Seagate

Seagate DiscWizard™

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1   Introduction

1.1   What is Seagate DiscWizard?

Seagate DiscWizard is an integrated software suite that ensures security of all information on your PC. It can backup the entire disc drive or selected partitions, including your operating system, applications, settings and all of your data. You can also use the software to securely delete any confidential data you no longer need.

Should your disc drive become damaged or your system attacked by a virus or malware, you can restore the back-up data quickly and easily, eliminating hours or days of work trying to rebuild your disc drive's data and applications from scratch.

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

The unique technology implemented in Seagate DiscWizard allows you to perform exact, sector-by-sector disc backups, including all operating systems, applications and configuration files, software updates, personal settings, and data.

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

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

Wizards and a Windows Vista-style interface will make your work easier. Just perform a few simple steps and let Seagate DiscWizard take care of everything else! When a system problem occurs, the software will get you up and running in no time.

1.2   Seagate DiscWizard basic concepts

This section provides general information about basic concepts which could be useful for understanding how the program works.

Backup

According to Wikipedia, "**backup** refers to making copies of data so that these additional copies may be used to **restore** the original after a data loss event. Backups are useful primarily for two purposes. The

first is to restore a state following a disaster (called disaster recovery). The second is to restore small numbers of files after they have been accidentally deleted or corrupted."

Seagate DiscWizard provides for these purposes by creating disc (or partition) images. By default, Seagate DiscWizard stores in an image only those hard disc parts that contain data (for supported file systems). However, you may use an option that lets you include in an image all of the sectors of a hard disc (so called sector-by-sector backup).

Disc cloning

This operation migrates/copies the entire contents of one disc drive to another (e.g., when installing a larger disc) to get two identical drives with the same file structure. The "Disc Clone" tool effectively copies all of the contents of one hard disc drive onto another hard disc drive. The operation allows you to transfer all the information (including the operating system and installed programs) from one hard disc drive to another without having to reinstall and reconfigure all of your software. If you decide to use cloning, the best chance of success is to remove the existing drive from the computer and install the new drive in its place. It should be connected in exactly the same way as the old drive.

Seagate DiscWizard does not provide for cloning a single partition. You can clone only an entire drive.

By the way, you can also transfer all the information from your hard disc drive to another one by backing up the entire old hard disc and then recovering the backup to the new disc.

Backup archive components

Archive - Known as archive chain or archive group, it is the whole set of backup files managed by a single backup task. The archive can consist of one or several slices.

Slice - It is a set of files created during each cycle of the task execution. The amount of slices created is always equal to the amount of times the task is executed. A slice represents a point in time, to which the system or data can be recovered.

Volume - It is a tib file associated with the slice. Usually there is only one volume per slice however, each slice may consist of several volumes. If you have set archive splitting in the task options, the resulting slice will be split into several files. In addition, Seagate DiscWizard automatically splits a slice into several files of 4GB each (except the last file) when you make a large backup to a FAT32 formatted hard disc. These files are the slice's volumes.

Snapshots

While creating disc images, Seagate DiscWizard uses "snapshot" technology that allows creating even system partition backups while running Windows with files open for reading and writing without the necessity to reboot the computer. Once the program starts the partition backup process, it temporarily freezes all the operations on the partition and creates its "snapshot". Snapshot creation usually takes just several seconds. After that the operating system continues working as the imaging process is under way and you will not notice anything unusual in the operating system functionality.

In its turn, the Seagate driver continues working to keep the point-in-time view of the partition. Whenever the driver sees a write operation directed at the partition, it checks whether these sectors are already backed up and if they are not, the driver saves the data on the sectors to be overwritten to a special buffer, then allows overwriting. The program backs up the sectors from the buffer, so that all the

partition sectors of the point-in-time when the snapshot was taken will be backed up intact and an exact "image" of the partition will be created.

Backup file format

Seagate DiscWizard saves backup data in the proprietary tib format using compression. This provides for reducing the storage space requirements, as well as for backward compatibility with the previous Seagate DiscWizard version. While creating a tib file, the program calculates checksum values for data blocks and adds these values to the data being backed up. These checksum values allow verifying the backup data integrity. However, using the proprietary format means that the data from such backups can be recovered only with the help of Seagate DiscWizard itself – either in Windows or in the recovery environment.

Backup archive validation

How can you be sure that you'll be able to recover your system if the need arises? The feature called backup validation provides a high degree of such assurance. As was already said, the program adds checksum values to the data blocks being backed up. During backup validation Seagate DiscWizard opens the backup file, re-calculates the checksum values and compares those values with the stored ones. If all compared values match, the backup file is not corrupted and there is a high probability that the backup can be successfully used for data recovery. It is highly recommended to validate system partition backups after booting from the rescue media.

Disaster recovery

Recovering from a disaster usually requires a rescue media, because such disaster often means that your operating system does not boot either due to system data corruption (e.g. caused by a virus or malware) or a hard disc failure. When the operating system fails to boot, you need some other means of booting and using Seagate DiscWizard to recover the system partition. So to be better prepared for a disaster, you absolutely must have a rescue media. Legal owners of the program can create a rescue media using the tool called Media Builder.

To enable booting to the recovery environment, it is necessary to ensure that the BIOS boot sequence includes the rescue media. See Arranging boot sequence in BIOS (p. 107).

1.3　System requirements and supported media

1.3.1　Minimum system requirements

The hardware requirements of Seagate DiscWizard correspond to the minimum requirements for the operating system installed on the computer to be used for running Seagate DiscWizard. In addition Seagate DiscWizard requires the following hardware:

- Attached Seagate/Maxtor hard drive
- CD-RW/DVD-RW drive for bootable media creation
- Mouse or other pointing device (recommended)

Seagate DiscWizard rescue media has the following hardware requirements:

- 256 MB RAM

- Processor Pentium 1 GHz or faster

The recommended minimum screen resolution is 1152 x 864.

1.3.2 Supported operating systems

Seagate DiscWizard has been tested on the following operating systems:

- Windows XP SP3
- Windows XP Professional x64 Edition SP2
- Windows Vista SP2 (all editions)
- Windows 7 (all editions)

Seagate DiscWizard also enables creation of a bootable CD-R/DVD-R that can back up and recover a disc/partition on a computer running any Intel- or AMD- based PC operating system, including Linux®. The only exception is the Intel-based Apple Macintosh, which is currently not supported in native mode.

1.3.3 Supported file systems

- FAT16/32
- NTFS
- Ext2/Ext3 *
- ReiserFS *

If a file system is not supported or is corrupted, Seagate DiscWizard can copy data using a sector-by-sector approach.

The Ext2/Ext3, and ReiserFS file systems are supported only for disc or partition backup/recovery operations. You cannot use Seagate DiscWizard for file-level operations with these file systems (file backup, recovery, search, as well as image mounting and file recovering from images), as well as for backups to discs or partitions with these file systems.

1.3.4 Supported storage media

- Hard disc drives (including MBR discs larger than 2 TB)*
- Networked storage devices
- CD-R/RW, DVD-R/RW, DVD+R (including double-layer DVD+R), DVD+RW, DVD-RAM, BD-R, BD-RE**
- USB 1.0 / 2.0 /3.0, FireWire (IEEE-1394) and PC card storage devices
- REV®, Jaz® and other removable media

* Seagate DiscWizard does not support dynamic discs.

** Burned rewritable discs cannot be read in Linux without a kernel patch.

2   Seagate DiscWizard installation and startup

2.1   Installing Seagate DiscWizard

To be able to install the program you need at least one Seagate/Maxtor hard drive to be attached.

To install Seagate DiscWizard:

- Run the Seagate DiscWizard setup file.
- In the Install Menu, select the program to install: **Seagate DiscWizard**.
- Follow the install wizard instructions on the screen.

> **Typical**, **Custom** and **Complete** installation is available. Having pressed **Custom**, you can choose not to install **Rescue Media Builder**.
>
> With **Rescue Media Builder** you can create bootable rescue discs (see details in Creating bootable media (p. 67)). Installing the **Bootable Rescue Media Builder** will allow you to create bootable media or its ISO image at any time from the main program window or by running **Bootable Rescue Media Builder** on its own.

When installed, Seagate DiscWizard creates a new device in the Device Manager list (**Control Panel** → **System** → **Hardware** → **Device Manager** → **Acronis Devices** → **Acronis Backup Archive Explorer**). Do not disable or uninstall this device, as it is necessary for connecting image archives as virtual discs (see Exploring archives and mounting images (p. 70)).

2.2   Running Seagate DiscWizard

You can run Seagate DiscWizard in Windows by selecting **Start** → **Programs** → **Seagate** → **Seagate DiscWizard** → **Seagate DiscWizard** or by clicking on the appropriate shortcut on the desktop.

2.3   Removing Seagate DiscWizard

Select **Start** → **Settings** → **Control panel** → **Add or remove programs** → **Seagate DiscWizard** → **Remove**. Then follow the instructions on the screen. You may have to reboot your computer afterwards to complete the task.

If you use Windows Vista, select **Start** → **Control panel** → **Programs and Features** → **Seagate DiscWizard** → **Remove**. Then follow the instructions on the screen. You may have to reboot your computer afterwards to complete the task.

3   General information and proprietary Seagate technologies

3.1   Disc/partition images

A backup archive is a file or a group of files (also called "backups" in this guide), that contains a copy of all information stored on selected discs/partitions.

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

*By default, Seagate DiscWizard stores only those hard disc parts that contain data (for supported file systems). Furthermore, it does not back up swap file information (pagefile.sys under Windows XP and later) and hiberfil.sys (a file that keeps RAM contents when the computer goes into hibernation). This reduces image size and speeds up image creation and recovery. However, you might use the **Create an image using the sector-by-sector approach** option that lets you include all of the sectors of a hard disc in an image.*

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

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

By default, files in all Seagate DiscWizard archives have a ".tib" extension. Do not change this file extension.

It is important to note that you can recover files and folders from disc/partition images. To do so, mount the image as a virtual disc (see Exploring archives and mounting images (p. 70)) or start the image recovery and select **Recover chosen files and folders**.

3.2   Full backup

Seagate DiscWizard can create full backups.

A **full backup** contains all data at the moment of backup creation. It forms a base for further incremental backup or is used as a standalone archive (incremental backups are not available in the current version of the product).

A standalone full backup might be an optimal solution if you often roll back the system to its initial state or if you do not like to manage multiple files.

3.3 Backup file naming conventions

Let's remember that Seagate DiscWizard may split a full archive into volumes either when a user sets the splitting option or when a large backup having a size bigger than 4GB is saved to a FAT32 disc. See "Backup archive components" in Seagate DiscWizard basic concepts (p. 7).

Though users may assign any name to backups, many would still prefer using automatic naming and the below information may come in handy when viewing the contents of a backup archive storage in Windows Explorer.

1) When saved to a FAT32 disc, such backup may be split into volumes with the names SystemBackup_mm_dd_yyyy1.tib, SystemBackup_mm_dd_yyyy2.tib, SystemBackup_mm_dd_yyyy3.tib, etc.

As in this case the subsequent automatically scheduled backups will replace the previous one (once every seven days by default) only after the next backup finishes (to keep the old backup in the event of the current backup's failure), the backup filename(s) will be alternately named SystemBackup_mm_dd_yyyy.tib and SystemBackup_mm_dd_yyyy(1).tib.

2) In some cases when you create a new full backup task at a new destination, the backup gets the name "MyBackup_mm_dd_yyyy.tib".

If a backup is split (either automatically, e.g. due to the 4GB file size limit on FAT32 discs or when configuring a backup task), the constituent backup files (volumes) are named as follows:

MyBackup_mm_dd_yyyy1.tib…MyBackup_mm_dd_yyyyN.tib, where N is the number of volumes

3) When you back up, for example, partitions C and D, the backup gets the name "System_C_D_mm_dd_yyyy.tib".

4) When you rename backups on the Data recovery and backup management screen, a backup is renamed only in the program's metadata database; however, backup file names on the disc remain unchanged.

3.4 Viewing disc and partition information

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

The header may have up to three icons: **Columns**, **Arrange Icons by** and **Disc properties**, the latter duplicated in the context menu opened by right-clicking objects.

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

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

If you click the **Disc properties** button, you will see the selected partition or disc properties window.

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

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

3.5   Seagate DriveCleanser

Seagate DiscWizard contains utilities for secure destruction of data on an entire hard disc drive, individual partitions. When replacing your old hard drive with a new, higher-capacity one, you may unwittingly leave on the old disc lots of personal and confidential information that can be recovered, even if you have reformatted it.

The Seagate DriveCleanser provides for the destruction of confidential information on hard disc drives and/or partitions with the help of techniques that meet or exceed most national and state standards. You can select an appropriate data destruction method depending on the importance of your confidential information.

3.6   Technical Support

Support for Seagate DiscWizard users is provided by Seagate. Please visit Seagate's Support Page at http://www.seagate.com/www/en-us/support/installation_assistance.

3.7   Generating system reports

When you need help from Seagate support team, in most cases information about your system is necessary for resolving your problem. Sometimes getting the information is an inconvenient process and may take a long time. The tool simplifies the procedure. It generates a system report containing all the necessary technical information and allows you to save the information to file. When it's necessary, you can attach the created file to your problem description and send it to Seagate support team to simplify and speed up the search for a solution.

To generate a system report:

- Press the **ALT** key, and on the **Help** menu, click **Generate System Report**, or
- On the main program window click the **Help** arrow, and select **Generate System Report**, or
- Press **CTRL+F7**. Note that you can use the key combination even when Seagate DiscWizard is performing any other operation.

After the report is generated:

- To save the generated system report to file, click **Save As** and in the opened window specify a location for the created file.
- To exit to the main program window without saving the report, click **Cancel**.

You can place the feature on a bootable media as a specific component to be able to generate a system report when your computer cannot boot up. After you boot up from the media, you will be able to

generate the report even without running Seagate DiscWizard. In this case you should plug in a USB flash drive before clicking the component icon. The generated report will be saved on the USB flash drive.

To place Seagate System Report on a bootable media:

- Select the **Seagate System Report** check box on the **Bootable Media Content Selection** page of the **Seagate Media Builder** wizard

- Click **Next** to continue

4   If you have a new large hard drive (> 2TB) in your system

Purchasing a large size hard disc (with capacity more than 2 TB), a user may get into difficulties with allocating free space beyond 2 TB because of the following reasons:

- **MBR limitation**: an MBR partition layout can only address only up to 2^32 x 512 bytes (up to 2 TB of all available disc space);
- **GPT limitation**: a GPT partition layout allows addressing large discs, but some operating systems do not support working with GPT discs, such as Windows XP;
- **Booting from GPT discs**: only Windows Vista SP1 (x64) and Windows 7 (x64) support booting from GPT discs on UEFI systems;
- **UEFI**: UEFI is a new BIOS technology and is not supported on all computers;
- Windows XP (x32) is unable to detect discs larger than 2 TB properly;
- **USB controllers**: some USB controllers may not allow recognition of the correct size of the large disc.

Difference between Terabyte (TB) and Tebibyte (TiB)

The International System of Units (SI), which is used by hardware manufacturers to designate a hard drive size, defines a terabyte (TB) as 10^12 bytes. Therefore, 1 terabyte = 1000 gigabytes (1000000000000 bytes).

However, the International Electrotechnical Commission (IEC) uses a binary interpretation, where 1 terabyte = 2^40 bytes (1099511627776 bytes). IEC uses a name tebibyte (TiB).

Traditionally, a capacity of a hard disc is specified using SI decimal prefixes, though operating systems and applications mostly use IEC binary prefixes.

The use of both these standards may confuse users about the actual disc size. With regard to large size discs, after small calculation we see: **2 TiB = 2.2 TB**.

To learn how your operating system reports a disc capacity, right-click on a drive letter in Windows Explorer, and click **Properties**. Properties page displays a disc capacity in bytes and TB (or GB).

With Seagate DiscWizard you can easily add a new disc in your system, migrate data from another disc or from a previously created archive to this new disc, or allocate the extended capacity beyond 2 TB.

In addition, after installing Seagate DiscWizard on Windows XP (x32), a driver that allows the correct detection of a large disc's size, will be installed.

Adding a new disc

After installing a new hard drive in your computer, you can allocate the disc space, create new partitions and specify required file system, partition type and letter: see Adding a new hard disc section (p. 96).

Now Seagate DiscWizard allows you to select a partition style (GPT or MBR) while adding a disc operation. In the **Add New Disc** wizard, in the Select partition table step, you can define the required partition style.

If your new hard disc is larger than 2 TB, and you select an MBR partition style, later you can allocate the space beyond 2 TB with the Seagate Extended Capacity Manager.

Migrating to a new disc

When restoring or cloning the system to a larger disc, you may change the destination disc layout. At the respective step of a wizard, you may select an MBR or GPT partition layout depending on your system parameters. See Recovery Wizard - detailed information section (p. 60) on how to change a partition style while restore operation and Transferring the system to a new disc (p. 89) for information about cloning.

See Partition layouts section to learn more about MBR and GPT.

According to the parameters of a source and a destination hard drive, find the corresponding available options in the table: view Migrating to a disc larger than 2 TB section (p. 17).

Allocating disc space

Seagate DiscWizard allows you to allocate free space on a large hard disc with MBR partition style - see Seagate Extended Capacity Manager to know how you can make the disc space accessible for the operating system.

4.1 Adding and managing large drives (typical scenarios)

This chapter describes typical scenarios of managing a large hard drive in your system.

4.1.1 Adding a new large drive as non-system

Lets assume that you have purchased a new hard disc larger than 2 TB and plan to use it as a non-system disc, and an operating system installed on your computer does not support GPT discs like Windows XP.

1. Install a new hard drive in your computer.
2. Run Seagate DiscWizard and start **Add New Disc** wizard. Since your operating system does not support GPT partition style, MBR style will be applied and only 2 TB of all disc space will be available for use. To allocate the entire disc space, you need to restart Seagate DiscWizard on operation completion, and run Seagate Extended Capacity Manager, where you can create Extended Capacity Discs.

Note if you move such a disc to another system, you need at least one Seagate product installed on that system to be able to use Extended Capacity Discs.

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Extended Capacity Discs will not be available in non-Windows operating systems.

4.1.2   Migrating an operating system to a large disc

Let's assume that you have purchased a new hard disc larger than 2 TB, and an operating system installed on your computer does not support GPT discs or is not UEFI-based; and you plan to migrate your operating system to this new disc.

1. Install a new hard drive in your computer.
2. Run Seagate DiscWizard and start **Clone Disc** wizard to migrate an operating system to a new hard drive.
3. Acronis driver will be installed and activated automatically. On operation completion, the operating system will be bootable from a new disc.
4. Extended Capacity Discs will be available for use.

4.1.3   Installing an operating system on a large disc

Lets assume that you have purchased a new hard disc larger than 2 TB, and an operating system installed on your computer does not support GPT discs or is not UEFI-based; and you plan to install an operating system to this new disc.

1. Install a new hard drive in your computer.
2. After installing an operating system to a new disc, a disc space beyond 2 TB remains unallocated because of MBR partition style limitations.
3. Install Seagate DiscWizard to activate Acronis driver and reboot the computer.
4. To allocate the entire disc space, you need to restart Seagate DiscWizard, and run the Seagate Extended Capacity Manager, where you can create Extended Capacity Discs.

4.1.4   Recovering a GPT disc to Extended Capacity Disc

Let's assume you already have an Extended Capacity Disc created on your large hard drive and you want to use it as a target partition for recovering a GPT disc from an archive.

1. Remove Extended Capacity Disc(s) with Seagate Extended Capacity Manager before starting a recovery operation.
2. Start **Recovery Wizard** and restore a GPT disc.

4.1.5   Recovering an MBR partition to a large disc

Seagate DiscWizard allows recovering an MBR disc to a large hard drive.

1. Run **Seagate Extended Capacity Manager** and create Extended Capacity Disc on a target partition.
2. Run **Recovery Wizard** and select a required destination partition to recover an MBR disc from an archive.

4.1.6   Converting Extended Capacity Discs to a GPT style

Let's assume you have a large hard disc with Extended Capacity Discs created and you want to convert it to a GPT style.

It is important to consider, that conversion to GPT will lead to a data loss on the space beyond 2 TB. To avoid this issue, start Extended Capacity Manager and remove Extended Capacity Discs and then restart Seagate DiscWizard to convert a partition style to GPT.

4.1.7   Correcting a large disc size

When you install a hard drive larger than 2 TB in your system, Windows may recognize the disc's size incorrectly.

To fix detection of a disc size, perform the following steps:

- Install and activate Acronis driver.
- Reboot your computer.
- Now Windows can recognize the correct size of the disc. Use Seagate DiscWizard or disc management tools to create partitions.

4.1.8   Removing Seagate DiscWizard from a system with Extended Capacity Discs

After installing Seagate DiscWizard and using Seagate Extended Capacity Manager, the entire disc space is correctly recognized and allocated.

The disc space beyond 2 TB is used as Extended Capacity Disc.

While uninstalling the product, you will be asked whether you want Extended Capacity discs to be removed also.

- If you decide to remove them, Windows will still recognize a disc size correctly while Acronis driver is still installed in the system;
- If you decide not to remove Extended Capacity Discs, they will remain accessible for Add New Disc and disc management tools while Acronis driver is installed in the system.

4.1.9   Updating

When you update Seagate DiscWizard in your system, the newer version of Acronis driver will be kept.

Existing Extended Capacity Discs will be preserved after updating.

4.2 What you need to know about your system before deployment

Before you start a deployment (select a migration method or a new partition style in case you are adding a new disc in your computer), you need to know some particular information about your system parameters:

1. Does your hardware support UEFI?

What is UEFI?

Unified Extensible Firmware Interface (UEFI) is a BIOS specification that provides a better software interoperability by setting standard syntax for boot and runtime services.

Since UEFI is a rather new standard, not all systems support it: only Windows 7 x64 (all editions) and Windows Vista SP1+ x64 (all editions) operating systems support UEFI technology, Windows XP does not.

For more information on UEFI, please visit http://www.uefi.org.

Why do you need UEFI?

UEFI-based systems allows booting from a GPT partitions layout that allows a disc size larger than 2 TB.

To know whether your system is UEFI-based, you need to enter BIOS and find out if it has an **UEFI Boot** option:

1. Enter a BIOS setup program by pressing a key, mentioned in a message on the screen, during boot-up. Usually this key is [Del] or [F2].

2. Invoke a **Boot Options** menu using arrow keys.

3. If available, enter **UEFI Boot** item and select *Enable*.

4. Navigate to **Save & Exit Setup** and press **Enter** to save changes and boot the system.

Note, Windows operating system will not boot in UEFI, if a system disc layout is MBR.

2. Does your operating system support GPT?

On hard drives with MBR partition style only 2 TB can be accessible by disc management tools. To use the entire disc space, you need to convert the disc to a GPT style (if your operating system supports GPT) or use Seagate Extended Capacity Manager in case your operating system does not support GPT. Converting causes data loss.

A table below displays which operating systems support reading GPT discs and/or booting from such a disc:

	OS can read GPT discs	OS can boot from GPT discs (UEFI)
Windows XP 32-bit	NO	NO
Windows XP 64-bit	YES	NO
Windows Vista 32-bit	YES	NO
Windows Vista 64-bit	YES	NO

Windows Vista 64-bit SP1 or later	YES	YES
Windows 7 32-bit	YES	NO
Windows 7 64-bit	YES	YES

4.3 Adding a large hard drive

To add a new hard disc drive, you must first install it in your computer, install and run Seagate DiscWizard, and then start the **Add New Disc** wizard.

Initially, a disc space will be unallocated. Seagate DiscWizard will help you to create partitions and specify required parameters for newly created partitions.

Using **Add New Disc** wizard you can select a partition layout GPT or MBR.

A table below reflects the options you can select while adding a new disc in your system:

Your operating system	Available options
GPT is not supported **(Windows XP 32-bit)**	MBR style will be applied to a partition. Since MBR does not support large discs, the space beyond 2 TB will remain unallocated on operation completion. You need to restart Seagate DiscWizard and use Seagate Extended Capacity Manager to allocate the entire disc space and make it visible for disc management tools.
GPT is supported **(Windows Vista, Windows 7, Windows XP 64-bit)**	Seagate DiscWizard provides the following options for a partition layout style: ▪ **Create a GPT partition table on the disc** - a partition layout will be GPT. ▪ **Create an MBR partition table on the disc** - a partition layout will be MBR. If you select this option, you will not be able to use the entire disc space right after operation completion. You need to restart the product and use Seagate Extended Capacity Manager to allocate the entire disc space and make it visible for disc management tools.

