Figure 2.14).

3. Restoring a disk/partition from an image

3.1 Restoring a partition (disk)

Partition or disk restoration from an image is a more complex procedure than storing. When you store a partition, you can do it directly under Windows or from a bootable CD. But your system is assumed inoperable in general.

If your data partition **files** are corrupt, you'll be able to restore the partition with Acronis TrueImage Deluxe directly under Windows.

However, if your **system** or a system partition (usually the primary one) is damaged, it gets more complex. In this situation there's only way to restore everything: booting from a diskette, created with Acronis TrueImage Deluxe, or from a bootable CD with Acronis TrueImage Deluxe.

You can run Acronis TrueImage Deluxe from a CD and then replace a bootable disk with an archive file CD, containing the image of a partition to be restored. But an archive file can be possibly stored on a special back-up hard disk. In this case you'll have to connect it to PC.

There's a simple rule: do not store archive files with partition images on the same hard disk you create back-up copies of. As in case of filing structures (for example, Partition Table) damage, you'll just not be able to access these images!

So, the main thing for partition restoration is the availability of a **bootable media (a diskette or CD)**, created with Acronis TrueImage Deluxe, and also the access to an archive file with a partition image (on a hard disk or removable media).

After you ran the software from a diskette or a CD and got to Acronis TrueImage Deluxe welcome window, the further steps should not be of any difficulty to you.

3.1.1 Selecting an action: restore a disk/partition

To restore a disk/partition from an archive file you must set the switch to **Restore a partition or the whole hard disk drive or deploy a new PC** in the **Action Selection** window.

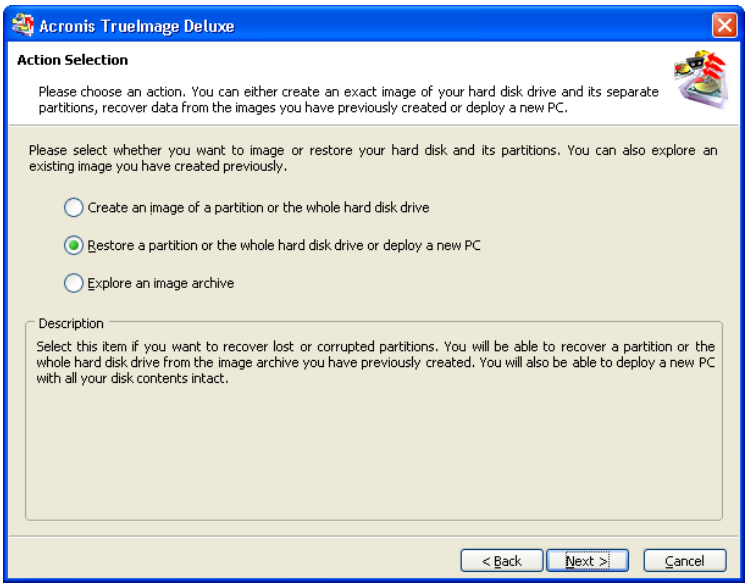


Figure 3.1. Selecting an action: restore a partition

Click Next to continue.

3.1.2 Selecting an archive file

In the next window Acronis TrueImage Deluxe will show you the complete list of storage devices connected to your PC, including hard disks as well as any other storage drives (Figure 3.2).

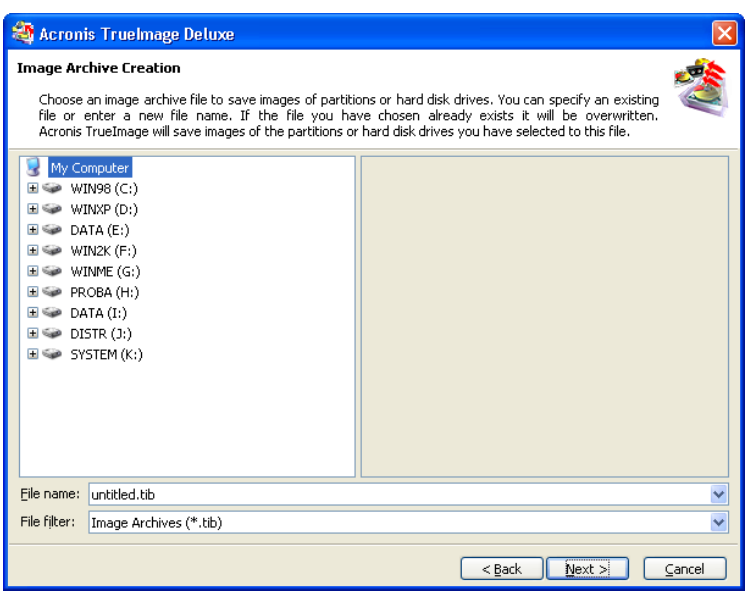


Figure 3.2. The list of storage devices

You'll be able to navigate the files and folders tree, using standard Windows controls, to find the archive file with the image of a partition to be restored and select it by clicking (Figure 3.3).

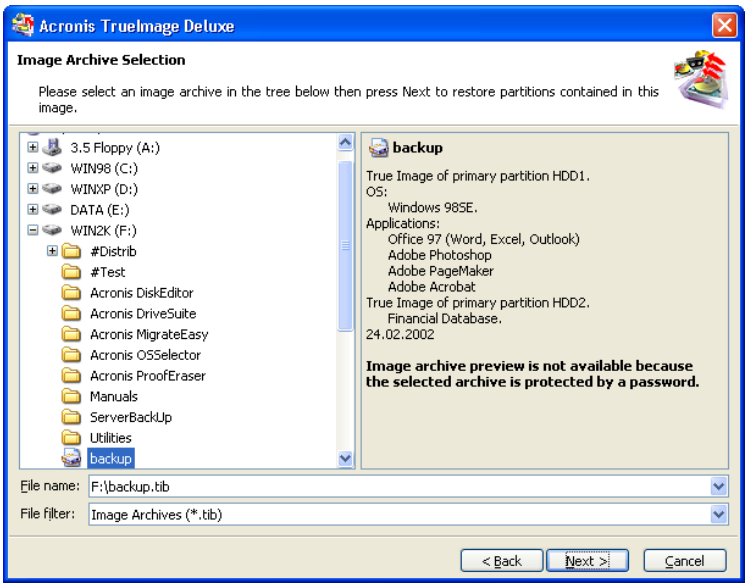


Figure 3.3. Selecting an archive file

If you commented the archive file when creating it, the description will help you understand if you selected the right archive file or the partition image is located in some other file. Your comment will be shown in the right part of the **Image Archive Selection** window. Notice that a comment is available without entering a password that protects an archive file. However, you won't be able to either restore, or browse archive file contents without a password (see Figure 3.4 – contents of a password unprotected archive file).

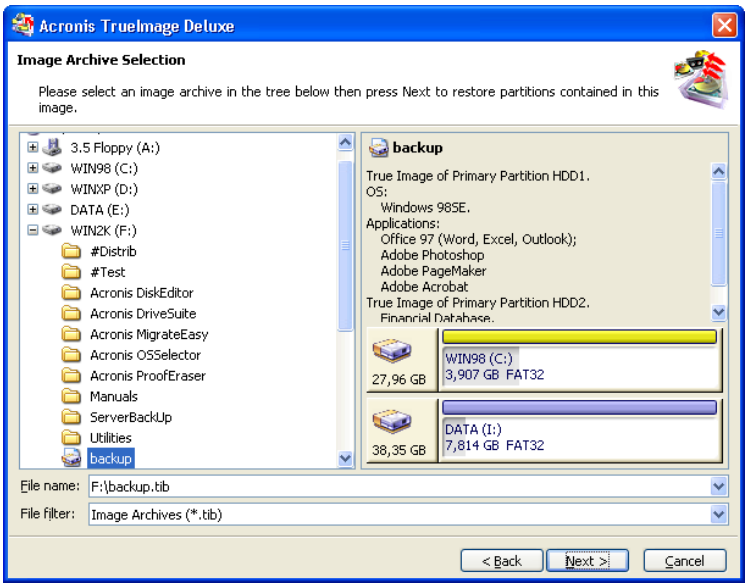


Figure 3.4. Contents of a password unprotected archive file

The more detailed is your comment, the more assured your actions would be. In particular, you can store several system partition configurations in archive files, if working intensively with your operating system,

experimenting with various applications or device drivers, to restore one of them if needed.

Having made sure that you are to restore a partition from the right archive file, click Next to continue.

3.1.3 Entering a password

So, if an archive file is protected with a password, Acronis TrueImage Deluxe will prompt you for it in the next window. You won't be able to move to the next wizard page, i.e. to continue the restoration without entering a password, as the Next key will be disabled. If you enter the right password, you'll be able to move to the page of selecting a partition to be restored.

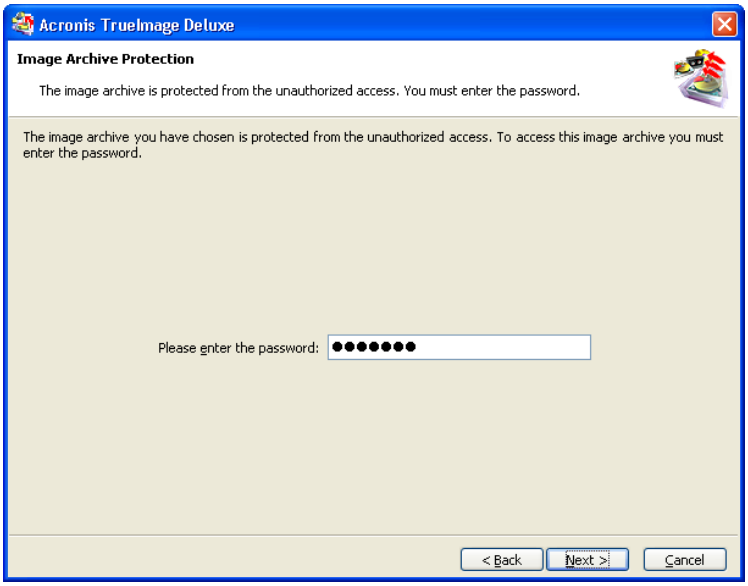


Figure 3.5. Entering a password to an archive file during the restoration

Having entered a password, click Next to continue.

3.1.4 Archive file partitions

One archive file may contain images of several disk partitions or the whole disks. Therefore the next window will offer you the contents of the selected archive file (Figure 3.6). The main level that Acronis TrueImage Deluxe works at is the hard disk partitions and the whole disks level, so you'll see all the partitions and disks, stored in the archive file.

As you'll see further, Acronis TrueImage Deluxe software can work with separate files as well during the restoration (see 3.4 «Restoring separate files»).

Select a partition for restoration by clicking the appropriate rectangle. It will become underlined red (by default).

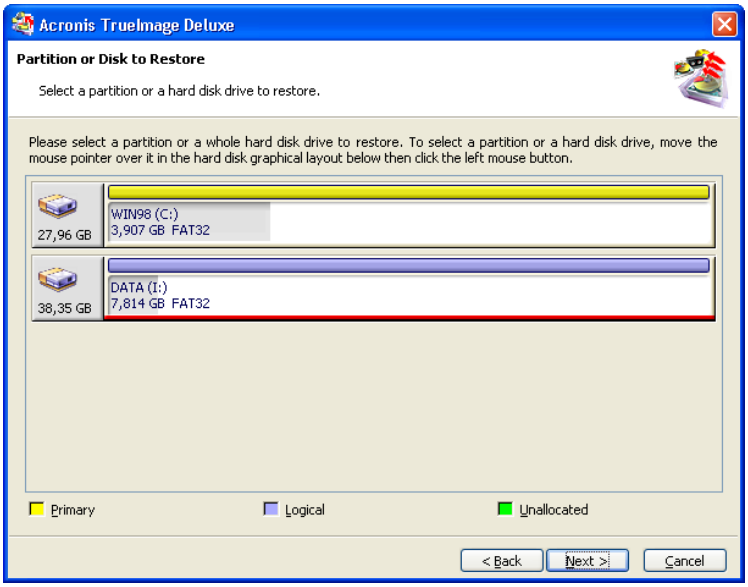


Figure 3.6. Selecting a partition to be restored from an archive file

You can select several partitions and/or disks for restoration during a session of Acronis TrueImage Deluxe, but you'll have to do it in turns (see 3.1.11 «The next partition/disk to be restored»), i.e. select one partition (disk) and set restoration parameters for it first, and then repeat this for all other. You'll be able to return to the **Source Partition Selection** window if needed after setting the partition restoration parameters and mark another partition (disk) for restoration. A partition you set restoration parameters of will be marked with an icon in the upper right corner.

Click Next to continue.

3.1.5 Destination partition

As it has been said above, you can restore a partition image, stored in an archive file, to a new hard disk. In the same way you can restore contents of a stored partition to another partition. For example, you could have stored logical drive D: data in an archive file. You would like this data to be restored to the logical drive E: on a new hard disk. Acronis TrueImage Deluxe software allows to do this as well. In the **Restored Partition Location** window click a partition, **to which** you'd like to restore the data to (Figure 3.7). This partition will become underlined red.

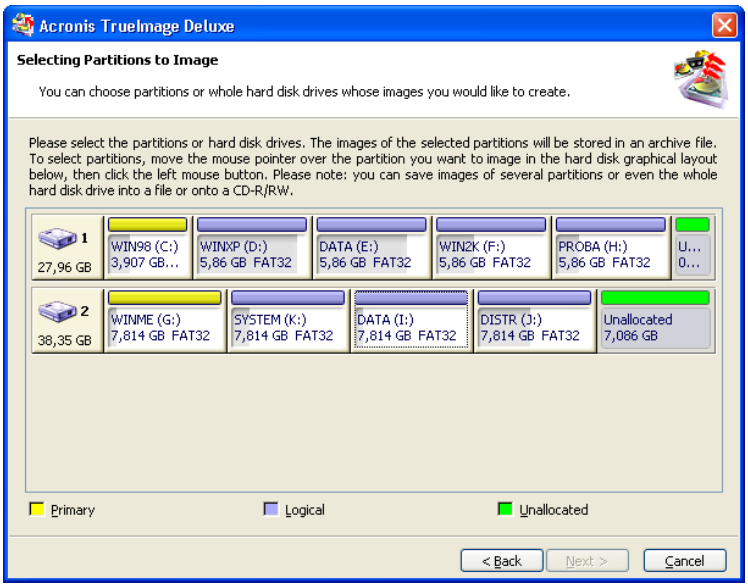


Figure 3.7. Selecting a destination partition

Click Next to continue.

3.1.6 Exclusive partition access

Acronis TrueImage Deluxe software must obtain **exclusive access** to a partition to restore an image from an archive file to. It means no other software must work with this partition during the restoration. Therefore it's recommended to close all applications for the restoration period (for more information see 3.2 «Partition restoration peculiarities»). However, it's not enough for some cases, in particular if you restore a partition the operating system was booted from. You can receive a message such as shown below (Figure 3.8).

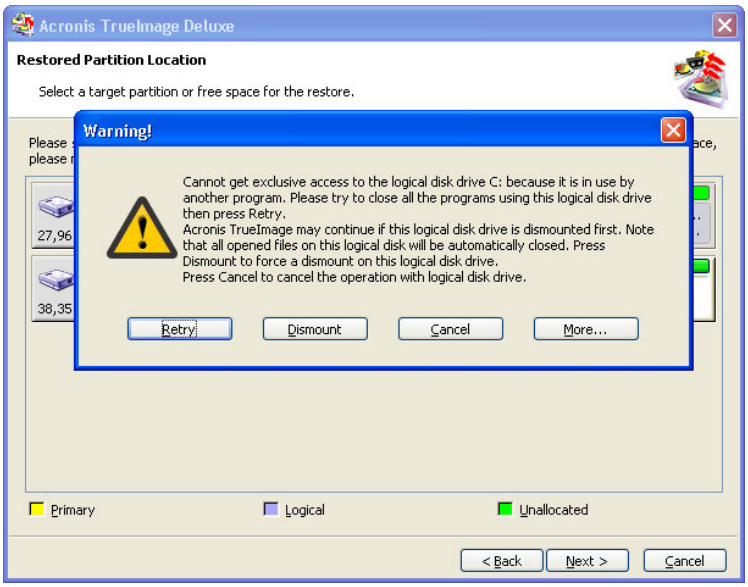


Figure 3.8. Unavailability of exclusive access to a partition

We'll discuss this situation later (see 3.2 «Partition restoration peculiarities»). It may appear at system partition restoration (the one PC is currently booted from).

So, having selected the destination to restore a partition from an archive file, click `Next` to continue.

3.1.7 Partition type (primary/logical)

You can change the **type** of a partition from an archive file, while restoring it (Figure 3.9).

Read more about partition types in the Appendix: see Appendix A «General Information. Hard Disks». We also note that an operating system is usually installed to a primary partition, and logical drives of an extended partition are used for storing data files.

You can imagine the following example situation to understand what you might have to change partition type for. Both system, and data files were stored on a single damaged primary partition. Now you need to restore a partition from a back-up copy to another hard disk with several partitions and an operating system installed.

You need only the data of a stored partition, and need not another system partition. In this case you can restore the partition as a **logical** to use its data.

In case you are restoring a system partition, you should select the **primary** type for it.

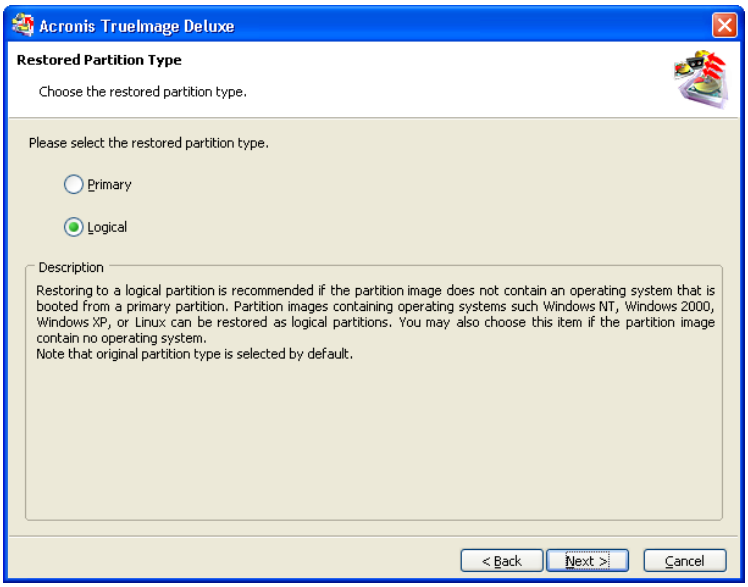


Figure 3.9. Selecting the restored partition type

Having selected partition type, click Next to continue.

3.1.8 File system

Acronis TrueImage Deluxe software allows to similarly change a partition **file system** at restoration (Figure 3.10).