	Seagate DiscWizard provides the following options for a partition layout style: ▪ **Create a GPT partition table on the disc** - a partition layout will be GPT. Note, your operating system must support GPT discs. ▪ **Create an MBR partition table on the disc** - a partition layout will be MBR. If you select this option, you will not be able to use the entire disc space right after operation completion. You need to restart Seagate DiscWizard and use Seagate Extended Capacity Manager to allocate the entire disc space and make it visible for disc management tools.
Seagate Bootable Media (CD)	

4.4 Migrating to a disc larger than 2 TB

After installing a new disc in your computer, you can start the **Clone Disc** wizard to transfer data to this new location.

Before starting the migration operation, you need to know whether your operating system supports UEFI, your source disc's layout (GPT or MBR). This will help you to select a migration method that perfectly meet your needs.

In **Migration Method** step, you have to select whether you want the destination disc to remain MBR (if a source disc is MBR), or you want to convert it to GPT using Seagate DiscWizard.

A table below displays the available options if you want to migrate a source disc to a large size (more than 2 TB) hard disc.

Each selection has its own advantages and limitations depending on your system parameters. Mostly it concerns the destination disc's bootability and capability of using the entire space on large discs.

	My system is BIOS-booted (Windows or Seagate Bootable Media)	My system is UEFI-booted (Windows or Seagate Bootable Media)

My source disc is MBR and my OS does not support UEFI	The partition style will remain MBR after cloning, Acronis Bus driver will be installed to the cloned operating system. Also, you will not be able to use the disc space beyond 2 TB since MBR does not support hard drives larger than 2 TB. To use the entire disc space, you need to change a partition style to GPT (if it is not the boot drive or Windows XP) or restart Seagate DiscWizard after operation completion and use Seagate Extended Capacity Manager to make disc space beyond 2 TB visible for disc management tools.	*You can select one of the required migration methods:* ▪ **Copy a source partition without changes** The partition style will remain MBR, but on operation completion, the operating system may fail booting from UEFI. Acronis Bus driver will be installed to the cloned operating system. Also, you will not be able to use the disc space beyond 2 TB since MBR does not support hard drives larger than 2 TB. To use the entire disc space, you need to change a partition style to GPT or restart Seagate DiscWizard after operation completion and use Seagate Extended Capacity Manager to make disc space beyond 2 TB visible for disc management tools. ▪ **Convert the partition style to GPT** The destination partition will be converted to GPT style. It can be used as a non-system disc, because your operating system does not support UEFI. The entire disc space will be available.
My source disc is MBR and my OS supports UEFI	The partition style will remain MBR after migration. Acronis Bus driver will be installed to the cloned operating system. You will not be able to use the disc space beyond 2 TB since MBR does not support hard drives larger than 2 TB. To use the entire disc space, you need to change a partition style to GPT or restart Seagate DiscWizard after operation completion and use Seagate Extended Capacity Manager to make disc space beyond 2 TB visible for disc management tools.	A partition style on your destination disc will be converted to GPT automatically. This disc may be used for booting in UEFI. Also, the entire disc space will be available.

	You can select one of the required migration methods:	You can select one of the required migration methods:
My source disc is MBR and OS is non-Windows, or no OS (data disc)	▪ **Copy a source partition without changes** The partition style will remain MBR, but you will not be able to use the disc space beyond 2 TB since MBR does not support hard drives larger than 2 TB. To use the entire disc space, you need to change a partition style to GPT or restart Seagate DiscWizard after operation completion and use Seagate Extended Capacity Manager to make disc space beyond 2 TB visible for disc management tools. ▪ **Convert the partition style to GPT** On operation completion, partition style will be converted to GPT. The destination disc cannot be used for booting, since no Windows operating system is installed on your source disc. The entire disc space will be available.	▪ **Copy a source partition without changes** The partition style will remain MBR, but you will not be able to use the disc space beyond 2 TB since MBR does not support hard drives larger than 2 TB. To use the entire disc space, you need to change a partition style to GPT or restart Seagate DiscWizard after operation completion and use Seagate Extended Capacity Manager to make disc space beyond 2 TB visible for disc management tools. ▪ **Convert the partition style to GPT** The destination partition will be converted to GPT style. The destination disc cannot be used for booting, since no Windows operating system is installed on your source disc. Also, the entire disc space will be available.
My source disc is GPT and my OS supports UEFI	The partition style will remain GPT after migration. After operation completion, the system will fail booting from BIOS, because your operating system cannot support booting from GPT on BIOS. The entire disc space will be available.	The operation will not affect neither partition layout nor bootability of the disc: partition style will remain GPT, the destination disc will be bootable in UEFI. The entire disc space will be available.
My source disc is GPT and OS is non-Windows, or no OS	The operation will not affect neither partition layout nor bootability of the disc: partition style will remain GPT, the destination disc will not be bootable. The entire disc space will be available.	The operation will not affect neither partition layout nor bootability of the disc: partition style will remain GPT, the destination disc will not be bootable in UEFI. The entire disc space will be available.

4.5   Seagate Extended Capacity Manager

The Seagate Extended Capacity Manager lets your operating system support large size discs with the MBR partition style. Then you are able to use the space beyond 2 TB: this free space will be recognized as a separate disc, and will be accessible by your operating systems and applications as if it was a regular physical hard disc.

Seagate Extended Capacity Manager wizard will display all hard discs larger than 2 TB (unallocated or with MBR partition style). You can see, which disc space is recognized and allocated by Windows - this space is called **Windows Native Capacity** in the wizard.
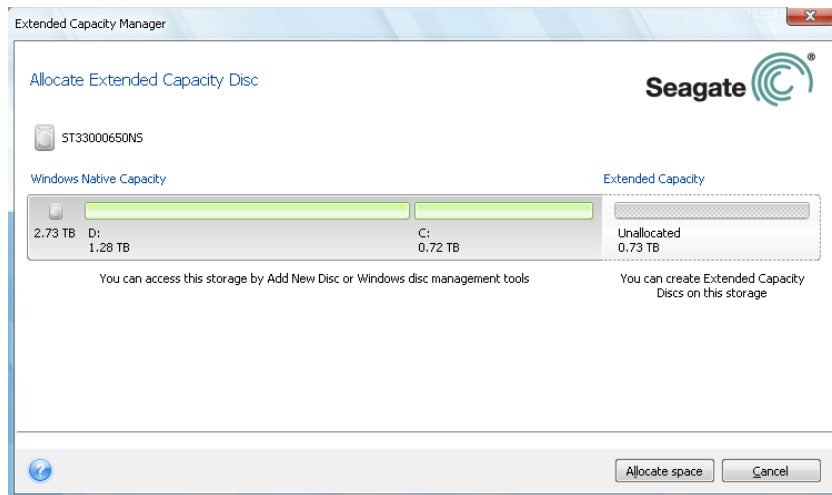
The space beyond 2 TB is displayed as **Extended Capacity**. You can enable **Extended Capacity Discs**, and once it is done, this space will be visible to the operating system and ready for disc management operations.

Click **Allocate space** to see the possible disc space allocation in the next step.
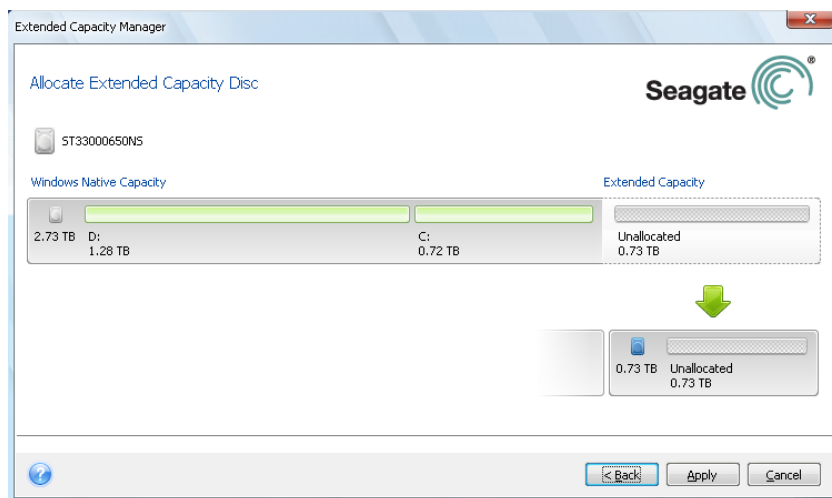
After clicking **Apply** button, the Extended Capacity Discs will be emulated on your physical disc. In case your physical disc is larger than 4 TB and the host operating system does not support a GPT partition layout, there will be several MBR Extended Capacity Discs.

Note these Extended Capacity Discs are not bootable, and most properties will be the same as a physical disc's.

After allocating the space, you may temporary switch off Extended Capacity discs by clicking the corresponding option - **Temporary switch off Extended Capacity Discs**. This will make Extended Capacity discs invisible for disc management tools, though the disc space will remain allocated and you will be able to enable these partitions again later.
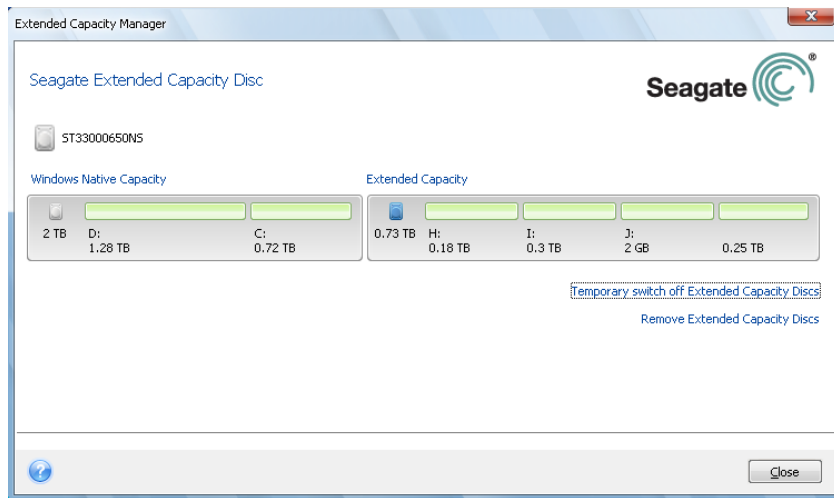
To remove Extended Capacity Discs, click **Remove Extended Capacity Discs** and then click **Apply** button in the next step: these discs will be removed from your system, and as a result - the disc space beyond 2 TB will become inaccessible. To allocate this space later, you will need to start Extended Capacity Manager again.

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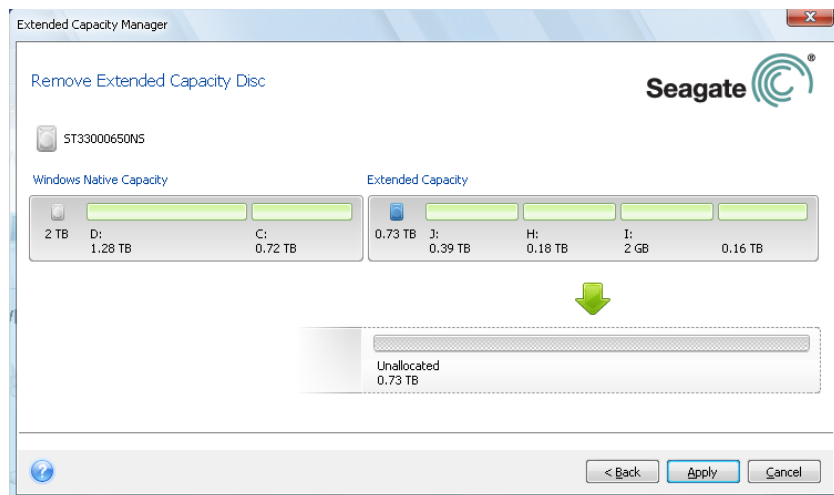
5   Preparing for disaster recovery

5.1   How to best prepare for a disaster

Let us remind you of Murphy's Law: "Whatever can go wrong will go wrong" (and at the worst possible time, in the worst possible way). And some people say that Murphy was an incurable optimist. So be warned – your computer may crash and will eventually crash (and maybe just at the worst possible moment). We may interpret Murphy's Law the other way around – it is vitally important to consider all the possible things that can go wrong and act so as to prevent them. The best way to counteract a possible disaster is by taking the necessary precautionary measures:

1) To be better prepared for a disaster, you need to make a full backup of your system disc (or at the very least the partition containing Windows and your applications).

2) Whenever possible, you should store your system drive image on a hard drive other than your primary hard disc C:, preferably on an external one. This gives an additional guarantee that you will be able to recover your system if your primary hard disc drive fails. Furthermore, it is usually better to keep your personal data separate from your operating system and applications, for example, on disc D:. Such an arrangement speeds up the creation of your system and data discs (or partitions) images and reduces the amount of information you will need to recover. This makes the backup file of your system disc much smaller and recovery can be easier. In its turn, the smaller the backup file size, the less chance of its corruption and the less time required for your system recovery.

3) If you store your data (documents, videos, photos, etc.) on a non-system disc, e.g. using the arrangement described in item 2), it needs to be backed up too. You can either back up the folders containing your data or create a data disc image. Remember that the imaging procedure is much faster than copying files and could speed up the backup process significantly when it comes to backing up large volumes of data. Incidentally, if the image file becomes corrupted for some reason, it is sometimes possible to mount the image and save most files and folders by copying them from the mounted image using Windows Explorer.

4) As recovery of your system from a disaster in most cases will be done after booting from the rescue media, you **must** test the rescue media as described in the next section - Testing bootable rescue media.

5.1.1   Recommendations for testing that your backups can be used for recovery

1) Even if you start recovery of the active partition in Windows, the program will reboot into the Linux environment after the recovery process starts because Windows cannot be left running while the recovery of its own partition is being carried out. So you will recover your active partition under the recovery environment in all cases. If you have a spare hard drive, we strongly recommend you to try a test recovery to this hard drive booting from the rescue media which uses Linux. If you do not have a spare drive, please, at least validate the image in the recovery environment. A backup that can be read during validation in Windows, **may not always be readable under Linux environment**.

When you use the Seagate DiscWizard rescue media, the product creates disc drive letters that might differ from the way Windows identifies drives. For example, the D: drive identified in the standalone Seagate DiscWizard might correspond to the E: drive in Windows. To be on the safe side, it is advisable to assign unique names to all partitions on your hard drives. This will make finding the disc containing your backups easier.

2) It may also be useful to complete all the steps in the Recovery Wizard right up to the Summary screen, but not click the Proceed button. This will allow you to simulate the recovery process and to make sure that Seagate DiscWizard recognizes both the drive containing your backups and the target drive. After completing all the Recovery Wizard's steps click **Cancel** on the Summary screen. You may repeat this until you feel sure of your settings and choices.

5.1.2   Additional recommendations

1) Many IT professionals recommend that you have at least two copies of your system backup (three are even better). To be on the safe side, it is further recommended to keep one copy of a backup in a different location from the other (preferably on other premises – for example, at work or at a friend's home, if you use the backed up computer at home). One more argument in favor of several backups: when starting recovery, Seagate DiscWizard deletes the target partition (or disc), so when you have just a single backup, the moment the system partition is deleted on the computer being recovered you are at great risk - the only thing you have is the image being recovered and if it is corrupted you are in big trouble.

2) It is better to format the hard drive used for storing your backups to the NTFS file system rather than FAT32. This is due to the 4GB file size limit on FAT32 discs. So if your backup has a size of about 100GB, Seagate DiscWizard will split it into 25 files. When there are several such full backups on the hard disc, the number of files will multiply accordingly. This may be inconvenient if, for example, you would like to move the backup to another location using Windows Explorer.

3) If you have only one computer at home, it is advisable to print some information that may be helpful in recovering from a disaster, because you may not be able to use the Internet. Keep the printed material in a safe place along with the rescue CD/DVD or another rescue media.

5.2   Testing bootable rescue media

To maximize the chances of your computer's recovery if need arises, you must test that your computer can boot from the rescue media. In addition, you must make sure that the recovery media contains all drivers required for operation of your mass storage devices and network adapter.

1) If you purchased the program after downloading it, you absolutely must create a bootable rescue CD (or other rescue media, for example, a USB stick) following the recommendations given in the User's Guide or program's Help and then make sure this rescue media is bootable on your computer.

You must configure your computer so as to enable booting from the rescue media and make your rescue media device (CD-ROM/DVD-ROM drive or USB stick) the first boot device. See Arranging boot sequence in BIOS (p. 107);

In case you have a rescue CD, press a key to start booting from the CD, as soon as you see the prompt "Press any key to boot from CD". If you fail to press a key within five seconds, you will need to restart the computer. When using other rescue media, the procedure will be similar.

2) After the computer boots into the recovery environment, check that it detects all the hard drives you have in your system, including external ones, if you use them for storing backups. Incidentally, you must attach the external drive(s) before booting from the rescue media, otherwise the recovery environment might not detect the drive(s).

3) If you store your backups on the network, you should also check that you can access the network in the recovery environment. When booted from the rescue media, Seagate DiscWizard might not detect the network. If no computers are visible on the network, but the Computers near me icon is found under My Computer, ensure that a DHCP server is running on your network. If you don't use a DHCP server, specify network settings manually in the window available at Tools & Utilities → Options → Network adapters.

If the **Computers near me** icon is not available under **My Computer**, there may be problems either with your network card or with the card driver shipped with Seagate DiscWizard.

Selecting video mode when booting from the rescue media

When booting from the rescue media the optimal video mode is selected automatically depending on the specifications of your video card and monitor. However, sometimes the program can select the wrong video mode, which is unsuitable for your hardware. In such case you can select a suitable video mode as follows:

1. Start booting from the rescue media. When the boot menu appears, hover the mouse over Seagate DiscWizard (Full version) item and press the F11 key.
2. When the command line appears, type "vga=ask" (without quotes) and click **OK**.
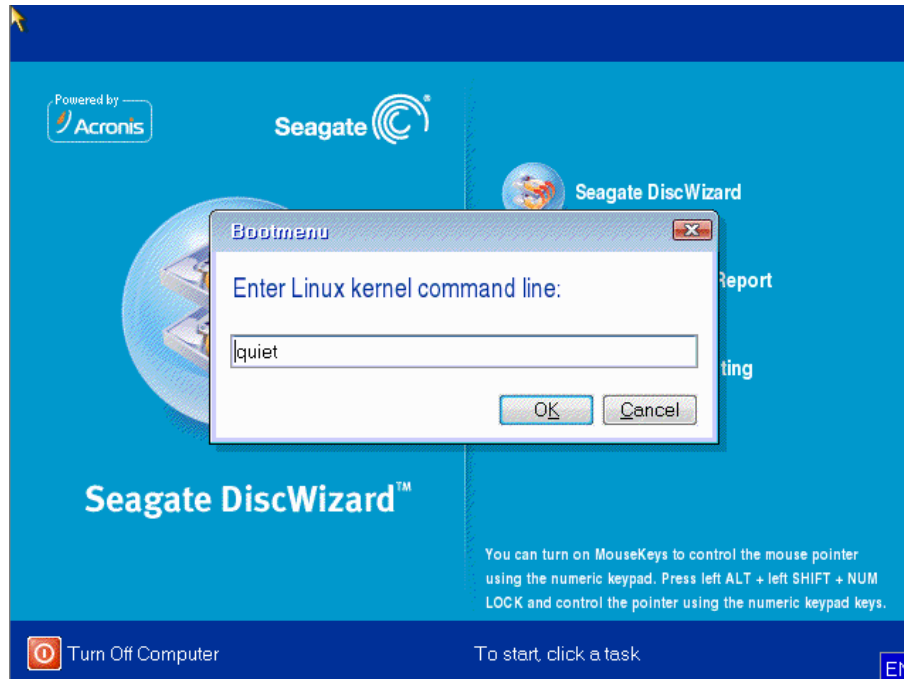
3. Select Seagate DiscWizard (Full version) in the boot menu to continue booting from the rescue media. To see the available video modes, press the Enter key when the appropriate message appears.

4. Choose a video mode you think best suitable for your monitor and type its number in the command line. For instance, typing 338 selects video mode 1600x1200x16 (see the below figure).

```
Press <ENTER> to see video modes available, <SPACE> to continue, or wait 30 sec
Mode: Resolution:   Type: Mode: Resolution:   Type: Mode: Resolution:   Type:
0 F00    80x25       VGA   1 F01    80x50       VGA   2 F02    80x43       VGA
3 F03    80x28       VGA   4 F05    80x30       VGA   5 F06    80x34       VGA
6 F07    80x60       VGA   7 320   320x200x8    VESA  8 321   320x400x8    VESA
9 322   640x400x8    VESA  a 323   640x480x8    VESA  b 324   800x600x8    VESA
c 325  1024x768x8    VESA  d 326  1152x864x8    VESA  e 327  1280x960x8    VESA
f 328  1280x1024x8   VESA  g 329  1400x1050x8   VESA  h 32A  1600x1200x8   VESA
i 32B  1792x1344x8   VESA  j 32C  1856x1392x8   VESA  k 32D  1920x1440x8   VESA
l 32E   320x200x16   VESA  m 32F   320x400x16   VESA  n 330   640x400x16   VESA
o 331   640x480x16   VESA  p 332   800x600x16   VESA  q 333  1024x768x16   VESA
r 334  1152x864x16   VESA  s 335  1280x960x16   VESA  t 336  1280x1024x16  VESA
u 337  1400x1050x16  VESA  v 338  1600x1200x16  VESA  w 339  1792x1344x16  VESA
x 33A  1856x1392x16  VESA  y 33B  1920x1440x16  VESA  z 33C   320x200x32   VESA
  33D   320x400x32   VESA    33E   640x400x32   VESA    33F   640x480x32   VESA
  340   800x600x32   VESA    341  1024x768x32   VESA    342  1152x864x32   VESA
  343  1280x960x32   VESA    344  1280x1024x32  VESA    345  1400x1050x32  VESA
  346  1600x1200x32  VESA    347  1792x1344x32  VESA    348  1856x1392x32  VESA
  349  1920x1440x32  VESA    300   640x400x8    VESA    301   640x480x8    VESA
  303   800x600x8    VESA    305  1024x768x8    VESA    307  1280x1024x8   VESA
  30E   320x200x16   VESA    311   640x480x16   VESA    314   800x600x16   VESA
  317  1024x768x16   VESA    31A  1280x1024x16  VESA
Enter a video mode or "scan" to scan for additional modes: _
```

Incidentally, when there is a digit or letter before a three-digit number, you can also select such video mode by typing the corresponding single digit or letter ("v" in our instance).

5. Wait until Seagate DiscWizard (Full version) starts and make sure that the quality of the Welcome screen display on your monitor suits you.

To test another video mode, close Seagate DiscWizard and repeat the above procedure.

After you find the optimal video mode for your hardware, you can create a new bootable rescue media that will automatically select that video mode.

To do this, start Seagate Media Builder, select the required media components, and type the mode number with the "0x" prefix (0x338 in our instance) in the command line at the "Bootable media startup parameters" step, then create the media as usual.

5.3   Creating a custom rescue CD

If the recovery environment cannot detect some of the hard disc drives or the network adapter, usually there is a problem with the drivers. Seagate rescue CD cannot contain drivers for all hardware on the market. So when the standard rescue CD lacks some of your hardware drivers, you need to create a custom one.

The Linux-based recovery environment used by Seagate does not provide the ability for users to add new drivers. Because of this, you should request Seagate Customer Service Department to create a custom rescue CD that will have all the drivers you need.

Before making a request, collect the information about your system. Select **Generate System Report** in the Help menu. Seagate DiscWizard will automatically collect the required information and display a list of what is collected in the report. In the process of creating the report the program may install some components required for collecting the necessary information. When the report is complete, click **Save As** and select the desired folder or leave the default **My Documents** folder. The program will archive the report into a zip file. Send the file to the Seagate Customer Service Department. They will build an iso image of a custom rescue media compatible with your computer hardware and send you an iso file. Burn this file to a CD/DVD using a program that can handle iso files such as Nero. Incidentally, this report may also be useful when you request the Seagate Customer Service Department to help you with a problem.

After burning your custom rescue CD, test it to make sure that your hard disc drives and network adapter are now detected in the recovery environment.

6 Getting to know Seagate DiscWizard

6.1   Program workspace

Starting Seagate DiscWizard takes you to the Welcome screen. This screen provides quick access to backup and recovery features, as well as highlights any issues with your system's protection.