Let's assume you are restoring a partition from a low capacity disk with the FAT16 file system to a new higher capacity hard disk. It would be ineffective (and just impossible in some cases) to use the FAT16 file system on a high capacity hard disk. The fact is that FAT16 limits partition size to 4 GB, so you won't be able to restore a 4 GB FAT16 partition to a new disk of higher capacity, as you'll have to change the file system.

It would be logical to change FAT16 to FAT32 in the given case. Set the switch to the appropriate position in the **Restored Partition File System** window to do this.

You should also remember that not all operating systems can boot from a FAT32 partition. MS-DOS, Windows 95 Original, Windows NT 3.x, 4.x does not support FAT32 and won't work after restoration with a file system change, i.e. they can be restored to a FAT16 partition only.

But you can freely convert a FAT16 partition with newer operating systems to FAT32.

You can find file system comparatives in the Appendix A «General Information. Hard Disks» section.

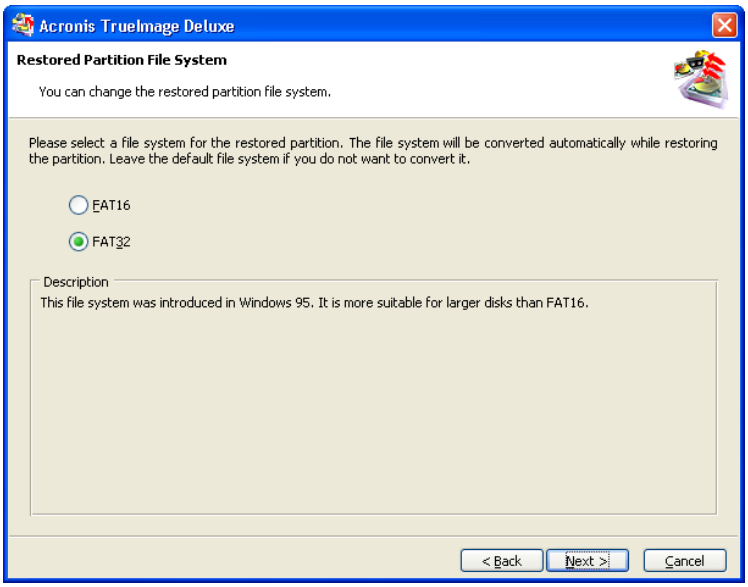


Figure 3.10. Selecting the restored partition file system

Click Next to continue.

3.1.9 Changing size of a partition to be restored

So, you are to restore a hard disk partition. The reasons can be very different: you might have just installed a bad device driver, causing system instability; or Windows registry is damaged. The question might be a hard disk: there have appeared many bad sectors; file read/write errors have become regular. Finally, the File Allocation Table (FAT) or the Root is damaged, or the Bootsector is infected with a still incurable virus.

If your PC health was ruined due to one of these reasons, you might like to restore a partition to a **new disk** and change the partition configuration and size comparing to what you had before. Acronis TrueImage software is flexible enough to let you do this. You'll be able to change the size and disk location of a partition to be restored in the following window (Figure 3.11).

The information on a stored partition is kept in its image. The window shows exactly this information. You can resize a partition to make it larger or smaller (not smaller than the space occupied with its data.)

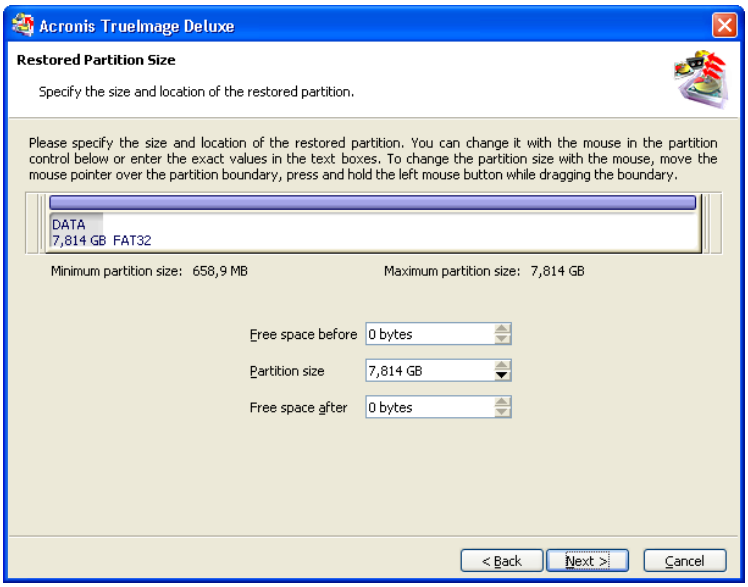


Figure 3.11. Changed partition: initial size

The figure below shows the initial 3.907 GB partition size changed to the 2.007 GB.

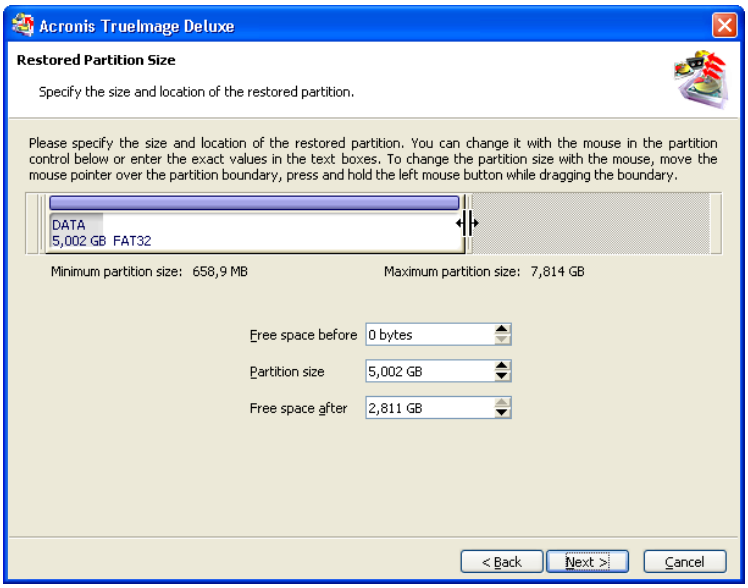


Figure 3.12. Resizing a partition

The next figure (Figure 3.13) demonstrates changing partition location.

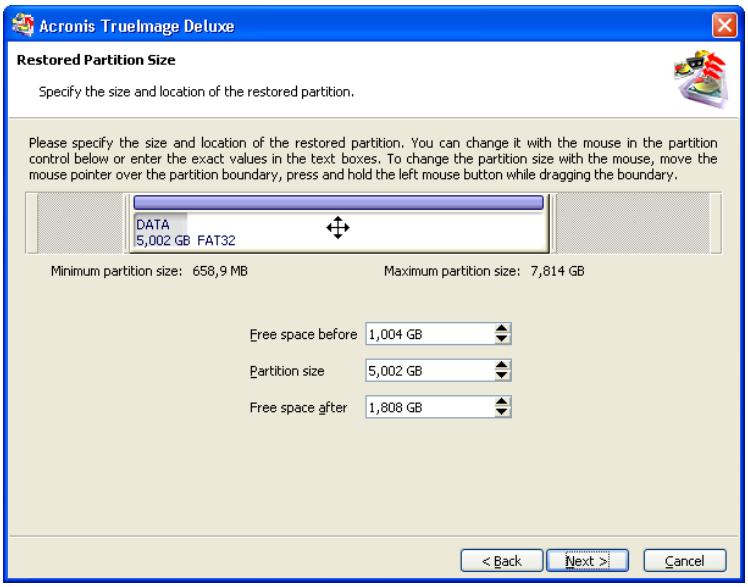


Figure 3.13. Changing partition location

Having changed partition size and location if needed, click Next to continue.

3.1.10 Selecting a letter for a partition to be restored

Having restored a partition, Acronis TrueImage Deluxe will «map» its contents, stored in an archive file, to a logical drive.

Windows operating system uses Roman alphabet letters for disk and partition **identification**. Letters are automatically assigned during OS boot process.

Acronis TrueImage software lets you assign any unoccupied letter to a partition (logical drive) to be restored under Windows NT/2000/XP. To do this, set the switch to **Yes, I want to assign a logical drive letter to the restored partition** on the following page and select a letter from the drop-down list. If you do not set this switch, a logical drive will have its letter automatically assigned by the operating system. This page will be omitted under Windows 9x/Me.

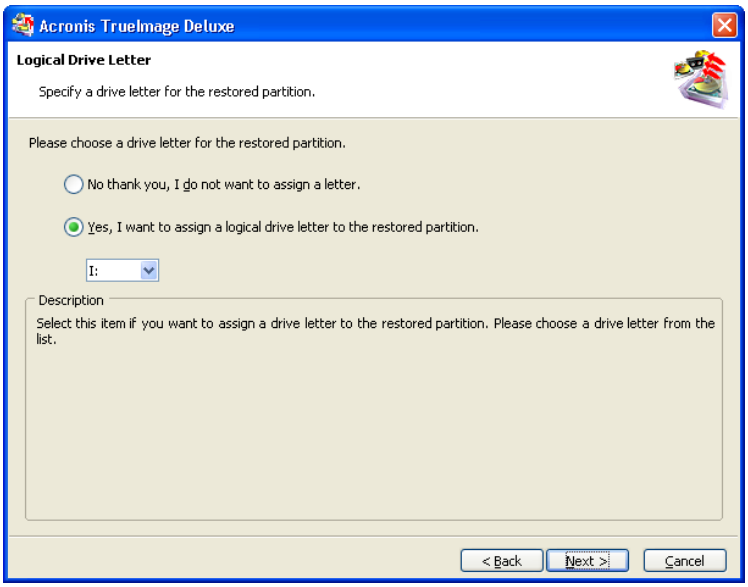


Figure 3.14. Selecting a partition letter

3.1.11 The next partition/disk to be restored

You can restore several partitions at one session in the same way as you can store several images. To do this, set the switch to **Yes, I want to restore another partition or hard disk drive** in the **Next Selection** window.

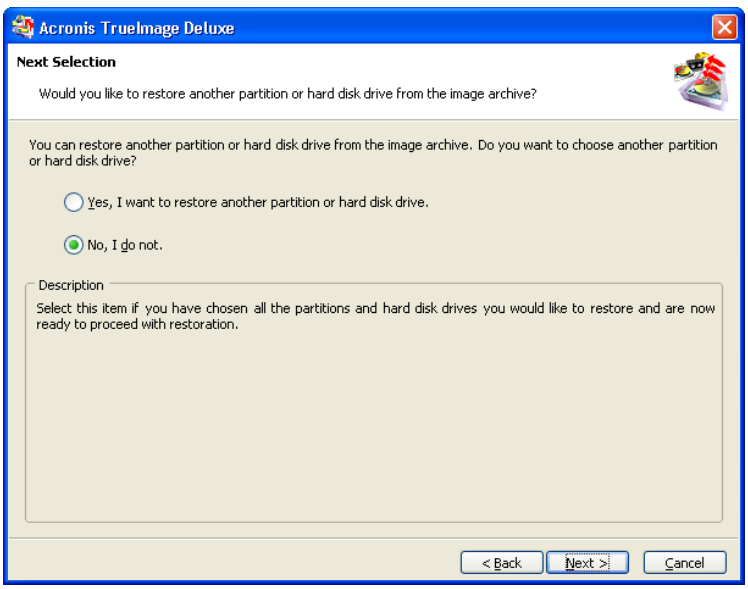


Figure 3.15. Selecting the next partition to be restored

Having clicked `Next`, you'll see the **Source Partition Selection** window again (Figure 3.6). This time the upper right corner of a rectangle representing the partition, which you have already worked with, will be ticked off. You'll be able to select the next partition to be restored and to perform actions, described above, in the following windows:

- Select a destination partition (Figure 3.7),
- Select a partition type (primary/logical; Figure 3.9),
- Select a file system (Figure 3.10),
- Change partition size and disk location if needed (Figure 3.11 - Figure 3.13).

If you restore the only partition, you don't need to set the switch to **Yes, I want to restore another partition or hard disk drive**. In this case you'll get to the restoration script window at once, having clicked `Next`.

3.1.12 Restoration script

So, you'll finally get a script again, but this time for **restoring** a partition from an image instead of creating an image in an archive file (Figure 3.16).

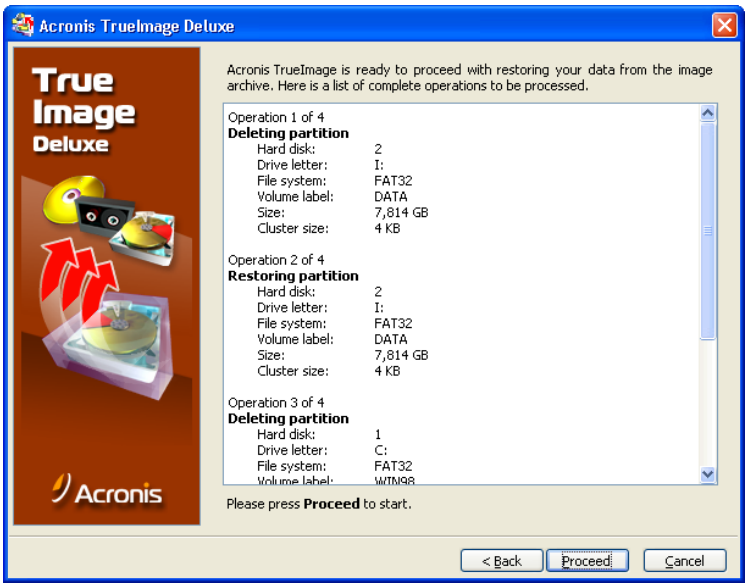


Figure 3.16. Partition restoration script window

All said about an image **creation** script is basically true regarding a **restoration** script (see Figure 2.12 above), including:

As you have seen before, **restoration** script creation includes the following stages:

- Selecting **restoration (Restore a partition or the whole hard disk drive or deploy a new PC)**,
- Selecting an archive file with a partition (disk) image on a hard disk (or removable media; see below),
- Selecting a partition and/or disk to be restored,
- Selecting a destination partition (disk) to restore a partition from an archive file to,

- Selecting a type of a partition to be restored,
- Selecting a partition file system,
- Changing partition size and/or location,
- Moving to the next partition to be restored or to the restoration script.

Now Acronis TrueImage Deluxe software is ready for partition restoration. If you click Back, you'll be able to select other partitions and/or disks for restoration, rethink partition size changes, its type and file system selection, in other words to change any restoration parameters. You can execute the partition restoration script by clicking Proceed.

So, click Proceed to execute the partition restoration script.

Restoration progress will be shown in the special window.

3.2 Partition restoration peculiarities

There may be several general cases of partition restoration:

- Data partition restoration,
- System partition restoration.

Restoring a data partition

If, for example, you find your accounting database damaged on a logical drive and decide to restore it from a previously created image in an archive file **to the same partition**, you might receive this warning:

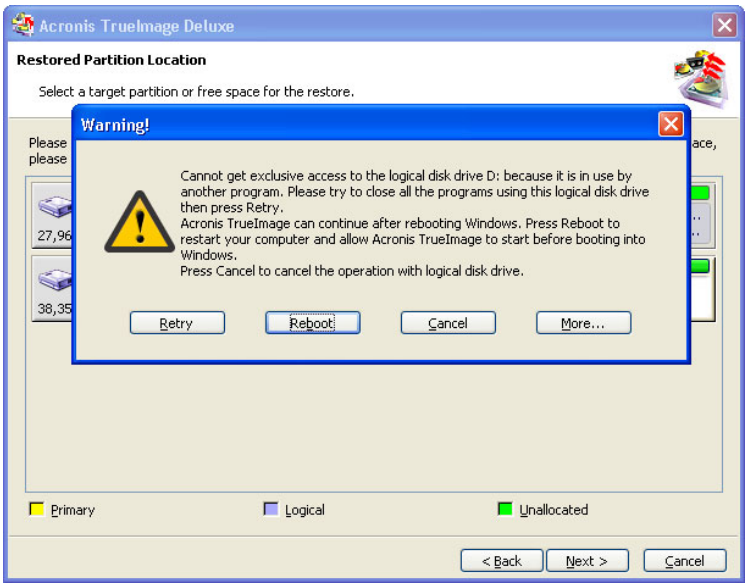


Figure 3.17. Warning of unavailability of exclusive access to a logical drive at partition restoration

This means the following. Operating system blocks logical drives for some low-level operations that Acronis TrueImage tries to perform to restore a partition. In particular, some application might work with this partition data. It can be MS Word, MS Excel, or Norton Utilities. Therefore, it is necessary to close all applications before restoring a partition.

In some cases Acronis TrueImage Deluxe can **unplug** a logical drive, perform restoration, and **connect** it again. (In the given situation `Reboot` is replaced by `Dismount`.) Sometimes it's impossible to unplug a logical drive. Acronis TrueImage Deluxe then prompts you to reboot the PC. So, in the situation above you can:

- Close applications and click `Retry` – retry to restore a partition from an archive file,
- Click `Dismount` to force logical drive disconnection,
- Click `Reboot` to reboot the PC.

You should remember that you can't force any drive disconnection. For example, an attempt to unplug a logical drive with an operating system or a swap file would cause OS to crash.

You can unplug a logical drive in case of a data partition restoration.

If you have free space on a disk, you can use it to restore a partition (for example, if you decided to enlarge the data partition). You won't have any problems with it: Acronis TrueImage Deluxe will restore a partition and connect a new logical drive.

Restoring a system partition

System partition restoration is different. There are two possible situations:

- System shows off failure signs, but still boots; you also succeed to run Acronis TrueImage Deluxe directly from the Windows **Start** menu;
- System doesn't boot, or it's impossible to run applications, including Acronis TrueImage Deluxe, under it after booting.

If you succeeded to boot Windows and run Acronis TrueImage Deluxe, you should do the following:

1. Set the switch to **Restore a partition or the whole hard disk drive or deploy a new PC** in the **Action Selection** window;
2. Find an archive file on a hard disk or removable media;
3. Select a partition (the system one) to be restored from this archive file;
4. Select a partition, **to which** you want to restore the previously selected partition, from the list of hard disks connected to the PC;
5. Having clicked `Next`, you receive a message such as shown on the figure above (Figure 3.17).

   You reboot your PC, clicking `Reboot`. As a result Acronis TrueImage Deluxe will run **before** Windows, restore the system partition and terminate, allowing Windows OS to boot.

If the operating system doesn't boot or applications (particularly Acronis TrueImage Deluxe) do not run, you should have a **bootable diskette or CD** for this situation. Acronis TrueImage Deluxe lets you create it by clicking Acronis -> TrueImage -> Bootable Rescue Media Builder. Such a diskette (CD) will contain everything necessary to run Acronis TrueImage Deluxe and access hard disks and other drives, connected to your PC. Having run Acronis TrueImage Deluxe, you should act the same as described above to restore the system partition. Having restored the partition, you should remove the diskette from the drive and reboot your PC.