Your system is considered fully protected when it is backed up and a bootable rescue media is created. If some of the aforementioned have not been done, Seagate DiscWizard shows the following links allowing to solve the protection issues: Back Up My System, Create Bootable Rescue Media. After an issue is solved, the corresponding link disappears.
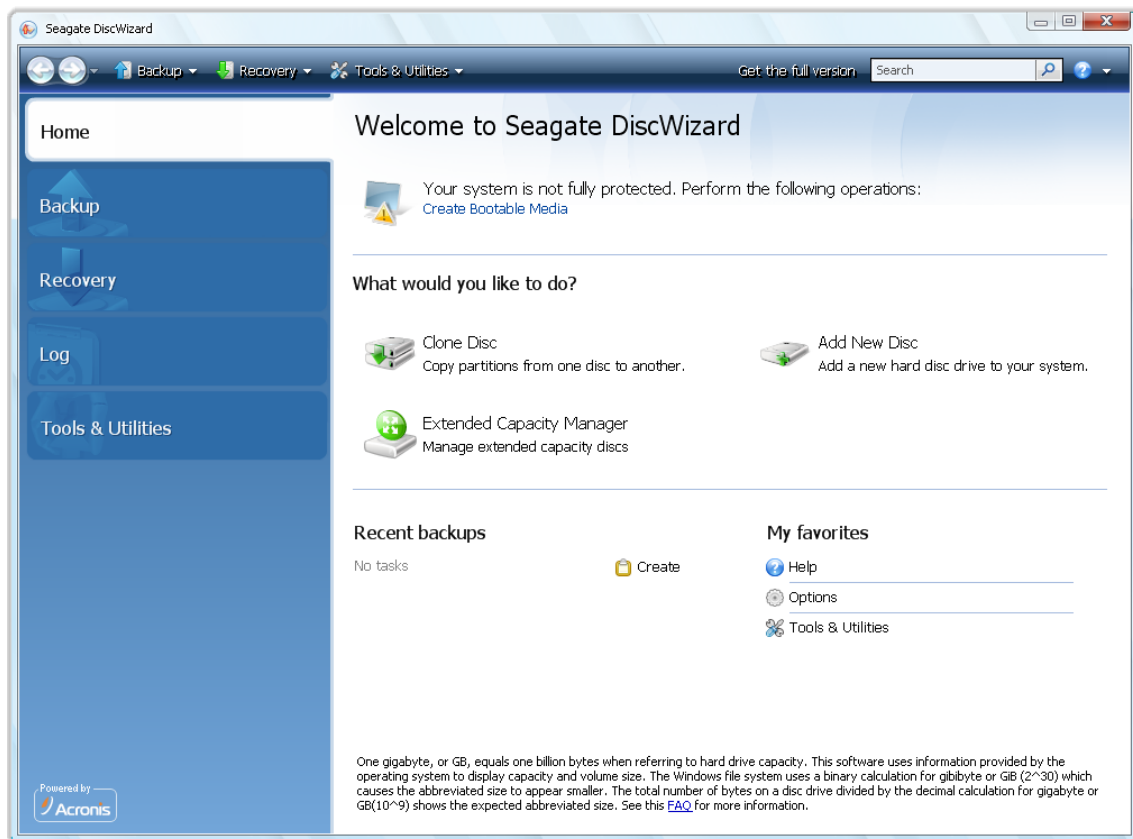
Clicking the items in the right pane takes you to the corresponding screen where you can either start the backup or recovery task immediately or make further selections.

The **My favorites** area in the right pane lists the features you have used most often and provides shortcuts to them in case you would like to use the features again. The **Recent backups** area lists the backups you have recently run and allows you to update the backup archives with just one click.

You can easily access the Seagate DiscWizard features through the so called *sidebar* occupying the left side of the screen. Choosing an item on the sidebar takes you to a screen, where you can access the corresponding features.

Seagate DiscWizard uses wizards, which guide you through many operations. Like the main program window, wizards also have the sidebar listing all the steps (both required and optional) needed for completing the operation. For example, see the Backup Wizard screen shot below.
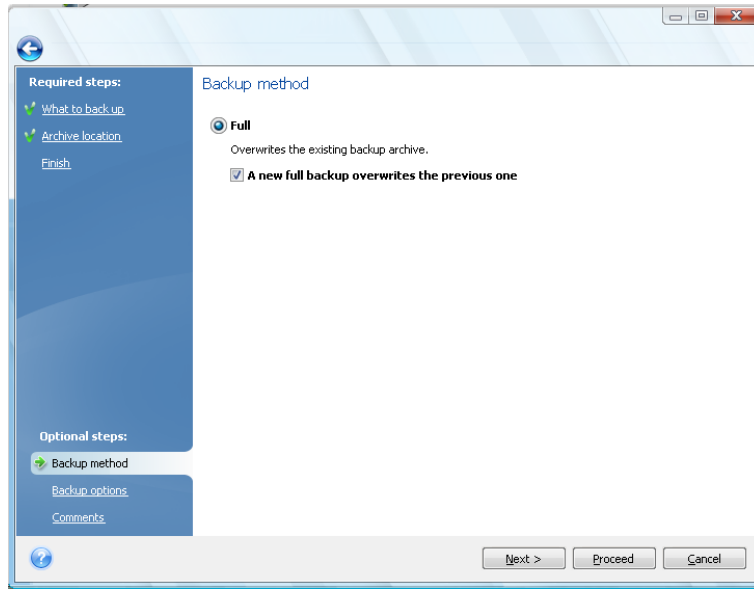
The completed steps are marked with green checkmarks. The green arrow shows the current step. After you complete all the required steps and come to the **Finish** step, the program displays the Summary screen. If you wish to omit the optional steps, read the summary of the operation to be performed (to make sure that the default settings satisfy you) and then click **Proceed** to start the task. Otherwise, click **Backup Options** to go to the optional steps where you can change the default settings for the current task.

Taskbar notification area icons

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

6.2 Main screens

And now let's get acquainted with some of the other screens you will use while working with Seagate DiscWizard.

To go to one more screen of interest, click **Recovery** on the sidebar.
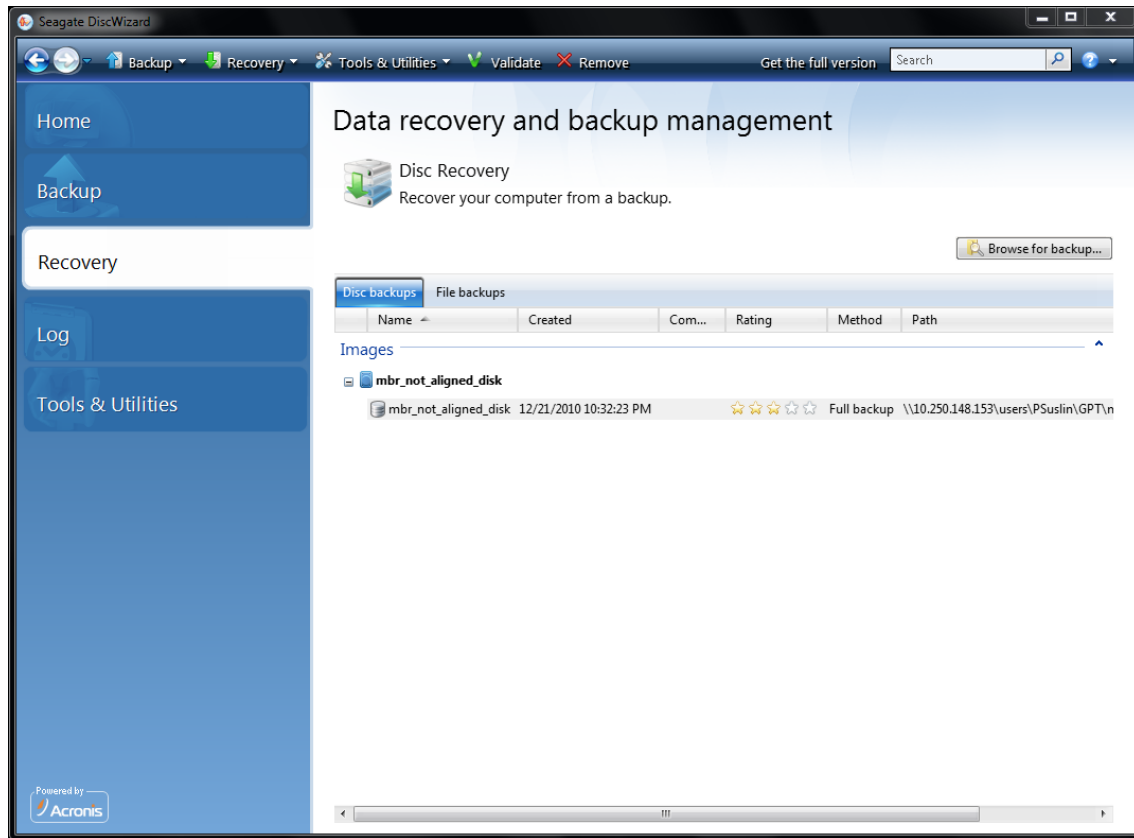
The **Data recovery and backup management** screen gives detailed information on your backup archives and provides for quickly performing operations on these archives – Recover, Validate, Move, Remove, Explore backup archives, as well as Mount image backups by right-clicking on an archive and choosing the required operation. This starts the appropriate wizard or performs the appropriate action.

Here you can also edit comments for backups, see detailed information on the backups, and assign ratings to your backups. For instance, you may want to assign a high rating to an important backup. A backup rating is indicated by the number of "stars" in the **Rating** column (more stars means a higher rating). The default rating is three stars, but you can raise or lower it by clicking on the stars in the column. Ratings might save you a lot of time you will otherwise spend on exploring multiple files in your backup archives, trying to guess which of the outdated backups can be deleted without losing important data.

Furthermore, this screen shows the results of searches for backup archives and their content. To perform a search, enter a search string into the Search field at the top right of the Seagate DiscWizard window and then click the magnifying glass icon. For more information see Searching.

Another useful screen shows the log of program operations. A calendar provides quick access to the logs (for past dates). You just click on a desired date. For more information see Viewing Tasks and Logs.
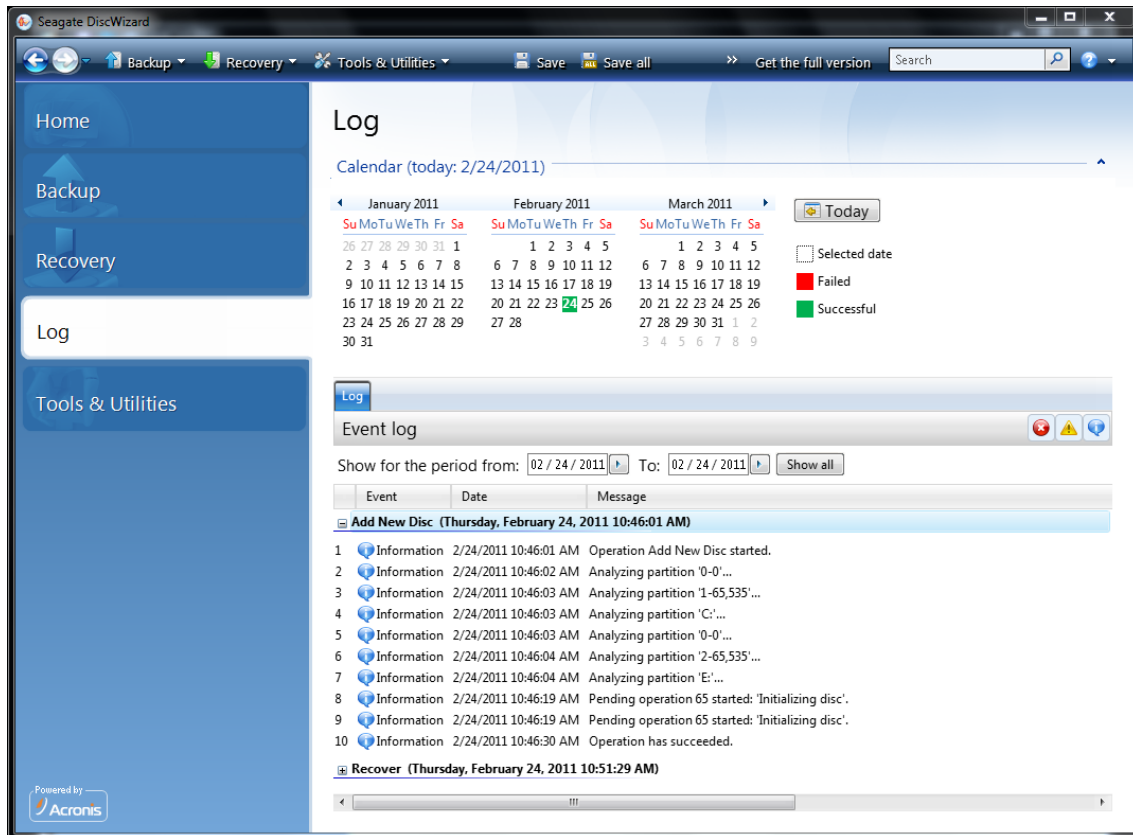
We will not bore you with a description of other screens, because many of them are self-explanatory and some are described in the appropriate chapters of this guide. In addition, you can always open contextual help by clicking the corresponding button.

Incidentally, you can also select most of the features through the main program menu, which is always at your disposal on the toolbar.

6.3   Options screen

Seagate DiscWizard has options related to its appearance and various program functions. To view or edit the default options, choose **Tools & Utilities**→ **Options** in the main program menu.
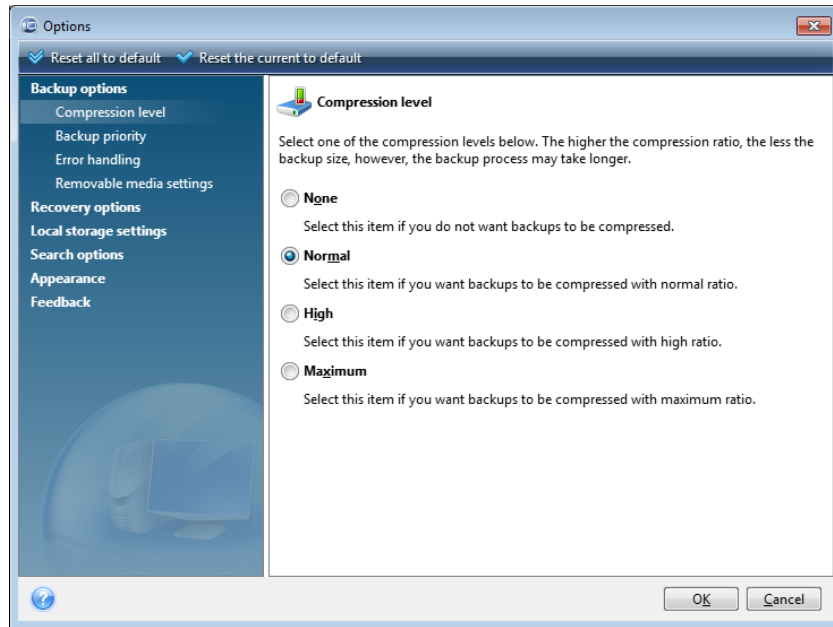
The **Backup options** item provides for making settings to be used by default in any backup task. You can modify the settings depending on your backup needs. For detailed information on the backup options and possible settings see Fine-tuning your backups (p. 48). In addition, you can change the backup options while configuring a specific backup task. In such case the changed options will be used only for this task.

Similarly, the **Recovery options** item provides for making settings to be used by default by any recovery task. For detailed information on the recovery options and possible settings see Setting default recovery options (p. 65). As with the backup options, you can change the recovery options for a specific recovery task.

The **Local storage settings** item provides for making other settings related to the backup process, for example, they may have a more or less noticeable effect on the backup process speed. For more information see Fine-tuning your backups (p. 48).

The **Search options** allow you to enhance the Search function by integrating it with Windows Search or Google Desktop search engines. If you have one of those search engines installed, you can include tib files in their index files by selecting the appropriate box in the **Desktop search options** window. For more information see Windows Search and Google Desktop integration (p. 75).

The **Appearance** options allow modifying the appearance of the program's user interface by selecting a font to be used on screens, in dialogs, etc. You can also modify a font to be used in the menu items. To view the appearance of a concrete font, click the "**...**" button, select the font and have a look at the sample text. If you are satisfied with the font's appearance, click **OK**, otherwise try another font or click **Cancel**.

The **Feedback** option allows you to quit the Seagate Customer Experience Program, if you decided to join it during Seagate DiscWizard installation or join the program by selecting the **Yes, I want to participate in the program** radio button. If you want to know more about the Customer Experience Program, click the **Learn more** link.

If modifying the default options does not provide the desired results or if you just want to restore the default options values set during Seagate DiscWizard installation, click **Reset all to default** on the toolbar. When you need to set the default values only for a selected option, click **Reset the current to default** on the toolbar.

7 Creating backup archives

7.1 Preparing for your first backup

First of all you should decide where to store your backups. Seagate DiscWizard supports quite a lot of storage devices. For more information see Supported storage media (p. 10). Since hard disc drives are now quite inexpensive, in most cases purchasing an external hard drive for storing your backups will be an optimal solution. In addition to enhancing the security of your data – you can keep it off-site (for example, at home if you back up your office computer and vice versa), many models are hot-pluggable, so you can attach and detach the drive as required. You can choose various interfaces – USB, FireWire, eSATA depending on the configuration of your computer ports and the required data transfer rate. In many cases the best choice will be an external USB hard drive. If you have a Gigabit Ethernet home network and a dedicated file server or NAS, for example, Buffalo TeraStation 1.0 TB NAS Gigabit Ethernet Home Server, you can store backups on the file server or NAS practically like onto an internal drive. Blank optical discs such as DVD-R, DVD+R are very cheap, so they will be the lowest cost solution for backing up your data, though the slowest one, especially when backing up directly to DVDs. Furthermore, if your backup consists of several DVDs, data recovery from such backup will require a lot of disc swapping.

Due to the necessity of swapping discs, it is strongly recommended to avoid backing up to DVDs if the number of discs is more than three.

If you decide to use an external hard drive, NAS, etc., you will need to check whether Seagate DiscWizard detects the selected backup storage.

Some external hard drives are sold preformatted FAT32. If so, it is better to convert the external hard drive for backups from FAT32 into NTFS, because of the 4GB file size limit of the FAT32 system. Due to this limitation, large backup files will automatically split into 4GB chunks, thus increasing the chance that something will go wrong during data recovery.

If you plan to use an external USB hard drive with your desktop PC, connecting the drive to a rear connector using a short cable will usually provide the most reliable operation, reducing the chance of data transfer errors during backup/recovery.

7.2 Deciding what data to back up

As operating systems and application software become ever larger (for example, Windows Vista x64 requires 15GB of free space on a hard disc), usually it will take you several hours to reinstall your operating system and application software from original CDs or DVDs on a new hard disc. Furthermore, the practice of buying application software by downloading from the Internet is becoming more and more popular. If you lose your registration information, for example, the activation key and/or registration number, which are usually sent by software vendors by e-mail, you may have problems with restoring your right to use the application. So making a backup of your entire system disc (making a disc image) will save you a lot of valuable time in case of a disaster, as well as safeguard you against other possible problems.

Backing up the entire system disc takes more disc space, but enables you to recover the system in minutes in case of a system crash or hardware failure (for details see Disc/partition images (p. 13)).

You might think it would take a while to make a copy of your entire hard disc, but the proprietary technologies used in Seagate DiscWizard ensure that image creation is quite fast.

You should create images of your primary disc and any other partition you normally use. If you have multiple partitions on a drive, it is advisable to include all of them in the image, because failure of the hard drive in most cases will mean that all the partitions it contains also fail.

Although we strongly recommend you to create images of your hard disc on a regular basis, that is just part of a reliable backup strategy.

7.3   Some typical backup scenarios

Below are several scenarios of "classic" backups describing frequently used backup tasks. Depending on your backup strategy, you may find some of them useful.

7.3.1   Backing up a system partition

It is recommended to back up the system partition when your C: disc consists of a single partition, though in this case partition backup is equivalent to system disc backup. It is also makes sense to back up the system partition if it contains all your applications and important data or if you do not have enough free space for backing up the entire system disc. A system partition backup would be most helpful when you need to recover the operating system corrupted by a virus, malware or, for example, after Windows update installation. Recovery on a new hard disc drive is possible too, though it may be a bit complicated in case you want to create more than one partition on the new hard disc. Otherwise it is better to back up the entire system disc, especially if it has hidden recovery or diagnostic partitions created by your computer's manufacturer. Furthermore, a system disc backup is more convenient when recovering on a new disc. Backing up the system partition may also be advisable when you like testing a lot of applications or games. Most applications cannot be uninstalled without a trace, including Seagate DiscWizard itself. You can make a basic system partition backup containing your operating system and main applications like MS Office and Outlook. Thereafter you will always be able to recover that basic system state after trying new programs – if you don't like them or if something goes wrong.

7.3.2   Backing up an entire system disc

When your backup storage device has enough free space, it is advisable to back up the entire system disc. Such a backup is most suitable for recovering your system and applications both when you need to recover them on the original hard disc drive or a new one, e.g. after your hard drive failed. Incidentally, if your system disc contains several partitions, an entire disc backup also provides for recovery of any individual partition.

Because system disc backups are the most important for disaster recovery, it is advisable to check both the system disc and the hard disc to be used as the backup storage for errors with the help of Microsoft's Chkdsk utility, which is part of Windows. The utility can repair errors and locate bad sectors.

You can back up the system disc both in Windows and in the recovery environment. Before starting a system disc backup in Windows it is advisable to close such applications as MS Outlook and DBMS programs.

Though the program locks the system partition while making a so called "snapshot" (see Seagate DiscWizard basic concepts (p. 7)), some users still prefer backing up the system disc when Windows is not running.

The subsequent description is made under the assumption that you boot from your bootable rescue media and the program "sees" all your hard drives and other storage devices in the recovery environment. See Testing bootable rescue media (p. 29).

Attach the external drive if it is to be used for backup storage and make sure that the drive is powered on. This must be done before booting from Seagate rescue media.

1. Arrange the boot sequence in BIOS so as to make your rescue media device (CD, DVD or USB stick) the first boot device. See Arranging boot sequence in BIOS (p. 107).
2. Boot from the rescue media and select Seagate DiscWizard (Full version).
3. Click **Backup** → **Disc and Partition Backup** on the Welcome screen.
4. Select the system disc as the source for backup by checking the appropriate disc box (this will select all partitions on the disc, including the hidden ones).
5. Choose a target archive for the backup being configured – you can either add a new backup to an existing archive or create a new one. Choose the backup location and assign a name to the backup to be created. It is better to use meaningful names, e.g. Disc1_full.tib.
6. Carefully read the Summary of actions to be performed during backup and click **Proceed** if you are satisfied with the backup task settings, otherwise click **Options** on the Summary screen to change the settings.
7. Select a backup method. For a more detailed explanation of the methods see Full backup (p. 13). When performing backups in the recovery environment many users prefer full backups, though you may choose another method depending on your needs.
8. Set the backup options. When backing up in the recovery environment you must set the options manually for each backup task. You can encrypt the backup for data protection and select a compression level (the program shows estimated backup sizes for each level). You can also choose to validate the backup immediately after its creation, though it can be done later. In any case validation of a system disc backup is best performed in the recovery environment, as you will use the recovery environment when recovering the system partition or disc.
9. If you wish, provide comments to the backup. You will also be able to add comments later.
10. Click **Proceed** to start the backup.

It is extremely important to validate the system disc backup before trying to recover, because Seagate DiscWizard deletes the original partition(s) on the disc before starting recovery and if it finds a problem with the backup file during recovery, you are left with nothing. It is even better to try system disc recovery to a spare hard drive, if you have one.

7.3.3   Backing up a data partition or disc

Your personal data (MS Office documents, financial documents, pictures, music, videos, etc.) require protection in no less degree than your operating system. Such data is better kept separately from your operating system and applications on a dedicated partition or disc. This speeds up data partition or disc image backup, as well as recovery. It is recommended to perform data disc backup in Windows, because in most cases Windows drivers for storage devices operate better and faster than the respective Linux drivers used in the recovery environment. In addition, recovery of data discs and partitions usually occurs in Windows. Let's create a data disc backup task in Windows.

Attach the external drive if it is to be used as the backup destination and make sure that the drive is powered on. This must be done before starting Seagate DiscWizard.