3.3 Peculiarities of restoration from removable media

Restoring a partition (disk) from removable media shouldn't be of any additional difficulties than restoring it from a hard disk. But you should remember that it (as well as back-up copying to removable media) will take much longer time.

Moreover, you will usually need several CD-R, CD-RW disks to create a back-up copy of a partition and, especially, the whole disk on removable media, that you'll have to insert into drive in turns.

3.4 Restoring separate files

As it has been said before, Acronis TrueImage Deluxe software works with both hard disk partitions, and the whole disks (see Introduction). In particular, you can store images of several partitions or even disks in an archive file. However, if you have only one or several files damaged (or accidentally deleted!) on the partition, it would be inefficient to entirely restore it. A disk partition may already contain many newer file versions than stored in the last image in an archive file along with new files and folders. So, how to restore a separate file on a partition? Acronis TrueImage Deluxe is flexible enough to help you in this situation as well.

Acronis TrueImage Deluxe features **temporary logical drive connection** from an image for separate files restoration. Having connected a drive, you'll be able to access it as a usual hard disk. It means that:

- The list of your PC drives will be updated with a new one with a letter assigned to it;
- You'll be able to browse the files and folders tree of a partition, stored in an archive file, with the Windows file managing tools (Explore, etc.), as in case of a usual hard disk (or its partition);
- You'll be able to use any file manager to find and copy any file (files and/or folders) needed from a connected drive to a real one.

You'll have the read access only to a connected drive, and won't be able to change it somehow.

3.4.1 Connecting a drive from a partition image

So, you'll need to connect a temporary logical drive to restore a separate file (a group of files, folders) from an image. To do this, set the switch to **Explore an image archive** (Figure 3.18) in the **Action Selection** window of Acronis TrueImage Deluxe.

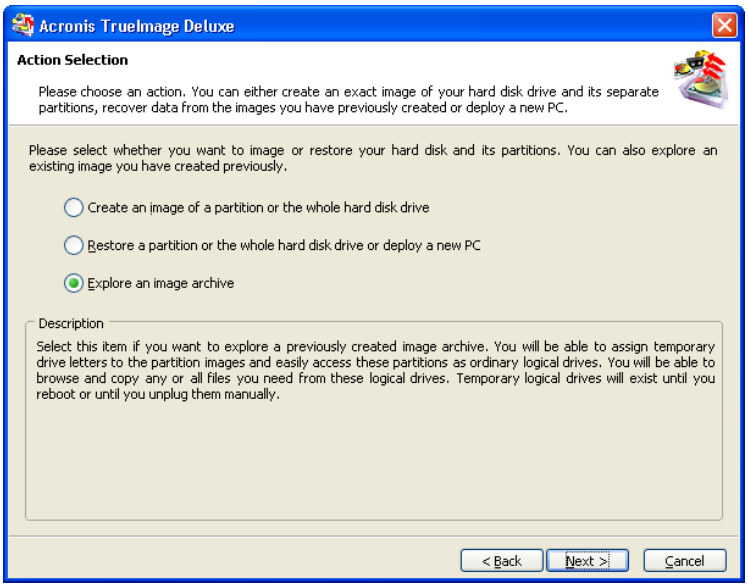


Figure 3.18. Exploring a partition image in an archive file

Click Next to continue.

3.4.2 Selecting an archive file

As in case of the whole disk partition (disk) restoration (Figure 3.2), the next window of Acronis TrueImage Deluxe will offer you the full list of storage devices, connected to your PC, which you will have to browse for the archive file with the necessary partition image (Figure 3.19).

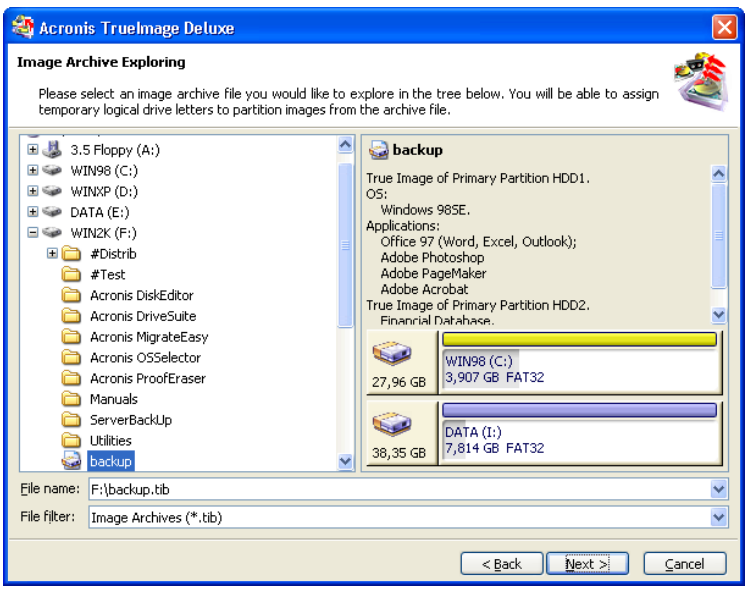


Figure 3.19. Selecting an archive file to connect a logical drive

If this archive file isn't protected with a password, selecting it you'll see the previously created comment along with the **list** of stored **partitions**, as shown on the Figure 3.19. If the file is protected with a password, you'll see the

comment only. Having clicked Next, you'll get to the window with a prompt to enter the archive file password.

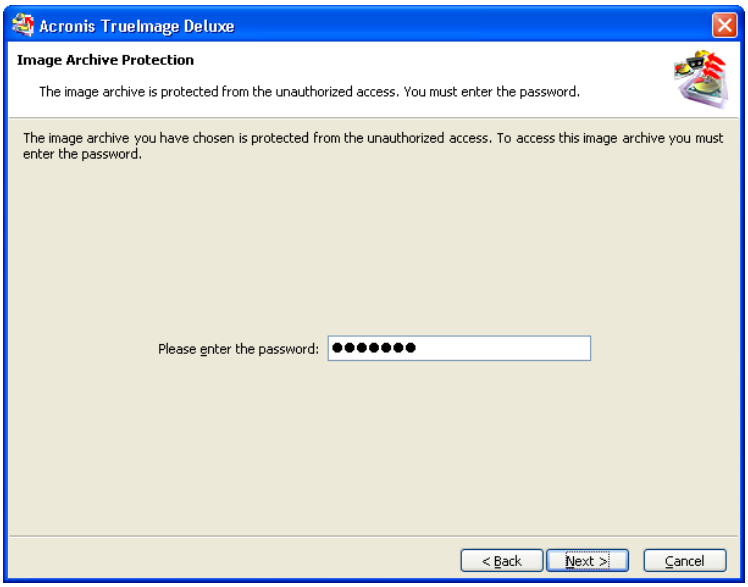


Figure 3.20. Entering an archive file password

Click Next to continue, having entered password if needed.

In the next window you'll be able to select one of the partition (disk) images to connect as a temporary logical drive (Figure 3.21).

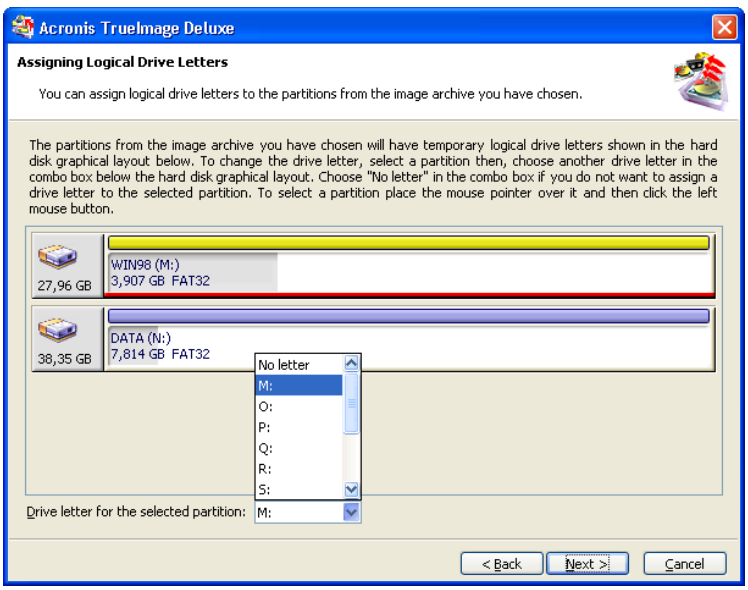


Figure 3.21. Selecting a partition and letter for a drive to be connected

A partition is selected by clicking the appropriate rectangle representing it. As a result, the selected partition (rectangle) will become underlined red. Another click will deselect the partition. You can select to connect several

partitions **simultaneously**. Each of them will be represented as a separate logical drive with a letter assigned to it.

The same window will also allow to select a letter to assign to a drive to be connected (**Drive letter for the selected partition** drop-down list).

If you want to change the letter assigned by default, you should select a partition first by clicking it and then select a letter. (You can then select another partition and letter if needed, etc.)

Having selected a partition (disk) and a letter, click `Next` to continue.

In the next window you'll see the temporary logical drive connection script.

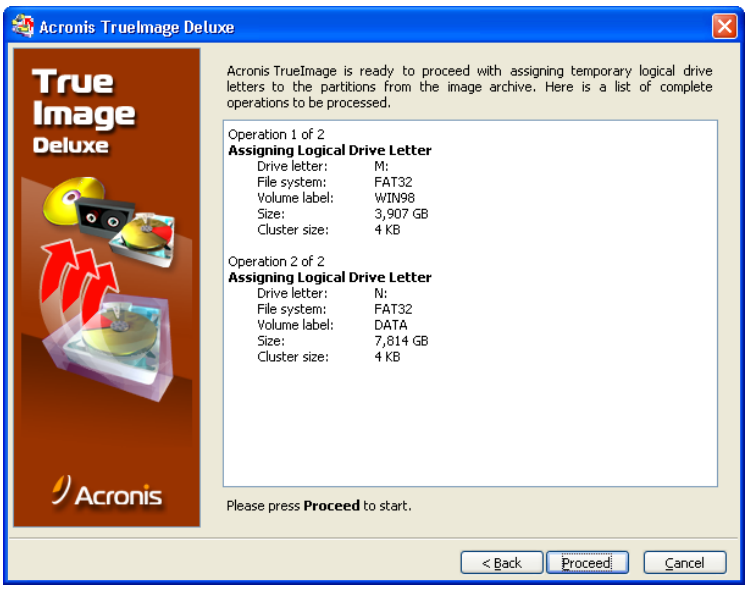


Figure 3.22. The drive connection script window

If you do not have any doubts regarding the selected partitions (and its letter), click `Proceed` to continue.

The connection of a temporary logical drive will finish a message about successful connection script execution (Figure 3.23).

Figure 3.23. The successful drive connection message window

Having clicked `Exit`, you'll find out a Windows **window** opened right after the message window, with the contents of the connected drive (partition, stored in an archive file; Figure 3.24).

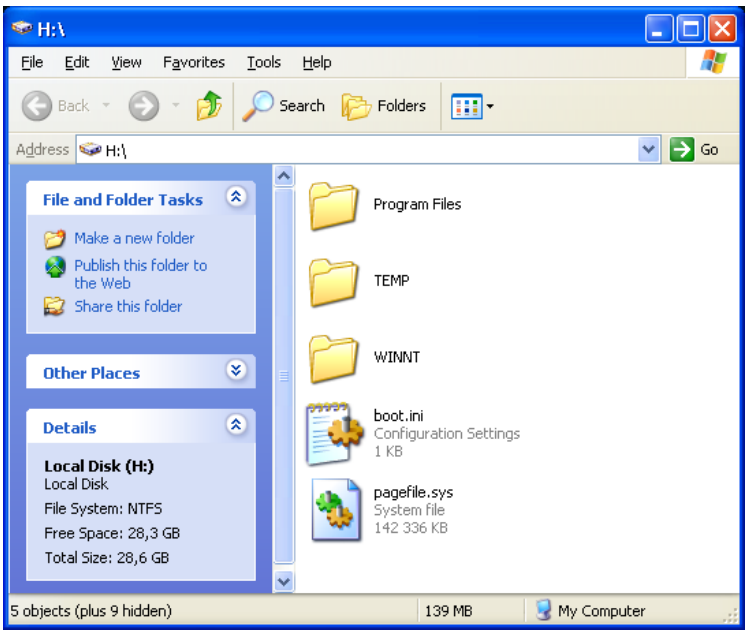


Figure 3.24. The Windows window with the temporary connected logical drive

Now you can easily copy any file (or file folder) from the connected logical drive to replace the damaged one on your real hard disk.

3.4.3 Disconnecting a drive

You should unplug a temporary logical drive after restoring separate files and folders. If you do not do this, it will disappear after reboot.

Disconnecting with the context menu

Select **Unplug** in the **context menu** of a connected drive, invoked by right-clicking the disk icon in the Windows window. As a result this disk will disappear.

Disconnecting from Acronis TrueImage Deluxe

Having run Acronis TrueImage Deluxe after connection, you'll find out another button in the operation selection window – **Unplug temporary logical drives** (Figure 3.25).

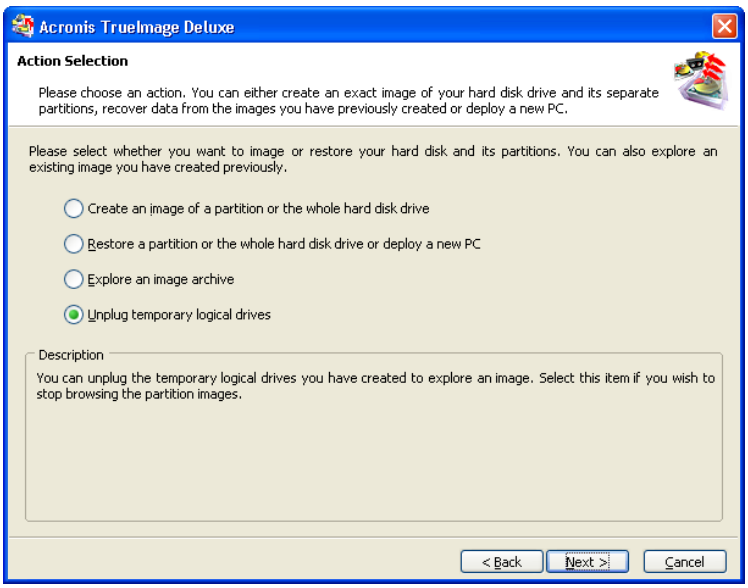


Figure 3.25. A new operation in the Action Selection window

After selecting this operation and clicking Next, you'll see the list of connected temporary logical drives (Figure 3.26). Use it to select a drive to unplug.

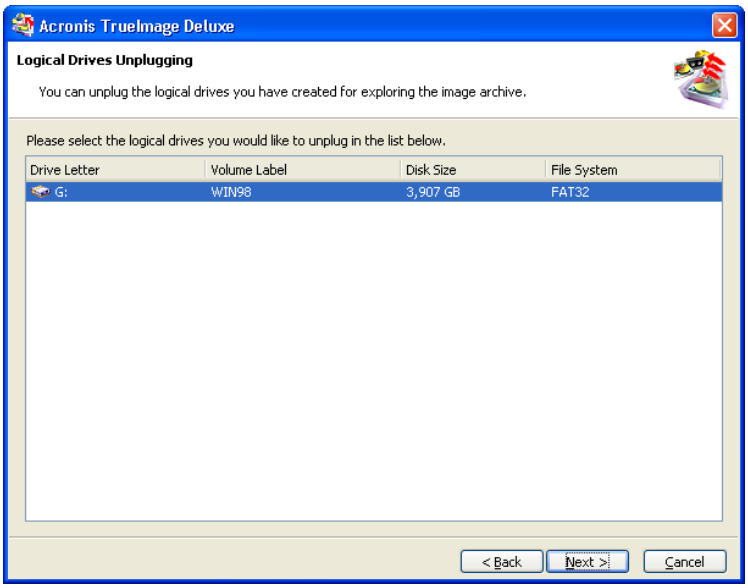


Figure 3.26. The list of connected drives

Click Next to continue. Acronis TrueImage Deluxe software will show you the temporary logical drive disconnection script (Figure 3.27).

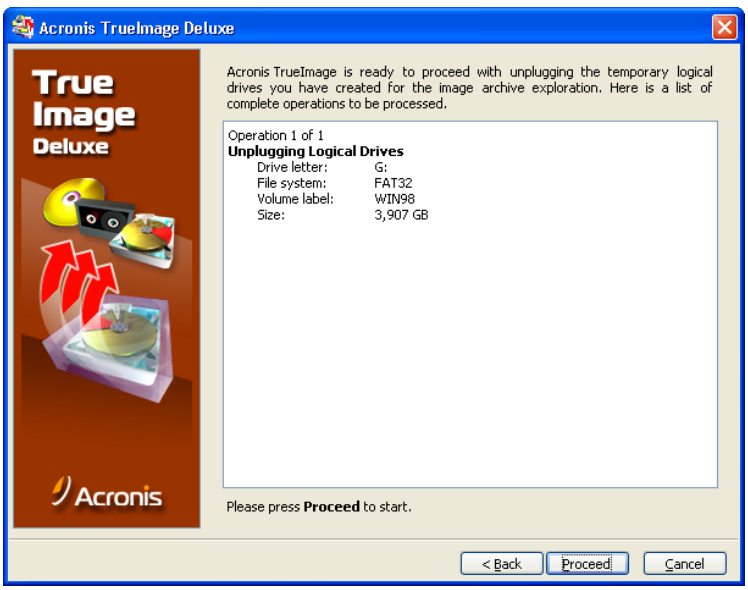


Figure 3.27. The drive disconnection script window

By clicking Proceed, you'll execute the script. Drive unplugging will finish with a standard message about the operation success (Figure 3.28).

Figure 3.28. The successful drive unplugging window

By clicking Exit you'll finish the session of separate partition files and folders restoration from an archive file.

Conclusion

Acronis TrueImage Deluxe software allows to create **exact image of a disk** (disk partition) in an archive file on a hard disk or any removable media. At creating a disk/partition image Acronis TrueImage Deluxe compresses the data. An archive file can be commented and protected with a password.

A disk image can be used to restore your hard disk data, or deploy a system on another PC, or revert a system back on a small office PCs, as well as on a school computer room, a club, an Internet café.

In all these cases Acronis TrueImage Deluxe offers effective tools for creating images and restoring both the whole disks, and separate partitions. Moreover, it lets you restore separate files and folders.

To restore separate files from an archive, a partition image, stored in an archive file, is connected to the system as a temporary logical drive, allowing to copy any files and folders to a real hard disk with any file manager. The connected disk is unplugged after separate files restoration.

Acronis TrueImage Deluxe offers effective tools for creating images of both data, and system partitions to restore them in the most complex cases. The software allows to create bootable diskettes and CDs to restore the system in case of its full inoperability.