1. Click **Backup** → **Disc and Partition Backup** on the Welcome screen.
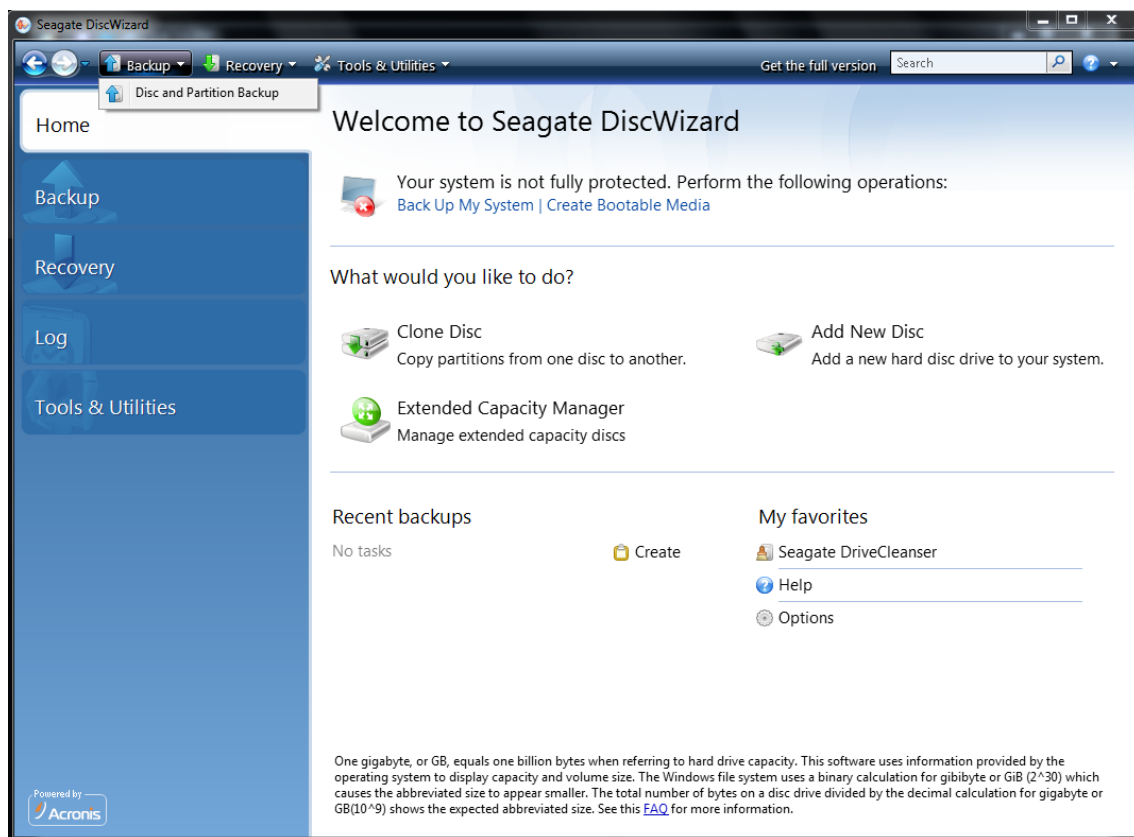
2. Select the box of your data partition or disc on the **What to back up** screen.
3. Choose a target archive for the backup task being configured – you can either add a new backup to an existing archive or create a new one. Choose the backup location and assign a name to the backup to be created. It is better to use meaningful names, e.g. Data_disc.tib. When you store different backup archives in the same location, e.g. on an external drive, you may want to create a new folder when creating a new backup archive. To do this, click **Create new folder** in the toolbar, then assign a meaningful name to the folder.

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4. Carefully read the Summary of actions to be performed during backup and click **Proceed** if you are satisfied with the backup task settings, otherwise click **Options** on the Summary screen to change the settings.

5. Choose a backup method. For a more detailed explanation of the methods see Full backup (p. 13). Let's reiterate that selection of the backup method may depend on the desired backup strategy.

6. Set the options for the backup task being created. For example, you can choose to validate the backup right immediately after its creation, though it can be done later.

7. If you wish, provide comments to the backup. You will also be able to add comments later.

8. Click **Proceed** when you are satisfied with the backup task settings.

If you have not included validation into the backup task settings, it is strongly recommended to validate the backup later – by performing the validation task manually. You should get into the habit of validating your backups.

7.3.4   Backing up to a network share

With Seagate DiscWizard you can back up your data to a network share. This may be desirable, for example, when you have a file server and want to use it for backing up data from PCs in your home network. Depending on your backup strategy, you may want to back up just files and folders or entire discs. One more consideration is the data transfer rate provided by your network. For example, a Gigabit Ethernet network has a bandwidth sufficient for all amounts of data to be backed up. However backing up over Wi-Fi connection may be time-consuming when you need to back up a hundred gigabytes.

Files and folders or data partitions can be backed up and recovered in Windows. If you plan to back up your system disc or partition, please, make sure that the standalone version of Seagate DiscWizard can "see" the network share to be used for backups as system recovery will be done in the recovery environment. After booting from the rescue media make sure that you can browse to the share in the Backup wizard or Recovery wizard.

It may be advisable to first back up and recover some files to ensure that you can perform those operations over the network. In addition, it is not recommended to map the drive containing the network share. Specifying the UNC path makes it easier to establish network connection in most cases.

Let's suppose you want to back up your system partition.

1. Start Seagate DiscWizard. Click **Backup** → **Disc and Partition Backup** on the Welcome screen.

2. Select the check box of your system partition on the **Source selection** screen.

3. When you are connecting to a networked computer, in most cases you will need to provide the network credentials (user name and password) to access a network share. To do this, select the **Use NT authentication** box and enter the user name and password into the appropriate fields. Pressing the **Test authentication and connection** button allows testing the ability of the computer to connect to the selected network share. If testing results in an error message, check whether you provided the correct credentials and enter the right credentials for the network share. When the **Use NT authentication** box is left unselected, the computer will try to log on to the share with the credentials used for logging on to Windows. Having provided the required information, click **OK** to continue. Choose a target archive for the backup task being configured – you can either add a new backup to an existing archive or create a new one. It is better to use meaningful names, e.g. Disc_C.tib.

4. Carefully read the Summary of actions to be performed during backup and click **Proceed** if you are satisfied with the backup task settings, otherwise click **Options** on the Summary screen to change the settings.

5. Choose a backup method. For a more detailed explanation of the methods see Full backup (p. 13). Let's reiterate that selection of the backup method may depend on the desired backup strategy.

6. Set the options for the backup task being created. You can choose to validate the backup immediately after its creation, though it can be done later.

7. If you wish, provide comments to the backup. You will also be able to add comments later.

8. Click **Proceed** when you are satisfied with the backup task settings.

8 Additional backup features

8.1 Backup Wizard – detailed information

The current version of Seagate DiscWizard allows you to choose only Disc backup type:

Disc backup:

▪ Choose the ![icon] **Disc and Partition Backup** parameter if you need to create an image of the entire disc or its partitions. Backing up the entire system disc (creating a disc image) takes up significant disc space, but enables you to recover the system in minutes in case of severe data damages or hardware failure.

We do not recommend backing up any data from drives protected by the BitLocker Drive Encryption feature, because in most cases recovering data from such backups will be impossible.

8.1.1 Selecting what data to back up

When the Backup Wizard screen appears, select what data to back up.

Disc and Partition Backup - select the discs or partitions to back up. You can select a random set of discs and partitions. The wizard's right pane shows the hard drives of your computer. Selecting a hard drive results in selecting all partitions on that drive. If a hard drive has more than one partition, you may want to select individual partitions for backing up. To do so, click on the Down arrow at the right of the drive's line. Select the desired partition(s) in the displayed partition list. By default the program copies only the hard disc sectors that contain data. However, sometimes it might be useful to make a full sector-by-sector backup. For example, perhaps you deleted some files by mistake and want to make a disc image before trying to undelete them because sometimes un-deleting may create havoc in the file system. To make a sector-by-sector backup, select the **Back up sector-by-sector (requires more storage space)** box. Please note that this mode increases processing time and usually results in a larger image file because it copies both used and unused hard disc sectors. In addition, when configuring a sector-by-sector backup of a complete hard disc you can include in the backup unallocated space on the hard disc by selecting **Back up unallocated space**. Thus you will include in the backup all physical sectors on the hard drive.

8.1.2 Selecting archive location

Select the location for the backup archive and specify the archive name.

If you are going to create a new archive (i.e. perform a full backup), select **Create new backup archive** and enter the path to the archive location and new archive file name in the **Backup Location:** field below or click **Browse**, select the archive location on the directory tree and enter the new file name in the **File name** line, or use the file name generator (a button to the right of the line).

If you want to change the location of added backup files, browse for a new backup location after clicking the **Browse** button, otherwise leave the location the same as that of the existing archive.
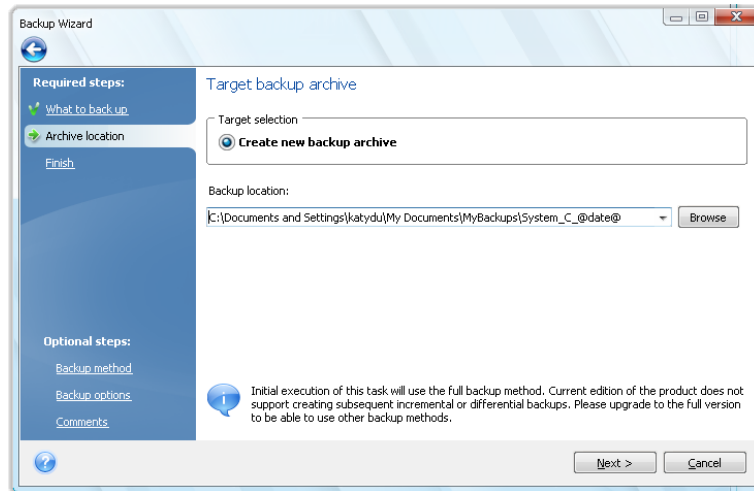
The "farther" you store the archive from the original folders, the safer it will be in case of disaster. For example, saving the archive to another hard disc will protect your data if the primary disc is damaged. Data saved to a network disc or removable media will survive even if all your local hard discs are damaged.

After selecting the archive location and naming the backup archive to be created, you have completed all the required steps for a backup task and this is confirmed by the fact that you come to the **Finish** step with the Summary of the backup task being displayed on the right pane. All the remaining steps are optional and in many cases you may omit them and just click **Proceed**. When you want to use the default backup options, you can omit the **Backup options** step, and so on.

Now let's see what optional steps you can set up while configuring a backup task. Click the **Options** button.

8.1.3   Backup method

Select a full backup to be created. If you have not backed up the selected data yet, or the full archive is old and you want to create a new master backup file, choose full backup.

After selecting the **Full** method, you can also choose what to do with the previous full backup when creating a new one. By default Seagate DiscWizard overwrites the previous full backup, but you can choose to keep it by unselecting the **A new full backup overwrites the previous one** box.
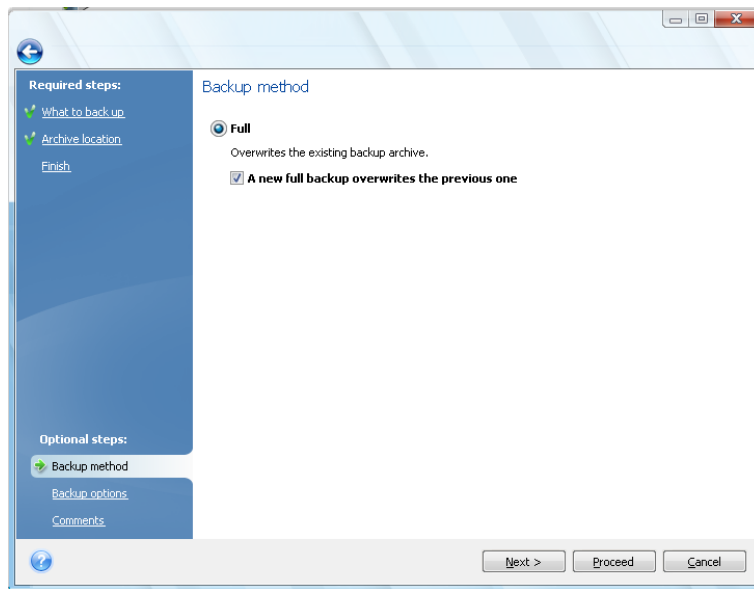
8.1.4   Selecting the backup options

Select the backup options (that is, backup file-splitting, compression level, etc.). The settings of the options will be applied only to the current backup task.
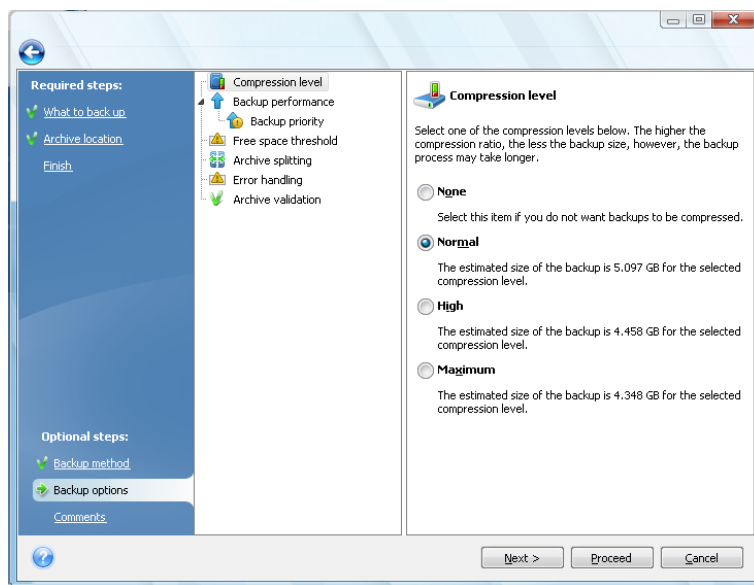
Or, you can edit the default backup options and local storage settings if you want to save the current settings for future tasks. For more information see Fine-tuning your backups (p. 48).

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8.1.5   Providing a comment

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

In addition, you can provide or edit a comment after the backup has been executed. To edit or add a comment, go to the **Data recovery and backup management** screen by clicking **Recovery** on the sidebar, choose the appropriate backup, right-click and select **Edit comments** in the shortcut menu.

8.1.6   The backup process

Clicking **Proceed** after completing all the optional steps you need for configuring the current backup task will start the task execution.

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

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

8.2   Fine-tuning your backups

You can fine-tune your backups to specific tasks. Such fine-tuning is made by configuring backup options before starting a backup task.

You can set temporary backup options by changing the default backup options while creating a backup task. If you would like to use the changed options for future tasks, make appropriate changes in the default backup options after selecting **Tools & Utilities** → **Options** → **Backup options**. Incidentally, you can always restore the default backup options to the values preset during installation of Seagate DiscWizard. To do this, click **Reset all to default** on the toolbar of the **Options** window. To reset just a single backup option, select it on the left pane and click **Reset the current to default**.

*Clicking **Reset all to default** will reset all the default options (for backup, recovery, etc.) to their preset values, so this button should be used with caution.*

8.2.1   Backup options

8.2.1.1   Compression level

The preset is **Normal**.

Let's consider such an example - you need to backup to a USB stick some files with a total size comparable to or exceeding the USB stick's capacity and want to make sure that the stick accommodates all the files. In this case use the **Maximum** compression for the files to be backed up. However, you should take into account that the data compression ratio depends on the type of files stored in the

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archive, for example, even the **Maximum** compression will not significantly reduce the backup size if it contains files with already compressed data like .jpg, .pdf or .mp3. It does not make any sense to select the **Maximum** compression for such files because in this case the backup operation will take significantly longer and you will not get an appreciable reduction of backup size. If you are not sure about the compression ratio of a file type, try to back up a couple of files and compare the sizes of the original files and backup archive file. A couple of additional tips: generally, you can use the **Normal** compression level, because in most cases it provides an optimal balance between backup file size and backup duration. If you select **None**, the data will be copied without any compression, which may significantly increase the backup file size, while making the fastest backup.

8.2.1.2   Backup priority

The preset is **Low**.

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

8.2.1.3   Error handling

Ignore bad sectors

The preset is **disabled**.

This option lets you run a backup even if there are bad sectors on the hard disc. Although most discs do not have bad sectors, the possibility that they might occur increases during the course of the hard disc's lifetime. If your hard drive has started making strange noises (for example, it starts making quite loud clicking or grinding noises during operation), such noises may mean that the hard drive is failing. When the hard drive completely fails, you can lose important data, so it is high time to back up the drive as soon as possible. There may be a problem though – the failing hard drive might already have bad sectors. If the **Ignore bad sectors** box is left unselected, a backup task is aborted in case of read and/or write errors that could occur on the bad sectors. Selecting this box lets you run a backup even if there are bad sectors on the hard disc ensuring that you save as much information from the hard drive as possible.

Do not show messages and dialogs while processing (silent mode)

The preset is **disabled**.

You can enable this setting to ignore errors during backup operations. This feature was mainly designed for unattended backups when you cannot control the backup process. In this mode no notifications will be displayed to you if errors occur during backup. Instead you can view the detailed log of all operations after the task finishes by selecting **Tools** → **Show Log**.

Cancel the operation when timed out

The preset is **enabled.**

Enable this option to force interrupting the backup creation if for some reasons the process cannot continue, e.g. a login or password for a network share is not entered when required, or a new CD/DVD is

not inserted, etc. By default, the timer is set to 10 minutes, and after this period, the program will cancel the backup task as failed if you still do not perform the required action. Please note if you disable this option, the backup operation will not continue until you perform those actions.

8.2.1.4 Removable media settings

When backing up to removable media, you can make this media bootable by writing additional components to it. Thus, you will not need a separate bootable disc.

Here the following settings are available:

- **Seagate DiscWizard (Full version)** - includes support of USB, PC Card (formerly PCMCIA) and SCSI interfaces along with the storage devices connected via them, and therefore is strongly recommended.

- **Seagate System Report** - the component allows you to generate system report that is used for collecting information about your system in case of any program problem. Report generation will be available before you start Seagate DiscWizard from the bootable media. The generated system report can be saved to a USB flash drive.

- **Ask for first media while creating backup archives on removable media**

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

8.2.2 Local storage settings

These settings also affect the backup process, for example, they may have a more or less noticeable effect on the backup process speed. Their values also depend on the physical characteristics of the local storage devices.

8.2.2.1 Free space threshold

The preset is **disabled**.

You may want to be notified when the free space on the backup storage becomes less than the specified value. To enable such notification, select the **On insufficient free disc space** box, then specify the free space threshold value in the below fields.

When this option is enabled, Seagate DiscWizard will monitor free space on your backup storage. If after starting a backup task Seagate DiscWizard finds out that the free space on the selected backup archive location is already less than the specified value, the program will not begin the actual backup process but will immediately inform you by displaying an appropriate message. The message offers you three choices - to ignore it and proceed with the backup, to browse for another location or to cancel the task. In case of choosing to cancel the backup you can either free some space on the storage and restart the task or create a new task with another location for the backup archive. If you choose **Browse**, select another storage, click **OK** and the backup file will be created on that storage.

If the free space becomes less than the specified value while the backup task is being run, the program will display the same message and you will have to make the same decisions. However, if you choose to

browse for another location, you will need to assign a name for the file that will contain the remaining data being backed up (or you may accept the default name assigned by the program).

Seagate DiscWizard can monitor free space on the following storage devices:

- Local hard drives
- USB cards and drives
- Networks shares (SMB/NFS)

This option cannot be enabled for FTP servers and CD/DVD drives.

The message will not be displayed if the "Do not show messages and dialogs while processing (silent mode)" box is selected in the "Error handling" settings (p. 49).

8.2.2.2   Archive splitting

Sizable backups can be split into several files that together form the original backup. A backup file can be split for burning to removable media.

Suppose you have a full backup of your PC on an external hard disc, but want to make one more backup copy of the system to keep it in a different location from the first one for added security. However, you do not have one more external hard disc, and a USB stick would not accommodate such a large backup. Using Seagate DiscWizard you can make a reserve backup copy on blank DVD-R/DVD+R discs, which are very cheap nowadays. The program can split large backups into several files that together form the original backup. If you have enough space on your PC's hard disc, you can first create a backup archive consisting of multiple files with a specified size on the hard disc and burn the archive to DVD+R discs later on. To specify the split file size, select **Fixed size** mode for **Archive splitting** and enter the desired file size or select it from the drop-down list.

If you do not have enough space to store the backup on your hard disc, select **Automatic** and create the backup directly on DVD-R discs. Seagate DiscWizard will split the backup archive automatically and will ask you to insert a new disc when the previous one is full.

Creating backups directly on CD-R/RW or DVD+R/RW might take considerably more time than it would on a hard disc.

8.2.2.3   Archive validation

Validate backup archive when it is created

The preset is **disabled**.

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

9   Data recovery with Seagate DiscWizard

The ultimate purpose of data backup is recovery of the backed up data when the original is lost due to hardware failure, fire, theft or just erroneous deletion of some important files.

There may be various reasons for recovering your system - from unstable operation after installing a new application, driver or Windows update to complete failure of the system hard drive or replacement of the old hard drive by a new larger one. In addition, it may be necessary to recover either only the system partition or the entire system disc comprising several partitions including hidden ones. Seagate DiscWizard provides for all these cases, though details of recovery may differ. In any case, it is better to perform system recovery when booting from the rescue media.

On the other hand, recovery of a data disc/partition or files and folders is usually performed in Windows.

9.1   Recovering your system partition

Let's first consider the simplest case - recovery of the system partition to the original location on the original hard disc drive.

As recovery of the system partition is one of the most important operations, it requires careful preparation even when you just want to recover a previous "known good" Windows state. While preparing for recovery you need to:

a) create and test Seagate bootable rescue media. For more information on testing media see Testing bootable rescue media (p. 29);

b) boot from the rescue media and validate the backup you want to use for recovery. Such validation is very important because Seagate DiscWizard deletes the target partition (the system partition in this case) when starting partition recovery, so you may find yourself without your system and applications if the backup file is corrupted. In addition, there were reports from users that a backup archive that has been successfully validated in Windows is declared corrupted when being validated in the recovery environment. This may be due to the fact that Seagate DiscWizard uses different device drivers in Windows and the recovery environment.

c) assign unique names to the discs and partitions used on your computer. This is strongly recommended because the drive lettering in Windows and in the recovery environment may differ. If you have not done this before making the backup, you can assign names now. The names will help you in finding the drive containing your backups as well as the target system partition.

d) optionally check the system hard drive for errors using Microsoft's Chkdsk utility, which is part of Windows.

Assuming that you have carried out the above, let's proceed with recovery.

Attach the external drive if it contains the backup archive to be used for recovery and make sure that the drive is powered on. This must be done before booting from Seagate rescue media.

1. Arrange the boot sequence in BIOS so as to make your rescue media device (CD, DVD or USB stick) the first boot device. See Arranging boot sequence in BIOS (p. 107).

2. Boot from the rescue media and select Seagate DiscWizard (Full version).

3. Select **Recovery** → **Disc and Partition Recovery** in the main menu and then choose the image backup of your system partition (or entire system disc) that you want to use for recovery. Right-click on the backup and choose **Recover** in the shortcut menu.

   If the discs have different disc letters in Windows and the recovery environment, the program will display the following error message: "Seagate DiscWizard cannot detect volume N of "Name" archive", where Name is the name of the required image backup archive and volume number (N) may be different depending on the number of backups in the archive. Click **Browse** and show the path to the archive.

4. Select **Recover whole discs and partitions** at the Recovery method step.

5. Select the system partition (usually C) on the **What to recover** screen. If the system partition has a different letter, select the partition using the **Flags** column. It must have the **Pri, Act** flags. As you are recovering the system partition to the original hard drive, there is no need to select the "MBR and track 0" box.

6. At the "Settings of partition C" (or the letter of the system partition, if it is different) step check the default settings and click **Next** if they are correct. Otherwise change the settings so as to suit you before clicking **Next**.

7. Carefully read the summary of operations at the **Finish** step. If you have not resized the partition, the sizes in the **Deleting partition** and **Recovering partition** items must match. If you do not want to validate the backup, click **Proceed**, otherwise click **Options** and select the "Validate backup archive before recovery" box before clicking **Proceed**.

8. When the operation finishes, exit the standalone version of Seagate DiscWizard, remove the rescue media and boot from the recovered system partition. After making sure that you recovered Windows to the state you need, restore the original boot sequence.

9.2   Recovering a disc backup to a different capacity hard disc

Recovery of a disc backup containing several partitions to a hard disc that has a different capacity using manual resizing of the partitions can be considered as one of the most complicated operations in Seagate DiscWizard. This is especially true when you have backed up the original hard disc containing a hidden diagnostic or recovery partition.