Acronis TrueImage Deluxe software is flexible enough to allow not only to restore a partition, but also to change its type, file system, size, and location during its restoration.

Acronis TrueImage Deluxe software features a user-friendly graphic interface, is intuitive. Back-up and restoration operations require user to answer literally a few simple questions. The software is available to every, even the most inexperienced PC user who needs to keep his personal data safe and the system operable.

The regular back-up copying with Acronis TrueImage Deluxe will make a user confident in his work, and guarantee that his personal data won't be lost in any circumstances.

Acronis TrueImage Deluxe will be very useful for both common users, and small company and office system administrators, managers of computer classes and clubs, where user actions often lead to necessity of time-consuming operating system (Windows) re-installation. Acronis TrueImage Deluxe allows to restore system and applications literally in minutes.

In conclusion we thank you for choosing our products! We are always ready to render you qualified assistance. Wherever you are, whatever tasks and problems you face, you can always find an answer to any question about our products and their running on these pages or by contacting our technical support.

If you have any questions concerning the installation and running of Acronis software, please **carefully** follow the instructions below:

- Try to find answers to your questions in the guide supplied with the software package. You can also download user's guides from our site at http://www.acronis.com/download/docs/. Please, look through the frequently asked questions (http://www.acronis.com/support/faq.html), where you can possibly find an answer to your question.
- Make sure you use the latest build of Acronis software. The current build number of Acronis products is at http://www.acronis.com/support/updates/. You can learn the version of installed software by running it and opening the «About» window. Registered users can use this link to update their software: http://www.acronis.com/support/updates/. If you use a demo version, please download the latest version from http://www.acronis.com/download/.
- If you couldn't find answers to your questions contact our technical support at support@acronis.com.
- Please provide the product name, version, and build in your letter along with the product registration information – the serial number and e-mail used at the registration.

Do not forget to register purchased software (http://www.acronis.com/registration/)! We guarantee an answer in 48 hours to registered users only.

Appendix A. General Information. Hard Disks

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 motherboard, configuring disks with BIOS, partitions, file systems, and how operating systems interact with disks.

A.1 Hard Disk Organization

All hard disks, or hard disk drives, have basically the same structure, however diverse they are in size. Inside the case there are several disks with magnetic coating set on a single axis (spindle). A special motor provides the necessary rotation speed to the spindle, e.g. 5400 rpm, 7200 rpm, or 10000 rpm.

Information on disks resides on concentric **tracks**. Each track has its number. The outermost track is number 0, and the numbers grow inwards.

Each of the tracks is divided into **sectors** that contain minimal information blocks that can be written to disk or read from it. Sectors also have numbers. On every disk there is a marker that indicates the beginning of sector enumeration. The sector that is the closest to this marker is number 1.

Usually sector size is 571 bytes. At the beginning of a sector there is a header (prefix portion) that marks the beginning of the sector and its number. At the end of a sector, in the suffix portion, there is the checksum that is used to check data integrity. Data area between the prefix and suffix portions is 512 bytes large.

Both upper and lower sides of each disk on the spindle are used to store data. All tracks that have the same number on all the surfaces of all disks comprise a **cylinder**. For each work surface of a disk in the drive there is a **head** that enables reading and writing data to/from the disk. Heads are assembled into a block and are enumerated, starting with 0.

To perform an elementary read or write operation the head block must be positioned at the necessary cylinder. When the necessary sector (with the necessary number in the service area) of the rotating disks approaches the head, data is exchanged between the head and the electronic board of the drive.

Sector structure of a hard disk is created via **low-level formatting** during which each of the tracks of the disk is marked up.

Modern disk drives usually contain relatively few magnetic disks (1-2) to make the head block lighter and speed up access to sectors (a drive like this has 2-4 heads respectively).

There can be up to several tens of thousands of cylinders per disk. The higher the write density on the disk, the more cylinders can be created on it and the larger the capacity of the disk.

This design has many technical implementation peculiarities, but we will not discussing those here.

A.2 Operating System and Hard Disks

You know that hard disks are used to store information. You also know (see A.1 «Hard Disk Organization») that information is stored in sectors, and the sectors appear on disks by way of low-level formatting. Each sector contains the smallest possible 512-byte data block.

Data blocks of larger size are stored in chains of such sectors. Each sector of a chain contains the address of the next sector in the chain or the marker telling that this sector is the last one in its service area. Chains of sectors make a **file**. The address (number) of the first sector of a file is stored in the file allocation table (FAT).

All applications you are familiar with – office applications (text and graphical editors, spreadsheet processors) – and documents, tables, images, e-mail clients and Internet access software, and games – are stored on hard disks as files. Files are grouped into folders to make working with them more convenient.

Among various software the most important one is the operating system.

An operating system provides all other applications running under its control with basic input/output access to all the resources of the PC, be that the CPU, memory, or external devices (monitor, hard disks, floppy disks, CD-ROM, DVD, printer). All applications are loaded into memory from a hard disk and are executed under the control of the operating system.

It would have been very inconvenient for a user to use data on disks if he/she had to deal only with addresses (numbers) of sectors comprising a file. That is why every file in the file system has its **name**. In DOS and Windows 3.x operating systems the name of the file contained 8 characters followed by a dot (.), which, in its turn, was followed by three more characters of the extension (or the type of the file). There could be fewer characters in the name and/or extension, and there were limitations as to what characters could be included in names and extensions.

Windows NT and newer OS versions allow files names that are up to 255 characters long. Full file name (including the disk letter and the name of the folder containing the file) can be up to 260 characters long, however it is not recommended using file names longer than 50-70 characters.

Other operating systems, like Linux, have never had such strict limitations on file names as did DOS or Windows. The name of the file in Linux can be up

to 256 characters long and have not one, but several extensions (or none at all). The path to the file in Linux can be up to 4096 characters long.

To provide access to data organized in files and folders each operating system, for example, MS-DOS, Windows 95/98/Me/NT/2000, Linux, has its own characteristic way to create and manage hard disk space, which is generally non-compatible with other OSes. However, it would be inefficient if one hard disk could be used by only one operating system. That is why a mechanism was created allowing several operating systems to use the hard disk. This mechanism breaks the hard disk space into **partitions**.

A.3 Hard Disk Partitions

Partitioning Hard Disks in DOS/Windows

Partitioning hard disk is done by special applications. In MS-DOS and Windows the widely known FDISK program is used for this purpose. It allows creating partitions, setting their size and labels. FDISK allows allocating either all hard disk space or part of it for MS-DOS or Windows, and leave some part of it for other operating systems.

FDISK can perform the following functions:

- create a primary DOS partition containing one logical disk;
- create an Extended Partition that can be broken into any number of logical disks;
- mark a partition as active (only one primary partition can be active).

The structure of partitions on the hard disk can be shown as follows:

MBR.
Primary partition 1-1. System logical disk C:.
Extended partition 1-2.
Logical partition 1-5.
Logical disk D:.
Logical disk E:.
Logical disk F:.
.....

Information about partitions on a hard disk is stored in a special disk area – in the 1st sector of the 0th cylinder, header 0, which is called a Partition Table. This sector is called the Master Boot Record, MBR.

A physical hard disk can contain up to 4 **primary** partitions. This limitation is due only to the capacity of the Partition Table, which itself consists of only four partitions. However, this does not mean that you can install **only 4** different operating systems. Modern software disk managers allows the installation of many more operating systems. For example, the **Acronis OS Selector 5.0 Deluxe** disk manager, allows a user to install up to 100 operating systems on one hard disk!

Partitioning hard disks is a feature that is available in all operating systems.

A.4 Creating Partitions for Other OSes

In this part of the Guide we have described the way to partition a hard disk by the FDISK program for the DOS/Windows operating system. As it has been said above, the FDISK program creates primary and possibly (but necessarily so) extended DOS partitions and logical partitions (disks) on them, and can also leave disk space unallocated to be used by other operating systems. However, the Windows operating system, while being a very widely distributed operating system for PCs, is not the only operating system.

You can configure the hard disk of your computer to used with the Linux operating system. In this case you do not need to create either primary nor extended DOS partitions (if you are not going to use DOS/Windows).

For example, the installation program from the ASPLinux operating system includes a disk manager that allows partitioning a disk into partitions that can be used by this OS.

A.5 Primary and Logical Partitions

Many operating systems, including DOS and Windows 95, can only be booted from primary partitions.

Some operating systems do not see primary partitions except those they were booted from (OS/2).

Knowing these limitations allows you to decide what partitions are better to use and for what purposes. Primary partitions are better used for booting operating systems and storing system folders and files.

Logical partitions can keep all the other information, since they are accessible from most operating systems.

If you are going to keep several operating systems on your computer, it is better to install those that can be booted from logical partitions onto logical partitions, so that they do not use up extra primary partition space.

A.6 Formatting Hard Disks

Within each of the partitions information has to be organized in a way understandable for the operating system that uses the partition. This organization is the **file system**. Format and location of information (the logical structure of a partition) for MS-DOS and Windows is created by the FORMAT program.

FORMAT program performs the following functions:

- It creates the boot record;
- It creates the file allocation table (FAT);
- It marks bad clusters so they are not used.

After formatting, logical disks created by the FDISK program are organized as follows:

- Logical disks start with the boot sector;
- One or several copies of file allocation table (FAT) are placed after the boot sector;
- Next goes the root folder;
- Then the data area.

Each logical disk has to be formatted with FORMAT separately.