Recovering a dual/multiboot system disc e.g. with Windows and some flavor of LINUX may be even more fraught with difficulties. Quite often it requires some research on the appropriate forums before attempting to perform a recovery so this section does not cover such case.

Make the preparations described at the beginning of the previous section Recovering your system partition (p. 52). In case of upgrading the healthy system disc to a larger capacity new one, if you have not assigned unique names to the partitions on the system disc before making a system disc backup, it might make sense to assign such names and create a new backup of the entire disc. This will allow identifying the partitions by their names and not by the letters which may differ when booting from the

rescue media. If you are recovering from a system disc drive failure, assign names now anyway. The names will help you find the drive containing your backups, as well as the target (new) drive.

The information on partition sizes, drive capacities, their manufacturers, and model numbers can also help in correctly identifying the drives.

One more recommendation - it is highly recommended to install the new hard drive to the same position in the computer and use the same cable and the same connector as for the original drive (though this is not always possible, e.g. the old drive may be an IDE and the new drive may be a SATA). In any case, install the new drive to where it will be used.

9.2.1 Recovering a disc without a hidden partition

At first let's consider recovery of a system disc containing two partitions (none of them hidden) using a disc backup. In addition, we assume that the system disc does not contain a recovery partition which may not be hidden. If the disc contains, for example, three partitions, the procedure will be similar. We will describe recovery using the rescue media (as this approach usually gives the best recovery results).

Attach the external drive if it contains the backup archive to be used for recovery and make sure that the drive is powered on. This must be done before booting from Seagate rescue media.

1. Arrange the boot sequence in BIOS so as to make your rescue media device (CD, DVD or USB stick) the first boot device. See Arranging boot sequence in BIOS (p. 107).
2. Boot from the rescue media and select Seagate DiscWizard (Full version).
3. Select **Recovery** → **Disc and Partition Recovery** in the main menu, then choose the image backup of your system disc that you want to use for recovery.

   If the discs have different disc letters in Windows and the recovery environment, the program will display the following error message: "Seagate DiscWizard cannot detect volume N of "Name" archive", where Name is the name of the required image backup archive and volume number (N) may be different depending on the number of backups in the archive. Click **Browse** and show the path to the archive.
4. Select **Recover whole discs and partitions** at the Recovery method step.
5. At the **What to recover** step select the boxes of the partitions to be recovered. Do not select the **MBR and Track 0** box, as this will result in selecting the entire disc for recovery. Recovering the entire disc does not allow you to resize partitions manually. If necessary, you can recover the MBR later. Select the partitions and click **Next**.

   Selecting partitions leads to appearance of the relevant steps "Settings of partition ...". Take note that these steps are in ascending partition drive letter order and that this order cannot be changed. The order may differ from the physical order of the partitions on the hard disc. In the case being considered (no hidden or recovery partitions), the physical order of the partitions on the new disc does not have special importance as Seagate DiscWizard automatically fixes the appropriate Windows loader files.

   Incidentally, this step allows you to find out whether the disc you are going to recover contains a hidden partition. Hidden partitions do not have disc letters and they go first in the "Settings of partition ..." steps. If you find a hidden partition, see Recovering a disc with a hidden partition (p. 55).

6. You can specify the following partition settings: location, type, and size. Most likely you will first specify the settings of the system partition as it usually has the letter C. Because you are recovering to the new disc, click **New location**. Select the destination disc by either its assigned name or capacity.

   If you have not assigned names to the discs and have any doubts when selecting the destination disc, you may abort the recovery by clicking **Cancel** and try to identify the target disc by its model number, interface, etc. To see this information, select **Tools & Utilities** → **Add New Disc** in the main menu and the **Disc selection** screen will show the information. Use it for identifying the destination disc number, then click **Cancel**, start the Recovery Wizard again, repeat the above steps, and select the destination disc.

7. Clicking **Accept** will return you to the "Settings of partition ..." screen. Check the partition type and change it, if necessary. You should remember that the system partition must be primary and marked as active.

8. Proceed to specifying the partition size by clicking **Change default** in the Partition size area. By default the partition will occupy the entire new disc. You can resize and relocate the partition by dragging it or its borders with a mouse on the horizontal bar on the screen or by entering corresponding values into the appropriate fields (Partition size, Free space before, Free space after). While specifying the partition size remember that you need to leave as much unallocated (free) space *after* the newly resized partition as will be needed for the second partition. Usually the free space *before* partitions is equal to zero. Click **Accept** when the partition has the size you have planned for it, then click **Next**.

9. Begin specifying the settings for the second partition. Click **New location**, then select unallocated space on the destination disc that will receive the second partition. Click **Accept**, check the partition type (change, if necessary) and then proceed to specifying the partition size which by default is equal to the original size. Usually there is no free space after the last partition, so allocate all the unallocated space to the second partition, click **Accept** and then click **Next**.

10. Carefully read the summary of operations to be performed. If you do not want to validate the backup, click **Proceed**, otherwise click **Options** and select the "Validate backup archive before recovery" box before clicking **Proceed**.

11. When the operation finishes, exit the standalone version of Seagate DiscWizard.

Windows should not "see" both the new and old drive during the first boot after recovery. If you upgrade the old drive to a larger capacity new one, disconnect the old drive before the first boot otherwise there may be problems booting Windows.

Switch off the computer, if you need to disconnect the old drive, otherwise just reboot the computer after removing the rescue media.

Boot the computer to Windows. It may report that new hardware (hard drive) is found and Windows needs to reboot. After making sure that the system operates normally, restore the original boot sequence.

9.2.2 Recovering a disc with a hidden partition

Recovering a backup of the system disc with a hidden partition (e.g. created by the PC manufacturer for diagnostics or system recovery) to a different capacity hard drive, requires to take into account some additional factors. First of all, for the best chance of success, it is necessary to keep on the new drive the

physical order of the partitions that exist on the old drive and place the hidden partition to the same location - usually at the start or the end of the disc space. In addition, it is better to recover the hidden partition without resizing to minimize the risk of possible problems.

So before proceeding with recovery, you need to know about all partitions existing on the system disc, their sizes, and physical order. To see this information, start Seagate DiscWizard and choose **Recovery →** **Disc and Partition Recovery** in the main menu. Select a backup of your system disc and click **Details** on the toolbar. Seagate DiscWizard will display information about the backed up disc, including a graphical view of all partitions the disc contains and their physical order on the disc. If any partition display is too small for accommodating the relevant information, hover the mouse pointer over the partition to see the information.

Assuming that you have got the information, let's proceed with recovery of a system disc using the rescue media.

Attach the external drive if it contains the backup archive to be used for recovery and make sure that the drive is powered on. This must be done before booting from Seagate rescue media.

1. Arrange the boot sequence in BIOS so as to make your rescue media device (CD, DVD or USB stick) the first boot device. See Arranging boot sequence in BIOS (p. 107).

2. Boot from the rescue media and select Seagate DiscWizard (Full version).

3. Select **Recovery → Disc and Partition Recovery** in the main menu and then choose the image backup of your system disc that you want to use for recovery.

    If the discs have different disc letters in Windows and the recovery environment, the program will display the following error message: "Seagate DiscWizard cannot detect volume N of "Name" archive", where Name is the name of the required image backup archive and volume number (N) may be different depending on the number of backups in the archive.

4. Select **Recover whole discs and partitions** at the Recovery method step.

5. At the **What to recover** step select the boxes of the partitions to be recovered. Do not select the **MBR and Track 0** box, as this will result in selecting the entire disc for recovery. Recovering the entire disc does not allow you to resize partitions manually. You will recover the MBR later. Select the partitions and click **Next**.

    Selecting partitions leads to appearance of the relevant steps "Settings of partition ...". Take note that these steps start with partitions without an assigned disc letter (as usually is the case with hidden partitions), then go in ascending order of partition disc letters and this order cannot be changed. The order may differ from the physical order of the partitions on the hard disc.

6. You can specify the following partition settings: location, type, and size. You will first specify the settings of the hidden partition as it usually does not have a disc letter. Because you are recovering to the new disc, click **New location**. Select the destination disc by either its assigned name or capacity.

    If you have not assigned names to the discs and have any doubts when selecting the destination disc, you may abort the recovery by clicking **Cancel** and try to identify the target disc by its model number, interface, etc. To see this information, select **Tools & Utilities → Add New Disc** in the main menu and the **Disc selection** screen will show the information. Use it for identifying the destination disc number, then click **Cancel**, start the Recovery Wizard again, repeat the above actions, and select the destination disc.

7. Clicking **Accept** will return you to the "Settings of partition ..." screen. Check the partition type and change it, if necessary.

8. Proceed to specifying the partition size by clicking **Change default** in the Partition size area. By default the partition will occupy the entire new disc. You need to keep the hidden partition size unchanged, as well as place it to the same location on the disc (at the start or the end of disc space). To do this, resize and relocate the partition by dragging it or its borders with a mouse on the horizontal bar on the screen or by entering corresponding values into the appropriate fields (Partition size, Free space before, Free space after). Click **Accept** when the partition has the required size and location and then click **Next**.

   Specify the settings for the second partition which in this case is your system partition. Click **New location**, then select unallocated space on the destination disc that will receive the partition. Click **Accept**, check the partition type (change, if necessary). You should remember that the system partition must be primary and marked as active. Specify the partition size which by default equals the original size. Usually there is no free space after the partition, so allocate all the unallocated space on the new disc to the second partition, click Accept and then click Next.

9. Carefully read the summary of operations to be performed. If you do not want to validate the backup, click **Proceed**, otherwise click **Options** and select the "Validate backup archive before recovery" box before clicking **Proceed**.

10. When the operation finishes, proceed to MBR recovery. In this case you need to recover the MBR as the PC manufacturer could change the generic Windows MBR or a sector on the track 0 to provide access to the hidden partition.

11. Select the same backup once more, right-click and select Recover in the shortcut menu, choose **Recover whole discs and partitions** at the Recovery method step and then select the **MBR and Track 0** box.

12. At the next step select the destination disc as the target for MBR recovery, click **Next** and then **Proceed**. After MBR recovery is complete, exit the standalone version of Seagate DiscWizard.

Windows should not "see" both the new and old drive during the first boot after recovery. If you upgrade the old drive to a larger capacity new one, disconnect the old drive before the first boot otherwise there may be problems booting Windows.

Switch off the computer, if you need to disconnect the old drive, otherwise just reboot the computer after removing the rescue media.

Boot the computer to Windows. It may report that new hardware (hard drive) is found and Windows needs to reboot. After making sure that the system operates normally, restore the original boot sequence.

9.3   Recovering a data partition or disc

As we already said, data partitions and discs are usually recovered in Windows because this allows you to avoid such issues as the program not detecting your hard drives, changing disc letters, etc. To reduce the risk of problems during recovery even more, validate the backup archive to be recovered and check the destination disc for errors using chkdsk.

Attach the external drive if it contains the backup archive to be used for recovery and make sure that the drive is powered on. This must be done before starting Seagate DiscWizard.

1. Start Seagate DiscWizard.

2. Select **Recovery** → **Disc and Partition Recovery** in the main menu, then choose the image backup containing the data partition you want to recover.

3. Select **Recover whole discs and partitions** at the Recovery method step.

4. As you are going to recover a data partition, there is no need to select the **Recover MBR and track 0** box at the **What to recover** step. Select just the data partition you want to recover.

5. The next step allows you to select settings for the partition to be recovered. When recovering the partition to the original location, you only need to check the settings. If you want to recover the partition to another location, select the new location and set the partition type you need (or leave the default setting). When the new location is an existing partition, usually you may leave its disc letter and size unchanged. When the new location is unallocated space e.g. after installing a new hard drive you intend to use for your data, specify the size of the new partition and assign a logical disc letter.

6. Carefully read the Summary. After making sure that you have made the correct settings, click **Proceed**, if you do not need to change the default recovery options, otherwise click **Options**.

7. The Options step allows setting the recovery options, for example, to check the file system after recovery. For more information about the recovery options see Setting default recovery options (p. 65). After setting the recovery options click **Proceed**.

Recovering the entire data disc backup requires similar steps with few minor differences, for example, there is no "Check file system after recovery" option. When recovering to the original hard drive the steps of the Recovery Wizard are straightforward - just make sure that you select the disc with the same number as the backed up disc, as the destination.

Recovering your data disc backup to a hard drive with a different capacity has some nuances depending on its capacity and geometry (the number of heads and sectors per track). When recovering to a smaller capacity hard drive, the partition(s) size will be proportionally reduced. When recovering to a larger capacity hard drive, there are two cases: 1) if the hard drive has the same geometry, the backed up disc will be recovered "as is" thus leaving unallocated space; and 2) if the hard drive has different geometry, the partition(s) size will be proportionally enlarged.

9.4   Recovering files and folders

Depending on the backup types you have used, there may be several methods of recovering files and folders. In most cases you recover files and folders in Windows. You can recover files and folders from a disc/partition image. To recover files/folders from an image, you can mount the image (see Mounting an image (p. 70)) and copy files/folders to a desired location using Windows Explorer.

If you need to recover just a single file/folder or a few files, double-click on the required image backup archive. Then drill-down to the folder containing the file(s) you need to recover, select the file(s), right-click and choose **Copy** in the shortcut menu, open a folder for saving the files to be recovered, right-click in the folder and choose **Paste** in the shortcut menu. You can also drag the files from the backup archive into the destination folder.

One more method of recovering files/folders from an image is described below. See Recovering files and folders from image archives (p. 59).

9.4.1 Recovering files and folders from image archives

Image archives provide recovery of not only entire discs/partitions, but files/folders too.

1. Start the **Recovery Wizard** by selecting **Recovery** → **Disc and Partition Recovery** in the main program menu.

2. Select the archive.

   Data recovery directly from an FTP server requires the archive to consist of files of no more than 2GB. If you suspect that some of the files are larger, first copy the entire archive (along with the initial full backup) to a local hard disc or a network share disc.

3. At the **Recovery method** step select **Recover chosen files and folders**.

4. Select where you want to recover the chosen files/folders. You can recover data to its original location or choose a new one, if necessary.

   *When recovering files/folders under bootable rescue media, the **Original location** option is disabled, because drive letters in standalone Seagate DiscWizard might differ from the way Windows identifies drives.*

   Choosing a new location results in appearance of one more required step, namely, **Destination**. When you choose a new location, by default the selected items will be recovered without recovering the original, absolute path. You may also wish to recover the items with their entire folder hierarchy. If this is the case, select **Recover absolute path**.

   At the **Destination** step select a new location on the directory tree. You can create a new folder for the files to be recovered by clicking **Create new folder**.

5. Select the files and folders to recover. Make sure that you unselect all unnecessary folders. Otherwise you will recover a lot of excess files.

6. The first optional step allows you to keep useful data changes made since the selected backup was created. Choose what to do if the program finds a file in the destination folder with the same name as in the archive. By default, the program will overwrite existing files and folders, though more recent files and folders are protected from being overwritten. If necessary, you can protect the system, hidden files and folders from being overwritten by selecting the appropriate check boxes.

   In addition, you can protect the files that meet the criteria you specify in this window from being overwritten.

   Unselecting the **Overwrite existing files** checkbox will give the files on the hard disc unconditional priority over the archived files.

7. Select the options for the recovery process (that is, recovery process priority, file-level security settings, etc.). The options you set on this page will be applied only to the current recovery task.

8. Up to this point, you can make changes in the created task by choosing the step you want to change and editing its settings. Clicking **Proceed** will launch the task execution.

9. The task progress will be shown in a special window. You can stop the procedure by clicking **Cancel**. Please keep in mind that the aborted procedure may still cause changes in the destination folder(s).

10 Additional recovery information

## 10.1 Recovery Wizard - detailed information

The below description of the **Recovery Wizard** refers to recovering partitions/discs from image backups. If you need to recover files and folders, see Recovering files and folders (p. 59).

10.1.1 Starting the Recovery Wizard

Start the **Recovery Wizard** by selecting **Recovery** → **Disc and Partition Recovery** in the main program menu.

10.1.2 Archive selection

Select the archive. Seagate DiscWizard will show the list of backup archives whose locations it knows from the information stored in its database. If the program has not found the backup you need (for example, when the backup was made in the recovery environment or by a previous Seagate DiscWizard version), you can find it manually by clicking **Browse** and then selecting the backup location on the directory tree and choosing the backup in the right pane.
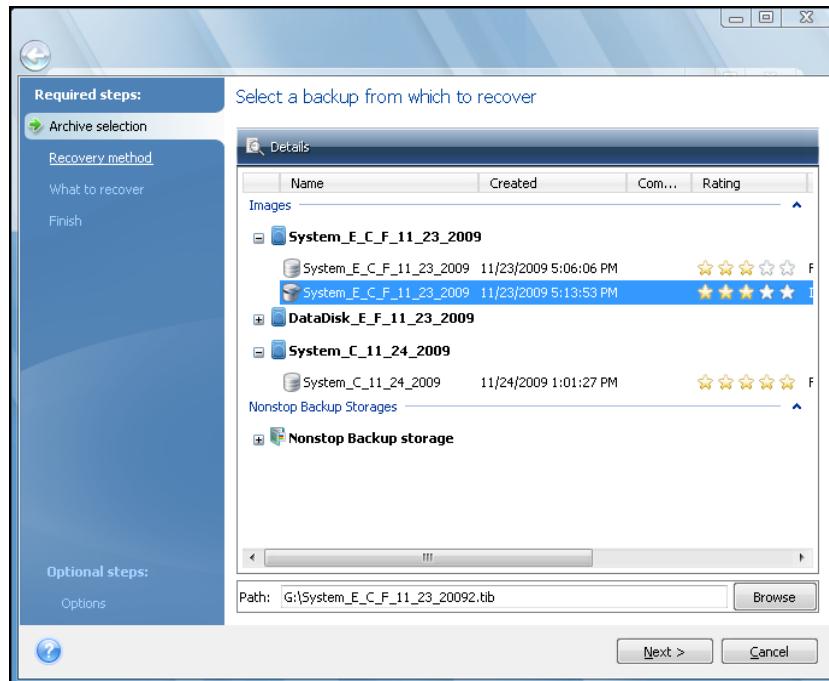

If the archive is located on removable media, e.g. CD, first insert the last CD and then insert discs in reverse order when the Recovery Wizard prompts you.

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Data recovery directly from an FTP server requires the archive to consist of files of no more than 2GB each. If you suspect that some of the files are larger, first copy the entire archive (along with the initial full backup) to a local hard disc or network share disc.

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When recovering a backup of Windows Vista or Windows 7 system disc containing restore points, some of your restore points (or all of them) may be missing if you boot from the recovered system disc and open the System Restore tool.

10.1.3 Recovery method selection

Select what you want to recover:
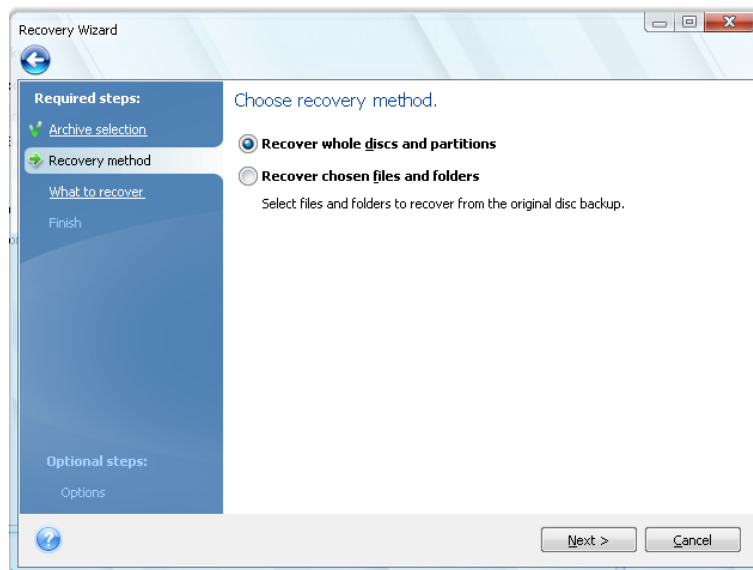
Recover whole discs and partitions

Having chosen a disc and partition recovery type, you may need to select the following option.

Recover chosen files and folders

If you are not going to recover the system, but only want to repair damaged files, select **Recover chosen files and folders**.

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

10.1.4 Selecting a disc/partition to recover

The selected archive file can contain images of several partitions or even discs. Select which disc/partition to recover.

During a single session, you can recover several partitions or discs, one by one, by selecting one disc and setting its parameters first and then repeating these actions for every partition or disc to be recovered.
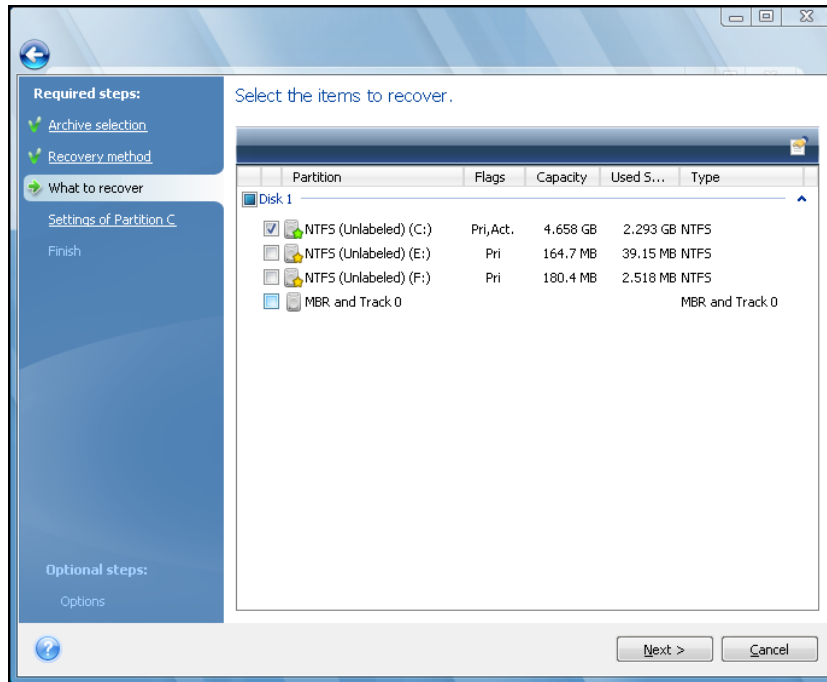
Disc and partition images contain a copy of track 0 along with the MBR (master boot record). It appears in this window in a separate line. You can choose whether to recover the MBR and track 0 by selecting the corresponding box. Recover the MBR if it is critical to your system booting.

When MBR recovery is chosen, the **Recover disc signature box** will appear in the bottom left corner at the next step. Recovering disc signature may be desirable due to the following reasons:

1. Seagate DiscWizard creates scheduled tasks using the signature of the source hard disc. If you recover the same disc signature, you don't need to re-create or edit the tasks created previously.
2. Some installed applications use disc signature for licensing and other purposes.
3. If you use Windows Restore Points, they will be lost when the disc signature is not recovered.
4. In addition, recovering disc signature allows to recover VSS snapshots used by Windows Vista and Windows 7's "Previous Versions" feature.

If the box is unselected, Seagate DiscWizard generates a new disc signature for the recovered drive. This may be needed when you use an image backup not for disaster recovery but for cloning your Windows Vista hard drive to another one. Trying to boot Windows after cloning with both drives connected will result in a problem. During Windows booting, its loader checks the disc signatures of all the connected drives, and if it finds two identical disc signatures, the loader changes the signature of the second disc, which would be the clone disc. Once this happens, the clone disc would not be able to boot up independently of the original disc, because the MountedDevices fields in the clone's registry reference the disc signature of the original disc, which will not be available if the original disc is disconnected.

10.1.5 Selecting a target disc/partition

1. Select a target disc or partition where you want to recover the selected image. You can recover data to its initial location, to another disc/partition or to an unallocated space. The target partition should be at least the same size as the uncompressed image data.

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

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

If there are partitions on the target disc, you will be prompted by the confirmation window stating that the destination disc contains partitions, perhaps with useful data.

You will have to select between:

- **OK** – all existing partitions will be deleted and all their data will be lost.
- **Cancel** – no existing partition will be deleted, discontinuing the recovery operation. You will then have to cancel the operation or select another disc.

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

10.1.6 Changing the recovered partition type

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

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

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

Seagate DiscWizard automatically corrects boot information during recovery of the system partition to make it bootable, even if it was not recovered to the original partition (or disc).

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

By default, the original partition type is selected.

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

10.1.7 Changing the recovered partition size and location

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

Using this feature, you can redistribute the disc space among partitions being recovered. In this case, you will have to recover the partition to be reduced first.
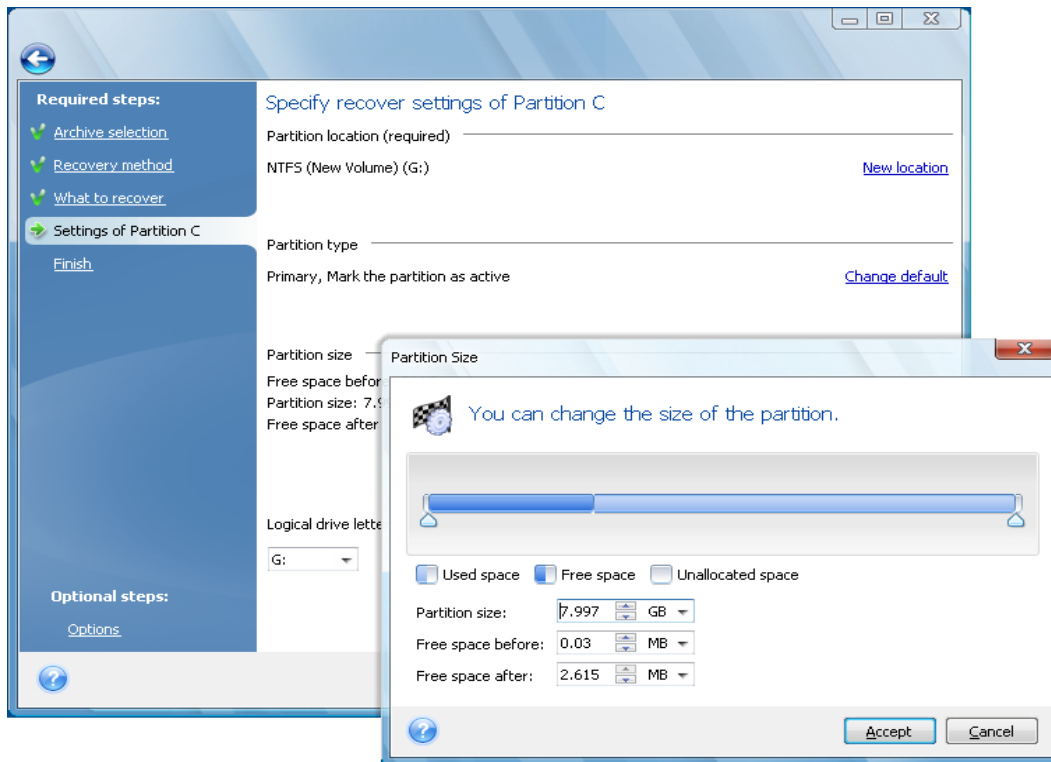
These changes might be useful if you are going to copy your hard disc to a new high-capacity one by creating its image and recovering it to a new disc with larger partitions.

10.1.8   Assigning a letter to the recovered partition

Seagate DiscWizard will assign an unused letter to a recovered partition. You can select the desired letter from a drop-down list or let the program assign a letter automatically by selecting the **Auto** setting.

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

10.1.9   Migration method

Seagate DiscWizard allows you to select a partition layout for a destination disc after restore operation completion - see chapter If you have a new large hard drive (>2 TB) in your system (p. 17) to learn about available options.

10.1.10 Setting recovery options

Clicking **Options** at the **Finish** step allows selecting the options for the recovery process (that is, recovery process priority, etc.). The settings will be applied only to the current recovery task. Or, you can edit the default options. See Setting default recovery options (p. 65) for more information.

10.1.11 Executing recovery

Up to this point, you can make changes in the created task by choosing the step you want to change and editing its settings. If you click **Cancel**, no changes will be made to the disc(s). Clicking **Proceed** will launch the task execution.

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

10.2 Setting default recovery options

To set the recovery options to be used by default during any data recovery, select **Tools & Utilities** → **Options** → **Recovery options**. You can always restore the default recovery options to the values preset during installation of Seagate DiscWizard. To do this, click **Reset the current to default** on the toolbar of the **Options** window. To reset just a single recovery option, select it on the left pane and click **Reset the current to default**.

*Clicking **Reset all to default** will reset all the default options (for backup, recovery, etc.) to their preset values, so this button should be used with caution.*

10.2.1 File recovery options

You can select the following file recovery options:

- **Recover files with their security settings** - if the file security settings were preserved during backup (see Backup security settings (p. 48)), you can choose whether to recover them or let the files inherit the security settings of the folder where they will be recovered to. This option is effective only when recovering files from file/folder archives.

- **Validate backup archive before recovery** - if you suspect that the archive might have been corrupted, check this option to verify the backup before recovery.

- **Check the file system after recovery** - check this parameter to verify the integrity of the file system after recovery. Verification of the file system is available only when recovering discs/partitions under Windows and for FAT16/32 and NTFS file systems. Note, that the file system will not be checked if a reboot is required during recovery, for example, when recovering the system partition to its original place.

10.2.2 Overwrite file options

This option is not applicable to recovery of discs and partitions from images.

By default, the program will overwrite existing files and folders, though more recent files and folders are protected from overwriting.

You can set default filters for the specific types of files you wish to preserve during archive recovery. For example, you may want hidden and system files and folders, newer files and folders, as well as files matching selected criteria not to be overwritten by the archive files.

While specifying the criteria, you can use the common Windows wildcard characters. For example, to preserve all files with extension .exe, add ***.exe**. **My???.exe** will preserve all .exe files with names consisting of five symbols and starting with "my".

Unselecting the **Overwrite existing files** check box will give the files on the hard disc unconditional priority over the archived files.

10.2.3 Recovery priority

The preset is **Low**.

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

11 Creating bootable media

11.1 Creating Linux-based rescue media

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

You can create bootable media using the Bootable Media Builder. For this, you will need a blank CD-R/RW, a blank DVD+R/RW or any other media from which your computer can boot, such as a Zip drive.

Seagate DiscWizard also provides the ability to create an ISO image of a bootable disc on the hard disc.

If you have chosen not to install the Bootable Media Builder during Seagate DiscWizard installation, you will not be able to use this feature.

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When booting from the Rescue Media, you cannot perform backups to discs or partitions with Ext2/Ext3, ReiserFS, and Linux SWAP file systems.

1. Choose **Create Bootable Rescue Media** in the **Tools & Utilities** menu. You can also run the Bootable Rescue Media Builder without loading Seagate DiscWizard by choosing **Programs** → **Seagate** → **Seagate DiscWizard** → **Bootable Media Builder** from the **Start** menu.
2. Select which components of the Seagate programs you want to place on the bootable media.
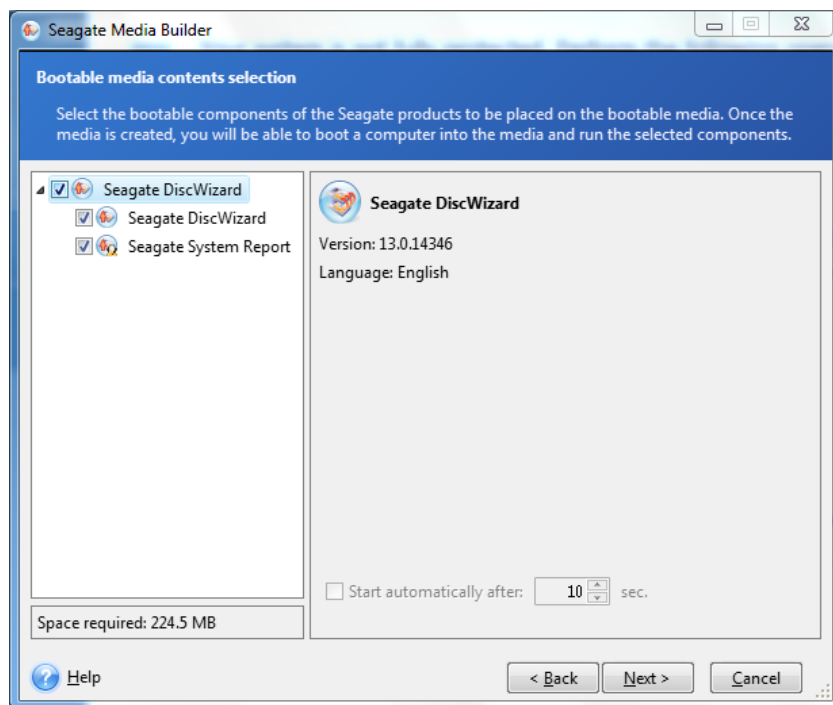
Seagate DiscWizard offers the following components:

Seagate DiscWizard full version

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

Seagate System Report

This component allows you to generate a system report after booting from the rescue media when both Windows and Seagate DiscWizard full version cannot start.

In the next window you can set Bootable media startup parameters in order to configure rescue media boot options for better compatibility with different hardware. Several options are available (nousb, nomouse, noapic, etc.). For all the available startup parameters see Startup Parameters (p. 114). These parameters are provided for advanced users. If you encounter any hardware compatibility problems while testing boot from the rescue media, it may be best to contact Seagate Technical Support.

The **Start automatically after** parameter specifies the timeout interval for the boot menu. If this parameter is not specified, the program will display the boot menu and wait for you to select whether to boot the OS or the Seagate component. If you set, for example, **10 sec** for Seagate rescue media, the standalone Seagate DiscWizard will launch 10 seconds after the menu is displayed.

To find out more about components of other Seagate products, see their respective user guides.

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

When using 3.5" diskettes, you will only be able to write one component at a time (for example, the full version of Seagate DiscWizard) on a set of diskettes. To write another component, start Bootable Media Builder again.
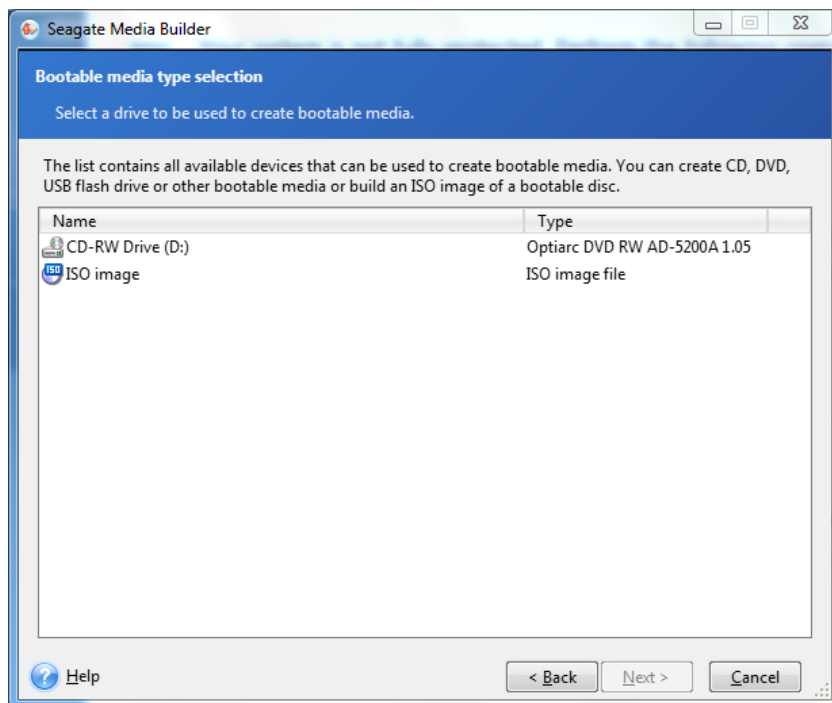
1. If you are creating a CD, DVD or any removable media, insert a blank disc so the program can determine its capacity. If you choose to create a bootable disc ISO image, specify the ISO file name and the folder in which to place it.

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

After you create a bootable media, mark it and keep it in a safe place.

Please keep in mind that the backups created by the later program version may be incompatible with the previous program versions. Due to this reason, we strongly recommend that you create a new bootable media after each Seagate DiscWizard upgrade. One more thing you should remember – when booting from the rescue media and using a standalone version of Seagate DiscWizard, you cannot recover files and folders encrypted with use of the encryption feature available in Windows XP and later operating systems.

12 Exploring archives and mounting images

Seagate DiscWizard offers two kinds of archive contents management: mounting and exploring for images.

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

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

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

Please keep in mind that, though both file archives and disc/partition images have a default ".tib" extension, only **images** can be mounted. If you want to view file archive contents, use the Explore operation. The following is a brief summary of the Explore vs Mount operation:

|	Explore	Mount
Archive type	Disc or partition image	Partition image
Assigning a letter	No	Yes
Archive modification	No	No
File extraction	Yes	Yes

12.1 Mounting an image

1. Start the **Mount Wizard** by selecting **Tools & Utilities** → **Mount Image** in the main program menu or by right-clicking on an image archive on the **Data recovery and backup management** screen and selecting **Mount Image** in the shortcut menu.

2. Select the archive for mounting.
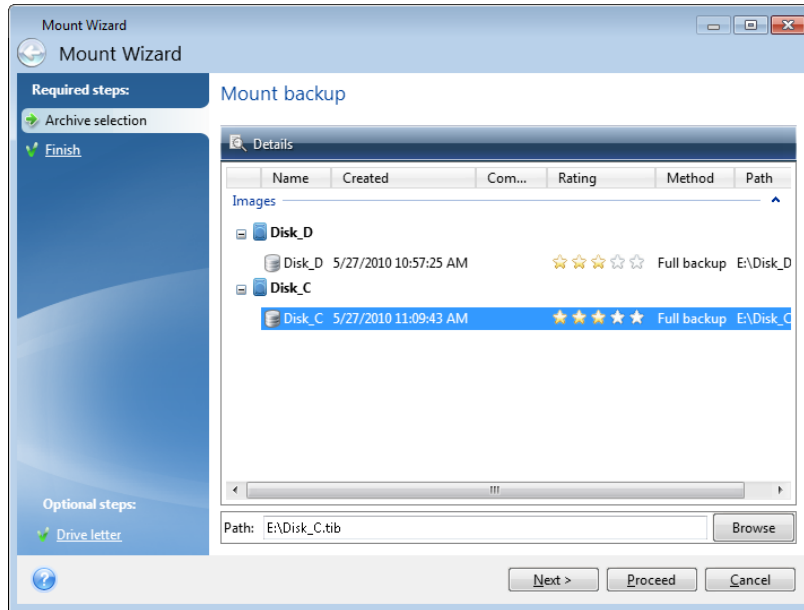
3. Select a partition to mount as a virtual disc. (Note that you cannot mount an image of the entire disc except in the case when the disc consists of one partition). If the image contains several partitions, by default all of them will be selected for mounting with automatically assigned drive letters. If you would like to assign different drive letters to the partitions to be mounted, click **Options**.

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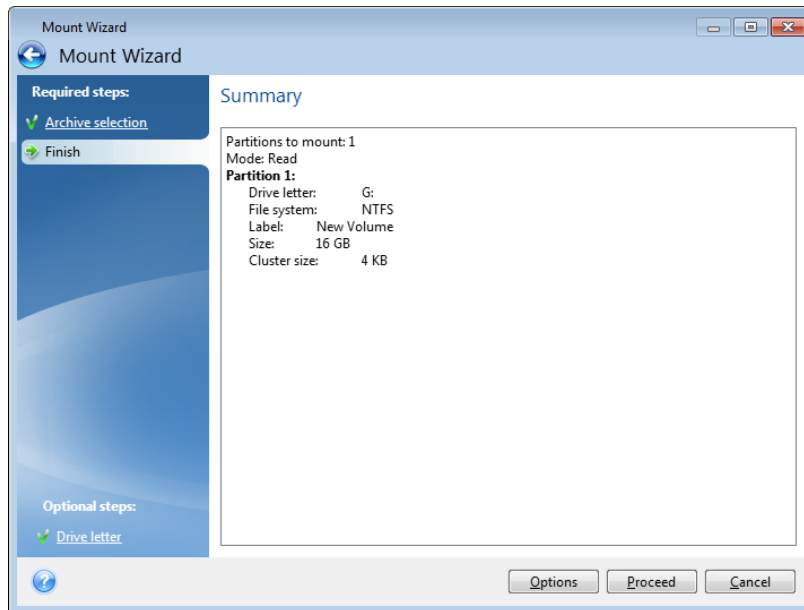
You can also select a letter to be assigned to the virtual disc from the **Mount letter** drop-down list. If you do not want to mount a partition, select **Do not mount** in the list or unselect the partition's checkbox.
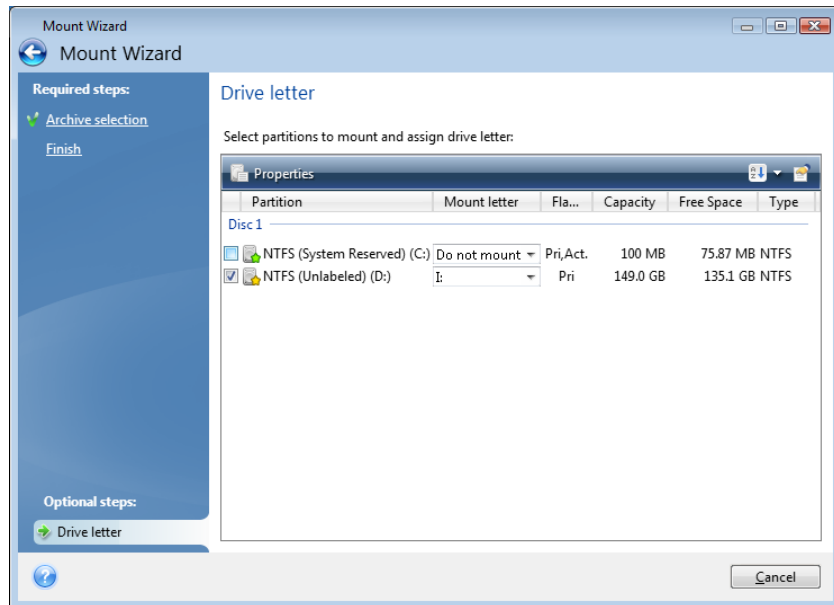

4. Having finished the settings, click **Proceed** to connect the selected partition images as virtual discs.

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

12.2 Unmounting an image

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

To disconnect the virtual disc, choose **Tools & Utilities** → **Unmount Image**, select the disc to unmount and click **OK**.

If you have mounted several partitions, by default all of them will be selected for unmounting. You can disconnect all mounted drives together or disconnect only those you do not need mounted anymore.
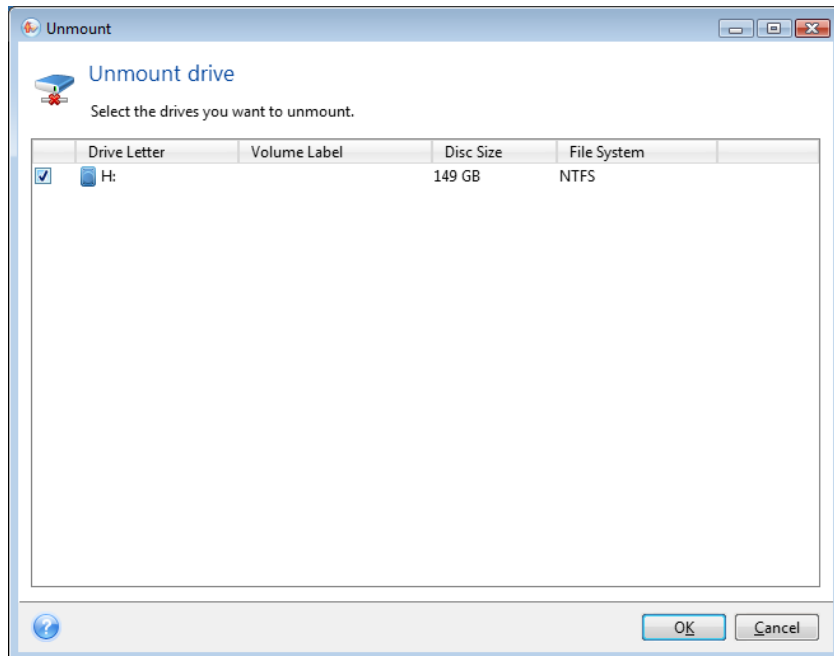

You can also do this in Windows Explorer by right-clicking on the disc icon and choosing **Unmount**.

13 Searching backup archives and their content

13.1 Searching

In addition to the ability to explore backup archives, Seagate DiscWizard provides a search facility for tib archives themselves, for files in tib archives only, as well as offering full-text search in the comments to archives. This facilitates searching for the information you need for using Seagate DiscWizard and for recovering files from your backup archives. Here's how you can search for the data you need.

1. Enter a search string into the Search field at the top right of the Seagate DiscWizard window and then click the magnifying glass icon. You will be taken to the **Data recovery and backup management** screen. The search results are output in the corresponding tab of the window.
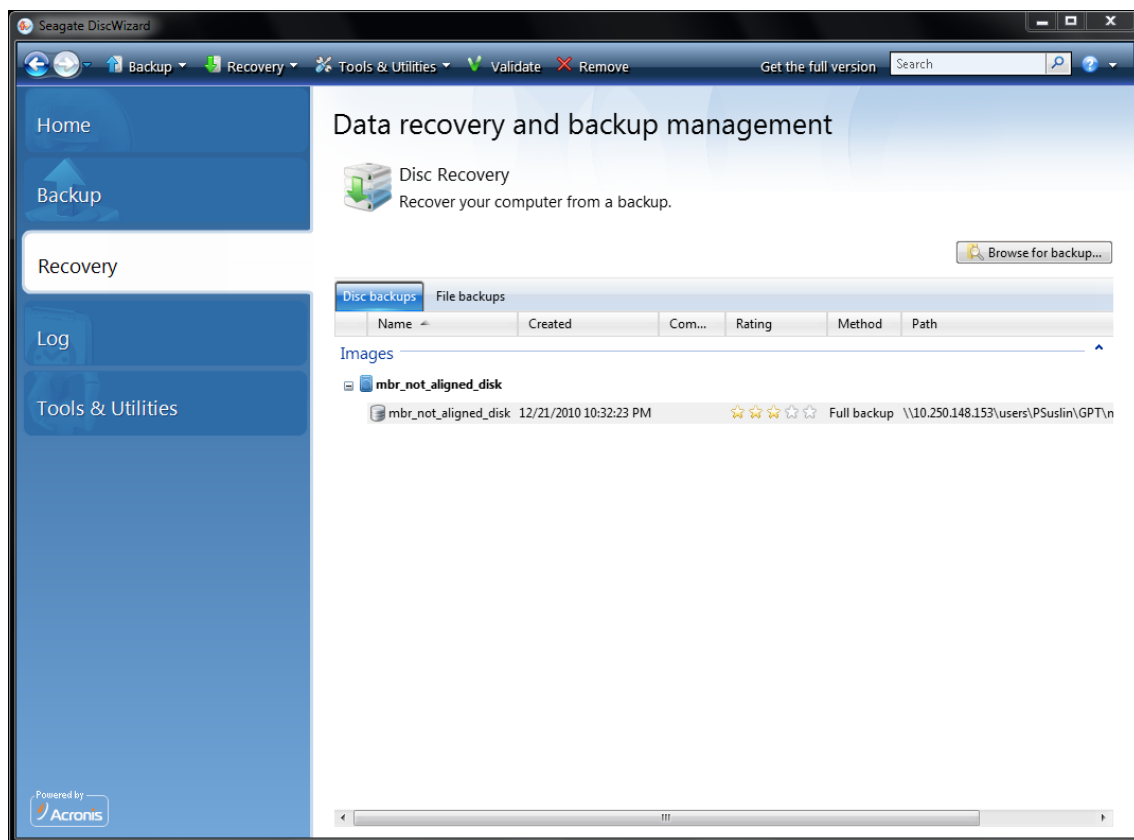
2. By default the search is performed in all the sources where Seagate DiscWizard can search information. You can select an information source of interest by choosing the appropriate area among **Backup names** and **Backup contents**.

Seagate DiscWizard cannot perform search on network shares and devices that are recognized by Windows as Devices with removable storage.

*   The **Backup names** area shows the results of the search for tib archives by archive filename. Double-clicking on a filename opens the corresponding archive in Windows Explorer where you can explore the archive contents. You can validate or recover the archive by right-clicking on its filename and

choosing the appropriate item in the shortcut menu. The shortcut menu contains the following items: **Recover**, **Mount** (for image backups), **Validate**, **Move**, **Remove**, **Explore backup, Edit Comments,** and **Details** buttons for tib archives.