Formatting a partition is done by issuing a DOS command:

```
FORMAT C:
```

To create a system (bootable) logical disk, it has to be formatted with FORMAT with /S parameter:

```
FORMAT C: /S
```

Another way is to transfer the system to the partition that has been formatted with /B parameter is booting the computer from a system diskette and issuing the command

```
SYS C:
```

IO.SYS, MSDOS.SYS, COMMAND.COM files that are necessary for the operating system to be booted are copied from the diskette to the disk. Initial loader code is written to the boot sector.

Other operating systems provide hard disk formatting means to create file systems that are recognizable by these OSes.

A.7 File Systems

The logical structure that has been created on the hard disk is supported by means of operating system. The file system itself presents the information on the disk as an ensemble of **files** and **folders**.

From the user's point of view a file is a unit of storage of logically connected information: text, graphics, and sound. As for data storage organization, a file is a chain of connected sectors or **clusters**. A cluster is a unit of several sectors. (Sectors are characteristic for file systems supported by various versions of Windows.)

Operating systems support file systems on hard disks (or disk partitions) by allowing to create, copy, and delete files and folders.

At present, the most widely spread file systems for PCs are the following two:

- **FAT** (File Allocation Table) for DOS, OS/2, Windows 95/ 98/Me/NT/2000;
- **NTFS** (Windows NT File System) for Windows NT/2000.

However, there are many more other file systems. The Linux operating system, for example, uses three different file systems:

- **Ext2** is a common file system used on desktop PCs running Linux;
- **Ext3** is the default file system used by Red Hat Linux;
- **ReiserFS** is a more secure (with respect to data integrity) file system that is used on many Linux data servers.
- For details on file systems see Appendix A. «General Information. Hard Disks».

Appendix B. Glossary

Active partition. One of the primary partitions of a hard disk is usually active. Default MBR code tries to boot an operating system from the active partition of the first hard disk. Letter assignment in Microsoft operating systems depends on what partitions are active.

Bad cluster. A cluster that contains bad sectors. Such cluster cannot store useful information.

Bad sector. A sector that cannot store the information written, for instance due to defects or aging of the magnetic surface.

BIOS extension. BIOS versions that were released before 1994 could only support hard disks that were less than 8 gigabytes. Extended hard disk management functions were added to BIOS versions to solve this problem, and now the maximum supported hard disk capacity is 2^{75} bytes.

Boot partition of an operating system is a partition from which the initial stage of operating system booting is done (boot sector is read and executed, first file of the operating system is read and executed).

Boot record. The initial part of a partition that contains code and data necessary for booting an operating system. May consist of one or several sectors. First sector of a boot record must end with the boot sector signature (0AA55h).

Boot sector is the first sector of a disk or a partition that contains the initial code for the operation system booting. Boot sector must end with 0AA55h signature.

Bootable disk is a disk from which an operating system may be booted. A bootable disk must contain the boot sector of an operating system and the necessary system and configuration files. The «Bootable disk» term usually refers to diskettes and CD-ROMs.

Bootable partition. A partition that can host an operating system. In the beginning of such a partition, there must be a boot record.

Booting an operating system is initialized by reading its boot sector to the memory at 0:7C00h and passing control to it. Since each operating system has its own boot sector, it is able to perform the required actions on loading and initializing system and configuration files.

Booting the computer is a procedure that is executed every time a computer is turned on or an operating system finishes its work or when the reset button is pressed. Booting consists of the following stages:

- Hardware diagnostics;
- Memory check;
- Built-in BIOS initialization;
- Initialization of additional hardware components and their BIOS versions (video, SCSI etc.);
- Booting an operation system.

Cluster. Information storage unit in such file systems as FAT and NTFS. Every file occupies a certain number of whole clusters, so the larger the cluster size the higher the losses are that are due to file size adjustment; and conversely, the smaller the cluster the larger the cluster distribution tables.

Cylinder. A group of all the tracks on all the magnetic platters of a hard disk that can be accessed without moving the magnetic head. Access to the data inside one cylinder is much faster than moving the head from one cylinder to the other.

Disk. It is a general term that can mean both a data storage media (floppy disk, compact disk), and a data-reading device (hard disk), and a partition that is accessible from some operating system (logical disk).

Diskette. Floppy disk. A removable storage media that consists of a flexible magnetic platter enclosed in a protective envelope. The most common are 3.5" diskettes with 1.44 megabyte capacity.

File. A file is named information storage in the file system. In different file systems files can be stored in different ways, differences may also exist in storing file names and writing the full path of the file in the folder tree.

File system. Data structure that is necessary to store and manage files. File system does the following functions: tracks free and occupied space, supports folders and file names, tracks the physical positions of files on the disk. Each partition may be formatted with its own file system.

Floppy disk drive. A device that reads and writes data to diskettes.

Folder. A table in the file system that contains description of files and other folders. Such structure allows creating folder tree that begins with the root folder.

Formatting. The process of creating service structure on the disk. There are three levels of hard disk formatting: low-level (marking the magnetic surface with tracks and sectors), partitioning and high-level (creation of file system on a partition).

Hard disk. Fixed storage media along with integrated electronics that consists of several magnetic platters that rotate synchronously on one spindle. Hard disks have relatively high capacity and high read/write speed.

Hard disk geometry. A set of hard disk parameters that usually includes the number of cylinders, heads and sectors per track.

Head (magnetic head, read/write head). A hard disk consists of several magnetic platters, for each side of each platter there is a head that is used to read and write information on it.

Hidden partition. A partition that is made invisible to the operating system. Usually partitions are hidden by changing their type.

Label. An optional name that can be assigned to a partition to simplify its identification. Usually has the same limitation as file names. For example, FAT partitions have labels up to 11 characters long, but may contain spaces.

Large hard disk support software. Some BIOS versions have troubles supporting large (larger than 8 gigabytes) hard disks. That is why some hard disk manufacturers provide special software that is installed in the beginning of the hard disk, is loaded before any operating systems, and substitutes hard disk access BIOS functions.

Letter (of a drive, partition). All operating systems that are somehow DOS-compatible use Latin letters to identify drives and partitions. Letters A: and B: are usually reserved for floppy drives. Starting with C: letters are assigned to hard disk partitions that can be recognized by the operating system. Separate letters may be assigned to CD-ROMs, to DVD drives, or to network drives.

Logical disk is a partition whose file system is recognized by the operating system. Usually each logical disk is assigned with a letter that uniquely identifies it.

Logical partition. Partition information which is located not in MBR, but in the extended partition table. The number of logical partitions on a disk is unlimited.

Master Boot Record (MBR) is a special place in the very first sector of the hard disk to store information about the hard disk partitioning and code to be loaded with BIOS. All the actions that follow depend on the contents of this code.

Operating system is a set of programs that usually includes kernel, drivers, shell, and system programs that are used for centralized hardware management and hiding the details of hardware management from the user and applications.

Operating system installation is a process during which its system folders are created, system files are copied and boot sector are created.

Partition. An independent area on a hard disk where a file system can be located. A partition can be either primary or logical, depending on its position in the partition structure. One of the primary partitions of a hard disk may be active. A partition has the following attributes: type, beginning and size. Some partition managing software and boot managers allow hiding partitions. Information about partitions is stored in the partition table.

Partition structure. All the partitions on a hard disk make a tree with the root in the MBR partition table. Many operating systems and programs assume that any partition table, but MBR, may contain not more than one partition entry and one table entry, and it simplifies the partition structure greatly – all the logical partitions form one chain.

Partition table. It is the table that contains the information about partitions and links to other partition tables. A partition table cannot have more than four entries. The main partition table is located in the hard disk MBR. Other partition tables are called extended. Partition tables are usually stored in the first sector of a cylinder.

Partitioning. The process of creating the partition logical structure on a hard disk. Partitioning is usually done with programs like FDISK.

Primary partition. The partition, information about which is contained in the MBR partition table. The majority of operating systems can be booted only from the primary partition of the first hard disk, and the number of primary partitions is limited.

Physical disk. A disk that is physically a separate device. Thus, a floppy disk, hard disk, CD-ROM, and DVD drives are considered physical disks.

Root folder. The folder where the folder tree of a file system begins. Starting from the root folder one can uniquely describe the file position on the folder tree by sequentially naming all the intermediate nested folders, e.g.: \WINDOWS\SYSTEM\VMM32.VXD. Here the WINDOWS folder is a subfolder of the root folder, SYSTEM folder – of the WINDOWS folder, and the VMM32.VXD file is located in the SYSTEM folder.

Sector. It is the minimal information unit on a disk that is transferred in single read or write operation. Usually a sector is 512 bytes large. A sector on a disk can be addressed two ways: via the absolute number or via cylinder, head, and sector number on a track.

Status. A flag that shows if a partition is active. This flag is stored in the partition table and has no meaning for logical partitions.

System disk/partition is a disk/partition from which an operating system may be booted. This disk usually contains the boot sector and system files of the operating system.

System file is a file that contains the code and constant data for an operating system. Each operating system has its own system file set.

System folder. Some operating systems keep most of their files in a special folder on a partition that may be different from the system one. For example for Windows 95/98/ME operating systems IO.SYS system file resides on the system partition, while other system files are located in the system folder which is usually called WINDOWS. Program Files folder can also be treated as system since it resides on the same partition as WINDOWS and also contains files that are relevant to the operating system.

Track. Disks are divided into concentric circles called tracks. Information from one track can be accessed without moving the head.

User interface is a set of principles, concepts, and means by which programs interact with the user. For example, in the window user interface, all input and output is done in windows with control via a mouse.