- The **Backup contents** area shows results of searches for files and folders in tib archives. Double-clicking on a filename opens the file. You can recover the file by right-clicking on its filename and choosing Recover in a shortcut menu. This shortcut menu also enables you to open the file or the parent folder that contains that file.

To help you better understand the search results, here is some information on the algorithms used by the Search feature.

1. When searching files in tib archives you can type all or part of the filename and use the common Windows wildcard characters. For example, to find all batch files in the archives, type "*.bat". Typing my???.exe will allow you to find all .exe files with names consisting of five symbols and starting with "my". It should be noted that search is case-insensitive, i.e. "Backup" and "backup" is the same search string. Furthermore, the search stops after the program finds 100 files corresponding to a search criterion you have typed. If the search results do not contain the file you need, you will have to refine the search criterion.

*When a file is included in several backups and it has not been modified, the search results will show it only once in the oldest backup file. If such a file has been changed, the search results will show all backup files containing **differing** versions of the file.*

1. Search in the comments to backup archives is carried out differently. First of all, you cannot use "*" and "?" as Windows wildcard characters. As in this case the program uses full text search, it will just find all occurrences of these characters in the comments (if any). The full text search uses the following rules:

- Search criteria consist of words separated by space character(s) or by a logical operator: "AND", "OR", "NOT" (please, take note of the upper case).

- Only one logical operator is allowed (the first one that occurs in a search string), otherwise they are ignored and interpreted as search words.

- All space-separated words must be in a topic for successful match.

The **Backup names** area shows the archive files whose comments satisfy the search criterion. Double-clicking on an archive opens it for exploring.

13.2 Windows Search and Google Desktop integration

Seagate DiscWizard has plug-ins for Google Desktop and Windows Search (WDS). If you use any of these search engines on your computer, Seagate DiscWizard will detect the search engine you use and install an appropriate plug-in for indexing your tib backup archives. Indexing of backups will speed up searches in the backup archives. After such indexing you will be able to search archive content by entering a filename into the Google Desktop or Windows Search deskbar query field without opening Seagate DiscWizard. The search results will be shown in a browser window. Using the search results you can:

- Select any file and open it for viewing and/or save that file back to anywhere in the file system (not in the archive) or where it was before

- See in which archive a given file is stored and recover that archive

Google Desktop has a "Quick Find" window. This window is filled with the most relevant results from your computer. The results change as you type, so you can quickly get to what you want on your computer. Windows Search provides similar functionality.

In addition to indexing the files in backup archives by their names, the Google Desktop and Windows Search provide Seagate DiscWizard with the ability to perform full-text indexing of many files in tib archives, so you will be able to use this feature and perform searches of the files' content.

Full-text indexing of files in backup archives is provided only for the file types recognizable by Google Desktop and Windows Search. They recognize text files, Microsoft Office files, all Microsoft Office Outlook and Microsoft Outlook Express items, and more.

## 13.2.1 Using Google Desktop with Seagate DiscWizard

If you do not have Google Desktop, it can be downloaded for free from Google's Web site. Click Google Desktop and follow the instructions for download and installation.

To enable using Google Desktop for searching files in tib archives:

1. To install the plug-in, choose **Tools & Utilities** on the sidebar. Then click **Search settings** on the right pane and select the appropriate check box in the Desktop Search Options window. The following window appears.
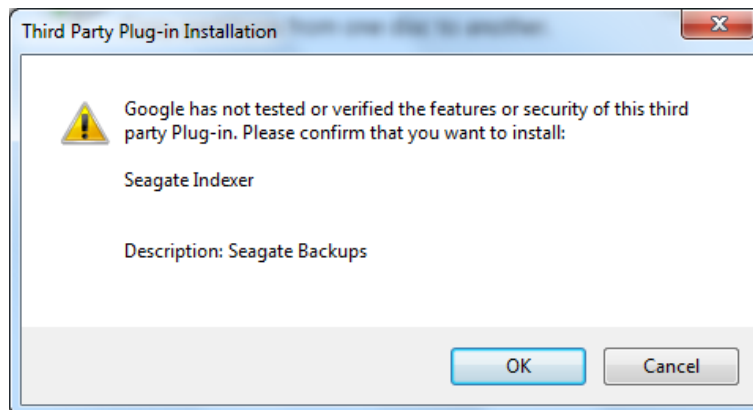
2. Verify that the plug-in is installed. Right-click on the Google Desktop icon in your system tray and select **Options** in the context menu. Google Desktop opens the **Preferences** window in your browser. Make sure that **Seagate Indexer (Seagate Backups)** is selected in the **Indexing Plug-ins** area.
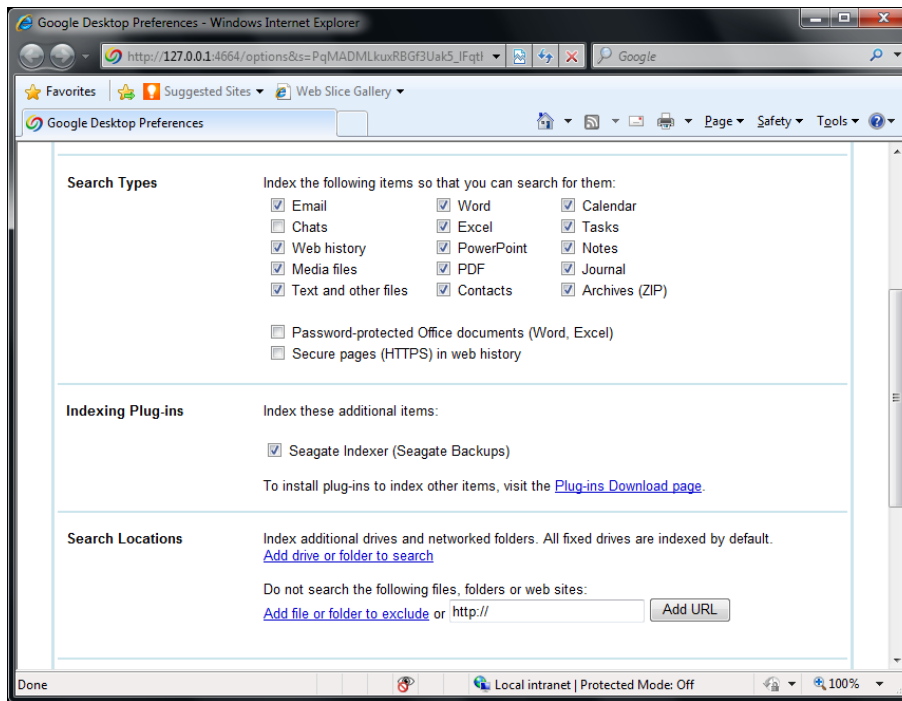

3. Right-click on the Google Desktop icon in your system tray once more and select **Indexing → Re-Index**. Click **Yes** in the confirmation window that appears. Google Desktop will add all the new content to the existing index.

Give Google Desktop some time for indexing all tib files on your computer's hard discs and adding the indexing information to its index database. The required time depends on the number of tib archives and the number of files they contain.

After for example an hour, check whether Google Desktop has indexed the tib archives by entering in its query field the name of a file which you know for sure that you backed up. If Google Desktop has completed indexing, it will show you the tib archives where it has found the file.
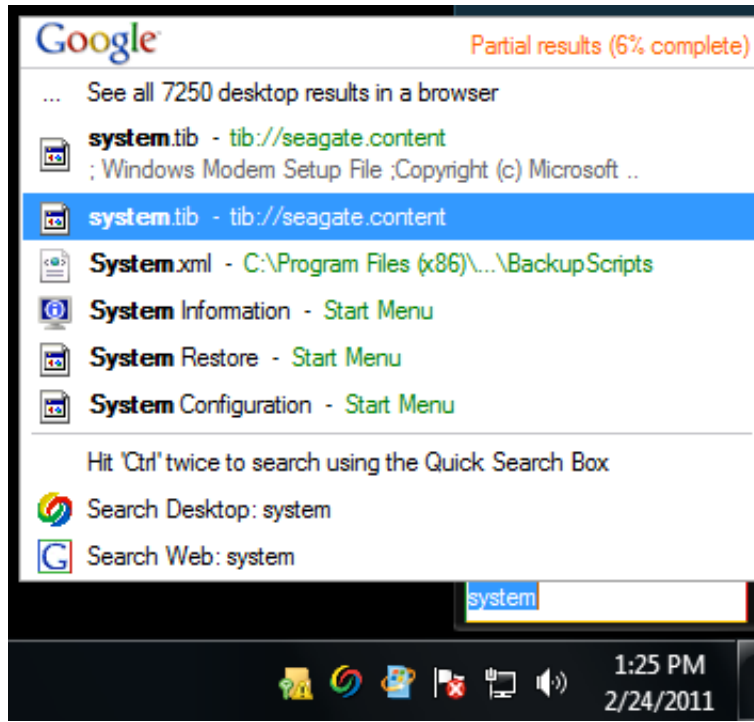
If you want to see all the search results, click the "See all N results in a browser" and you will see something like the screen shot below.
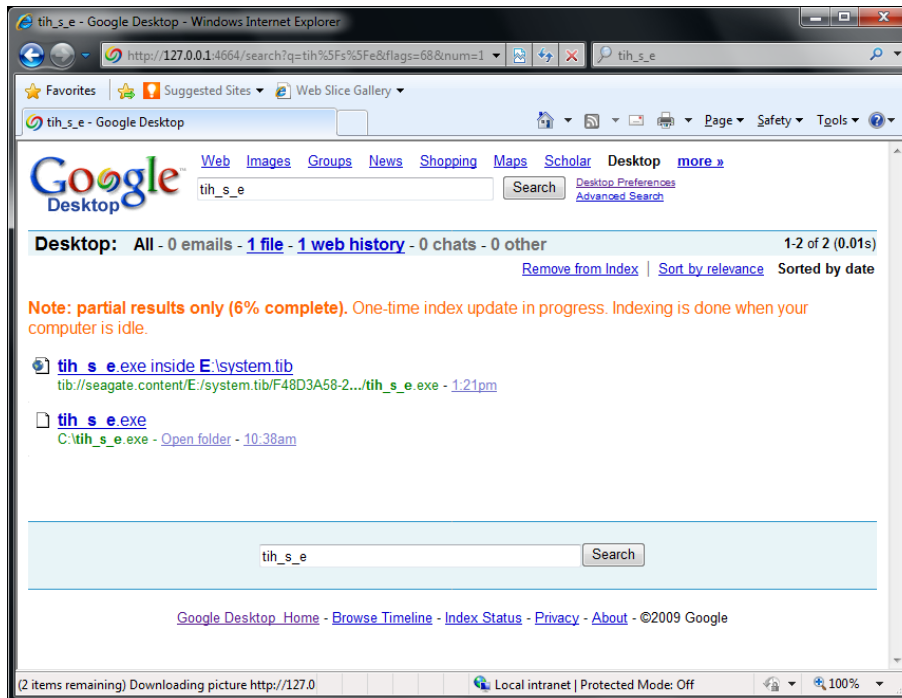
Clicking in the browser window on a line related to the desired file version opens a small dialog with just two options: **View** and **Recover**.
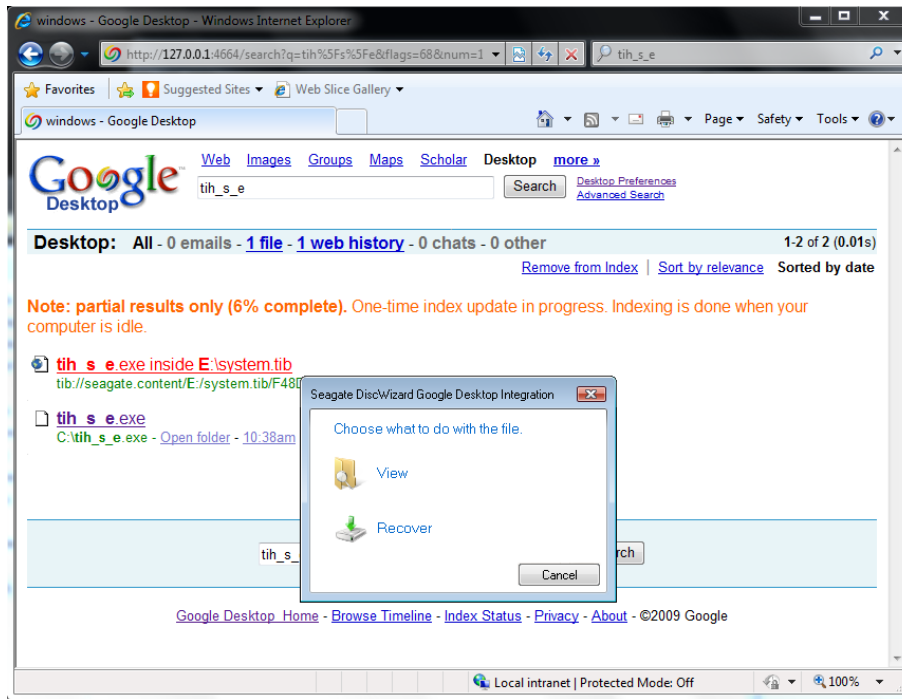
Choosing **View** starts the application associated with this file type and opens the file. Choosing **Recover** starts Seagate DiscWizard and you can then recover the file to a desired location.

13.2.2   Using Windows Search with Seagate DiscWizard

If you use any edition of Windows Vista or Windows 7 that has built-in Desktop Search functionality or Windows Desktop Search 3.0 or later, you can enable Windows Search support for tib files.

If you do not have Windows Search installed, but would like to use it, you can download Windows Search 4.0 for free from Microsoft's Web site. To download, click Windows Search 4.0. Double-click on the downloaded file and follow the instructions for installation.

*Windows Search does not support indexing of zip files content.*

To use Windows Search support:

1. To register the plug-in, choose **Tools & Utilities** on the sidebar. Click **Search settings** on the right pane and select the appropriate check box in the Desktop Search Options window. After successful registration of the plug-in Seagate DiscWizard will display the "Plug-in registration succeeded" information window.

2. You can verify that the tib support is enabled. Right-click on the Windows Search icon in your system tray and select **Windows Desktop Search Options…** in the context menu. The following window appears. Make sure that the "tib://..." item is present in the Included Locations list.

To open the Indexing Options window in Windows Vista, open the Control Panel and then double-click the
Indexing Options *icon. The Windows Vista indexing options have some differences in content and appearance,*
though most of the following information is applicable to Windows Vista as well.
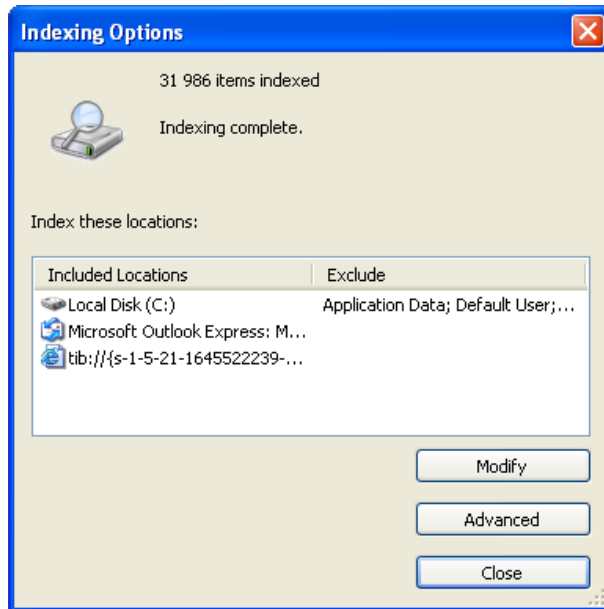
3. Click **Advanced**, select the **File Types** tab and then make sure that the **tib** extension is selected and ".tib IFilter" is shown in the Filter Description field. Select **Index Properties and File Contents**.

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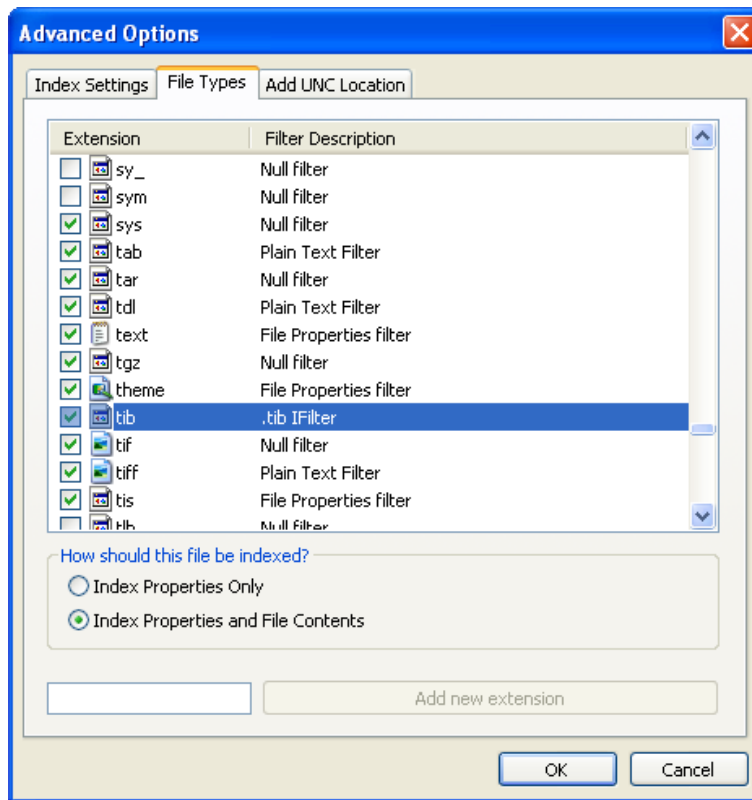
4. Click **OK** and while the **Indexing Options** window is open, check that the discs where you store your tib backup archives are shown in the "Included Locations" list. If the list does not contain those discs, the tib files will not be indexed. To include the discs, click **Modify** and select them in the window that appears.
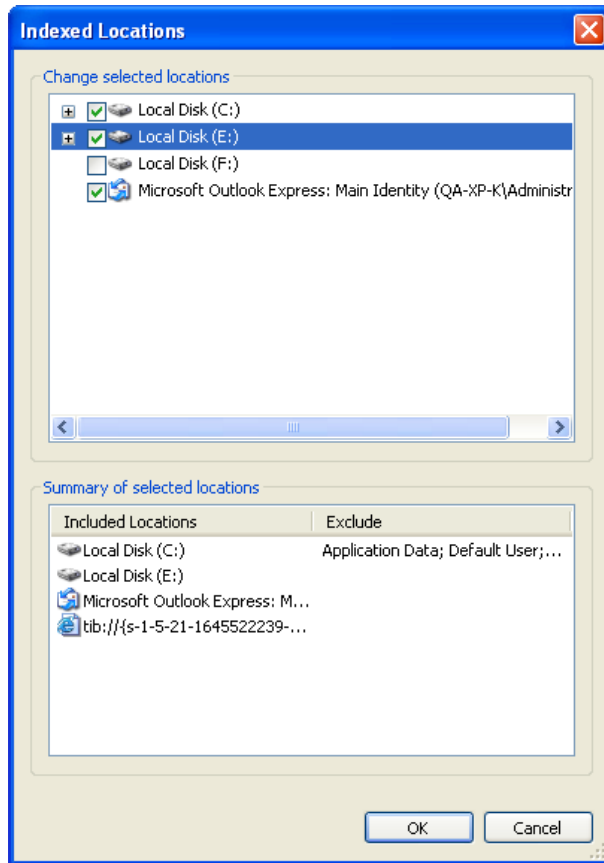
*If you store backups on a network share, Windows Search can index them too. You just have to add the share to the Indexed Locations list by typing the appropriate UNC path after selecting the **Add UNC Location** tab of **Advanced Options**.*

Give Windows Search some time for indexing all tib files on your computer's hard discs and adding the indexing information to its index database. The required time depends on the number of tib archives and the number of files they contain. After completing the indexing, the Desktop Search will be able to search files in tib backup archives. The search engines in WDS and Windows Vista have similar functionalities, though search results are presented somewhat differently:
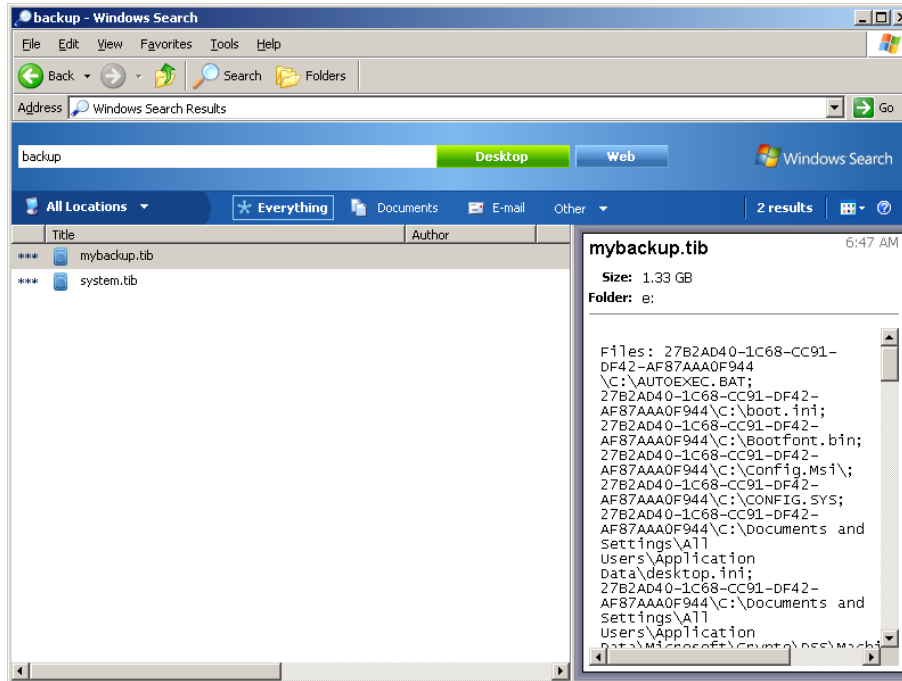
Windows Search results

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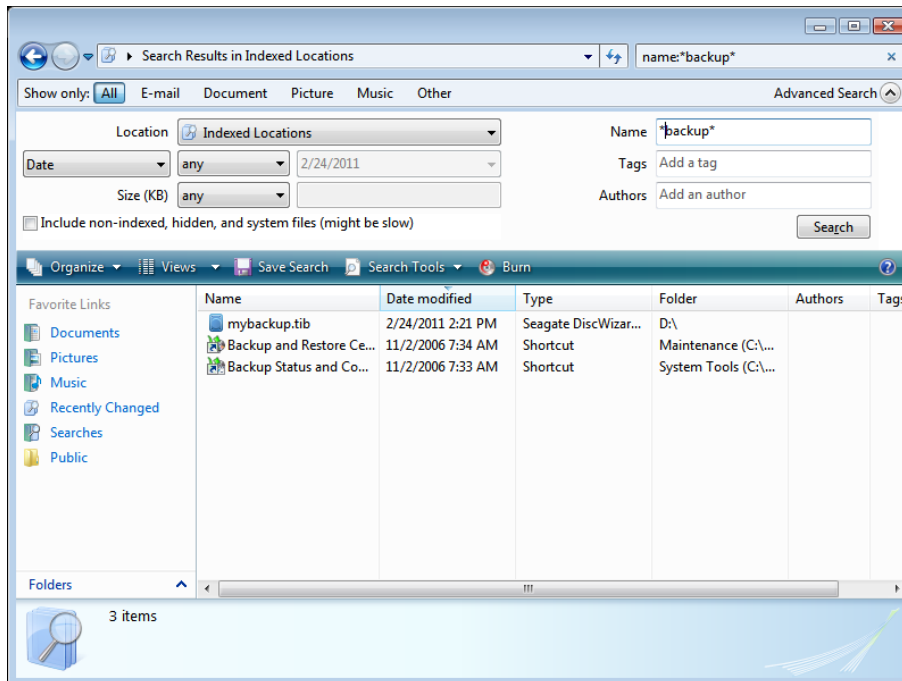
14 Other operations

14.1 Validating backup archives

The validation procedure checks whether you will be able to recover data from a particular backup, so when you select for validation:

- a full backup, the program validates the full backup only.

You can perform such validations using the **Validate Wizard**.

1. To validate an archive, click **Recovery** on the sidebar.
2. Select the archive to validate and click **Validate** on the toolbar.
3. Clicking **Proceed** will start the validation procedure. After the validation is complete, you will see the results window. You can cancel validation by clicking **Cancel**.

14.2 Viewing Logs

Seagate DiscWizard has a Log screen that allows you to view its working logs. The logs can provide information, for instance, about creating backup or validation results, including reasons for any failures.

Most Seagate DiscWizard operations write their own entries in the logs, though logs are not provided for image mounting/unmounting and bootable media creation.

The logs contain only partial information on operation of backup. The remaining information on operation of those features is written to their own log. That log is not available to users as it is intended for Seagate Support personnel to help in troubleshooting the issues users have with those features. It is included in Seagate System Report.

To open the **Log** screen, click **Log** on the sidebar. By default, the screen opens with the **Log** tab selected. The tab shows logs for the selected date. If there are no logs for that date, an appropriate message appears.

The color marks in the calendar show information about the days with tasks completed with errors, and successfully completed tasks.

The buttons with left and right arrows at the sides of the calendar allow you to browse the months being shown in the calendar. If you have gone several months back or forward, clicking the **Today** button will quickly return you to the current month and date.

Clicking any day in the past takes you to the **Log** tab and shows logs for the selected date. If there are no logs for that date, an appropriate message appears.

When the **Log** tab is selected, the upper pane shows the calendar, while the lower one shows logs' contents.
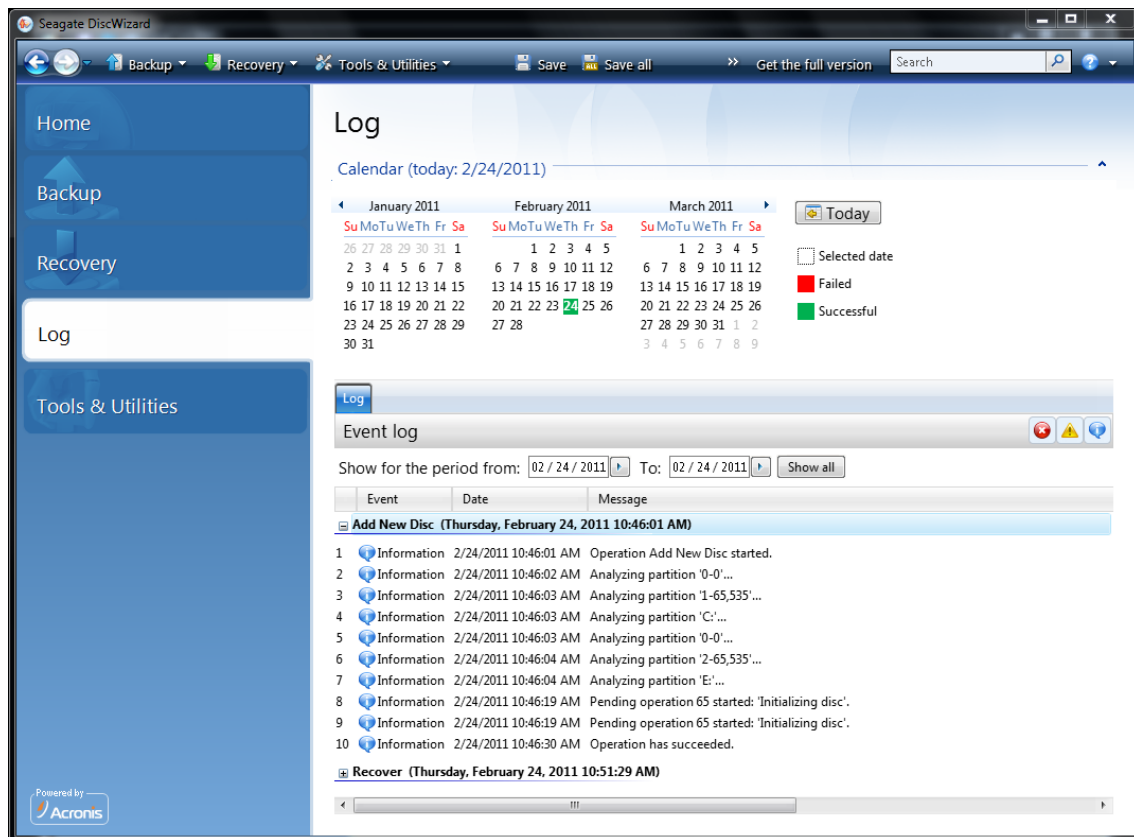
To view the logs for a specific period, select the period by clicking the right arrow buttons in the **From:** and **To:** fields of the **Show for the period** area. Clicking the arrow in the **From:** field opens a pop-up calendar where you can set the start day of the period by double-clicking the appropriate day. Then set the end day using the same procedure for the **To:** field. You can change months and years in the pop-up calendars using the left and right arrows in the month name area. In addition, you can enter the desired period start and end dates directly in the fields. If you would like to see all the logs, click the **Show all** button.

To delete a log entry, select it and click the **Delete** button on the toolbar. To delete all log entries, click the **Delete all** button. You can also save a log entry to file by clicking the **Save** button. To save all logs to file, click **Save all**.

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

The three buttons to the right control message filters: the white cross in the red circle filters error messages, the exclamation mark in a yellow triangle filters warnings, and the "i" in the blue circle filters information messages.

To better view the details of the current step, you can hide the calendar by clicking the **Up** arrow at the top right of the calendar pane. This will enlarge the logs area. To view the calendar again, click the **Down** arrow at the top right of the calendar pane.

14.3 Managing backup archives

After a while you may wish (or be forced) to manage your backup archives, for example, in order to free up some space for new backups by removing the oldest backups or those you no longer need. As now Seagate DiscWizard stores information about the backup archives in a metadata information database, you must manage backup archives (e.g. delete or move some of them) by using the program's tools and not Windows Explorer. To manage your backup archives, go to the **Data recovery and backup management** screen by selecting **Recovery** on the sidebar.

The **Disc backups** tab lists the image backups.
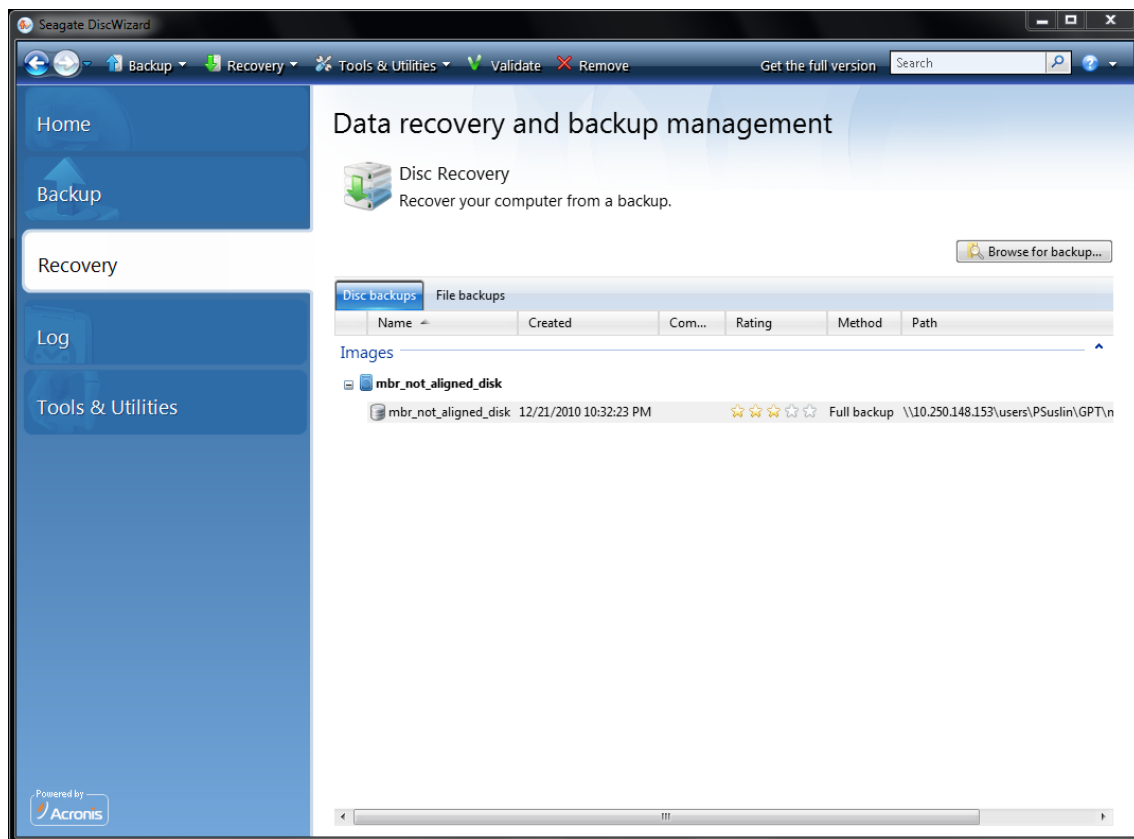
The shortcut menu opened by right-clicking on a desired backup archive provides the following operations with backups:

- **Explore** - see Exploring archives and mounting images (p. 70)
- **Recover** - see Recovery Wizard - detailed information (p. 60)
- **Validate Archive** - see Validating backup archives (p. 84)

- **Mount Image** (only for images) - see Mounting an image (p. 70)
- **Edit Comments** - editing comments made during backup creation
- **Rename** - renaming backup archives or individual backups (a backup is renamed only in the program's metadata database, however, the backup filename remains unchanged)
- **Move** - see Moving backup archives (p. 87)
- **Remove** - see Removing backup archives (p. 88)
- **Details** - viewing detailed information on the selected backup

14.4 Moving backup archives

Now Seagate DiscWizard allows you to move backup archives to another location. This may come in handy if you want to free space for a new backup, but want to keep an earlier backup archive at another location, for example, a network share. Another possible scenario - you want to recover a disc used for keeping your archives. As the program cannot recover if the backup archive is on the same disc you are going to recover, you need to move the archive to another hard disc.

1. Select the archive for moving after clicking **Recovery** on the sidebar.
2. To move the archive, select it on the **Data recovery and backup management** screen. If the archive consists of several backups, you can select any of them because Seagate DiscWizard always moves the entire archive.
3. After making your selection, right-click and choose **Move** in the shortcut menu.
4. When moving is complete, the path to the archive will change in the **Path** column of the Data recovery and backup management screen.

14.5 Removing backup archives

You may want to remove backups and backup archives you no longer need. Because Seagate DiscWizard stores information on the backup archives in a metadata information database, deleting unneeded archive files using Windows Explorer will not delete information about these archives from the database and Seagate DiscWizard will consider that they still exist. This will result in errors when the program tries to perform operations on the backups that no longer exist. So you must only remove obsolete backups and backup archives using the tool provided by Seagate DiscWizard. To remove the entire backup archive, select it and click **Remove** on the toolbar or right-click on the full backup of the backup archive and choose **Remove** in the shortcut menu. The following screen appears:
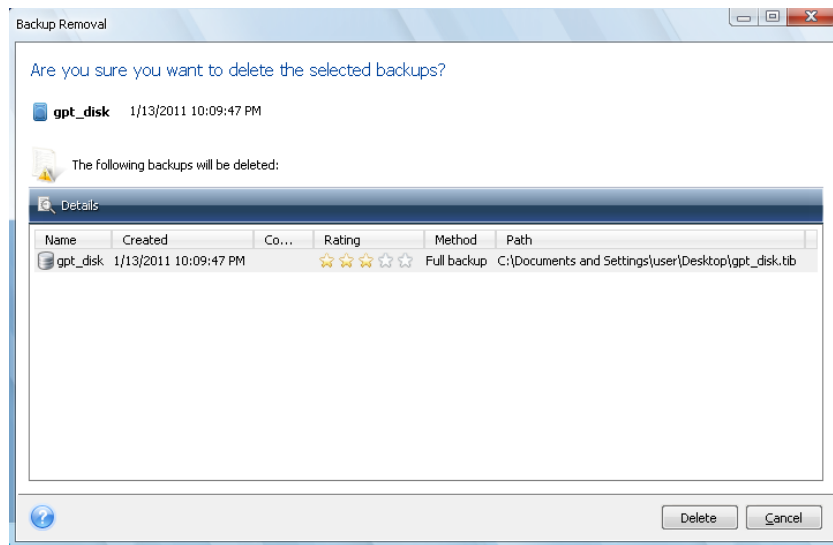
If you click **Delete**, the program will remove the backup archive from its metadata information database as well as from the hard disc.

15 Transferring the system to a new disc

15.1 General information

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

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

To transfer the system, you must first install the disc in the computer (see details in Hard discs and boot sequence (p. 107)). If your computer doesn't have a bay for another hard disc, you can temporarily install it in place of your CD drive or use a USB connection to the external target disc. If that is not possible, you can clone a hard disc by creating a disc image and recovering it to a new hard disc with larger partitions.

There are two transfer modes available: automatic and manual.

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

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

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

The manual mode will provide more data transfer flexibility. You will be able to select the method of partition and data transfer:

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

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

The current Seagate DiscWizard version does not support cloning of dynamic discs.

15.2 Security

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

No data will be lost because the original disc is only being read (no partitions are changed or resized). The system transfer procedure does not alter the original disc at all. After the procedure finishes, you

might want to format the old disc or securely wipe the data it contains. Use Windows tools or Seagate DriveCleanser for these tasks.

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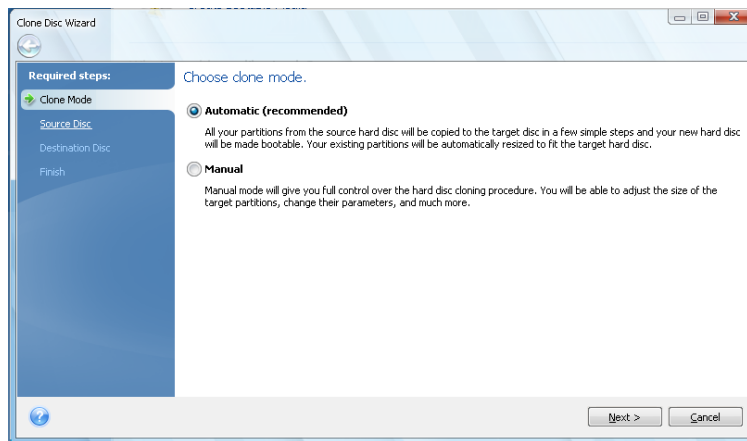
15.3 Executing transfers

For best results, install the target (new) drive where you plan to use it and the source drive in another location, e.g. in an external USB enclosure. This recommendation is especially important for laptops.

To start cloning, select **Tools & Utilities** → **Clone disc** in the main program menu.

15.3.1 Selecting Clone mode

You will see the **Clone Mode** window.

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

If the program finds two discs, one partitioned and another unpartitioned, it will automatically recognize the partitioned disc as the source disc and the unpartitioned disc as the destination disc. In such case, the next steps will be bypassed and you will be taken to the cloning Summary screen.

15.3.2   Selecting source disc

If the program finds several partitioned discs, it will ask you which one is the source (i.e. the older data disc).
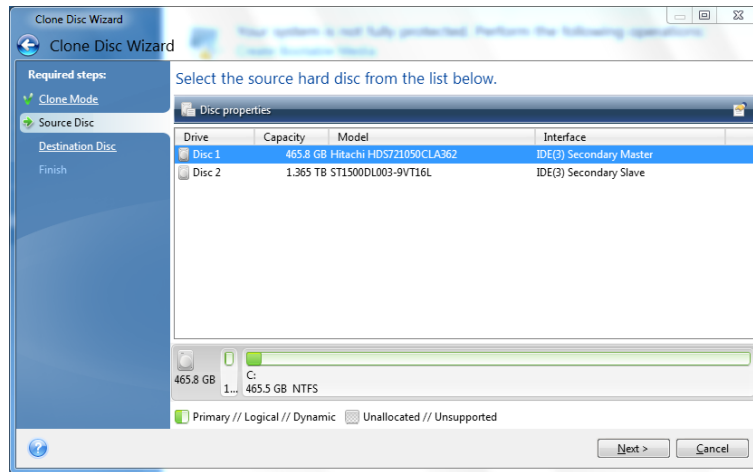
You can determine the source and destination using the information provided in this window (disc number, capacity, label, partition, and file system information).

15.3.3   Selecting destination disc

After you select the source disc, you have to select the destination where the disc information will be copied.
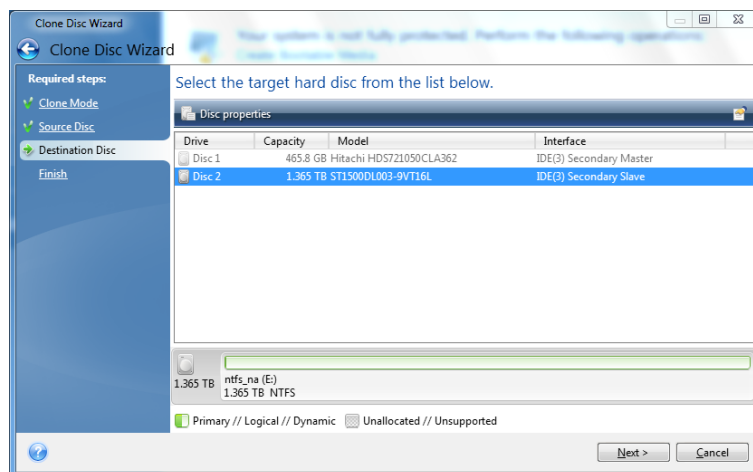
The previously selected source becomes grayed-out and disabled for selection.

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

15.3.4 Partitioned destination disc

At this point, the program checks to see if the destination disc is free. If not, you will be prompted by the Conformation window stating that the destination disc contains partitions, perhaps with useful data.
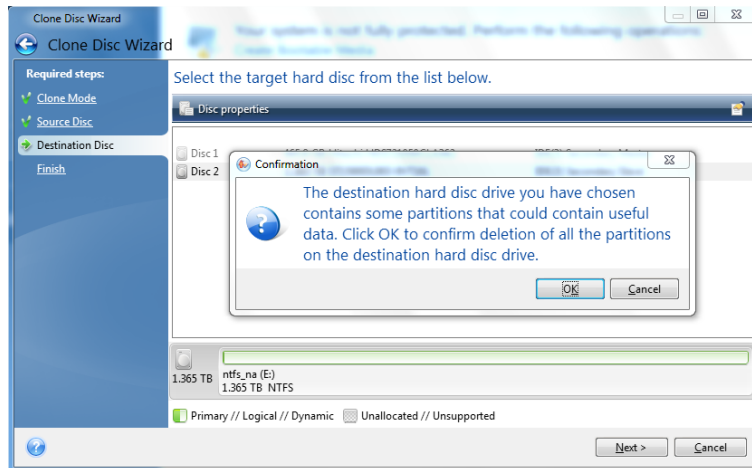

To confirm deletion of the partitions, click **OK**.

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

If you selected the automatic mode, the program will not ask you anything else and will take you to the cloning summary window.

15.3.5 Selecting partition transfer method

When you select the manual cloning mode, Seagate DiscWizard will offer you the following data move methods:

- **As is**
- **Proportional** – the new disc space will be proportionally distributed among cloned partitions

- **Manual** – you will specify the new size and other parameters yourself
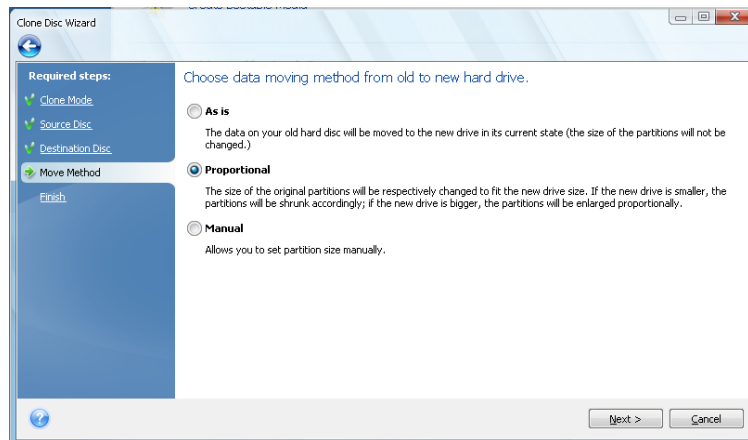
If you elect to transfer information "as is," a new partition will be created for every old one with the same size and type, file system and label. The unused space will become unallocated. Afterwards, you will be able to use the unallocated space to create new partitions or to enlarge the existing partitions with special tools.

As a rule, "as is" transfers are not recommended as they leave a lot of unallocated space on the new disc. Using the "as is" method, Seagate DiscWizard transfers unsupported and damaged file systems.

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

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

Depending on the selected combination, you will proceed to either the cloning summary window, or the Change disc layout step (see below).

15.3.6   Migration method

Seagate DiscWizard allows you to select a partition layout for a destination disc after clone operation completion - see chapter If you have a new large hard drive (>2 TB) in your system (p. 17) to learn about available options.

15.3.7   Cloning with manual partitioning

The manual transfer method enables you to resize partitions on the new disc. By default, the program resizes them proportionally. In the next window, you will see the new disc layout.

Along with the hard disc number, you will see disc capacity, label, partition, and file system information. Different partition types, including primary, logical, and unallocated space are marked with different colors.
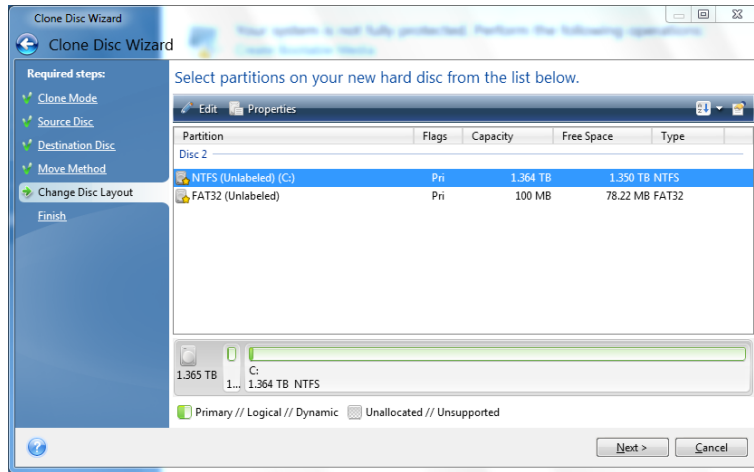
First, select a partition to resize and click **Edit** on the toolbar. This will open the Partition Settings window, where you can resize and relocate the partition.
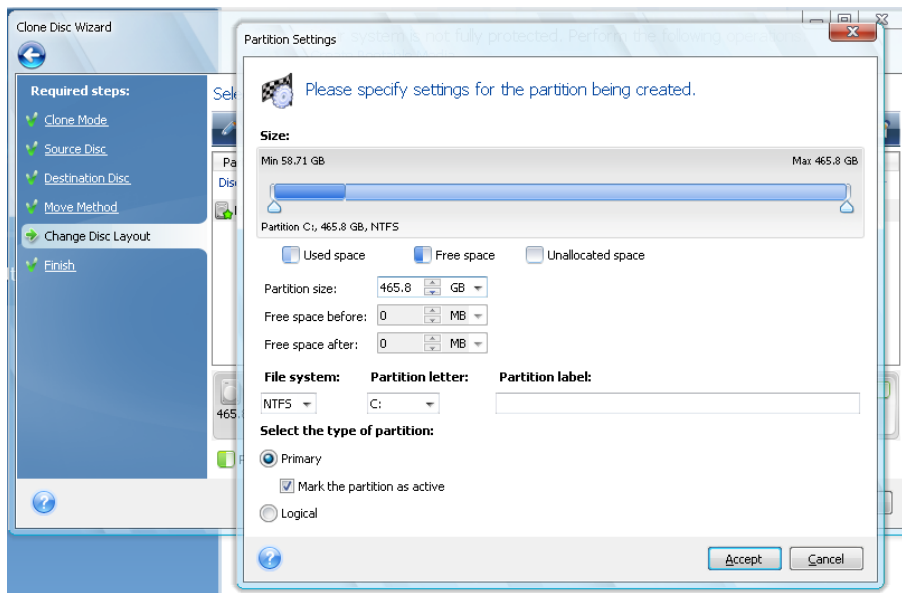
You can do this by entering values in the **Free space before**, **Partition size**, **Free space after** fields, by dragging partition borders or the partition itself.

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

Having provided the new location and size, click **Accept**. You will be taken back to the Change disc layout window. You might have to perform some more resizing and relocation before you get the layout you need.

15.3.8 Cloning summary

The cloning summary window graphically (as rectangles) illustrates information about the source disc (partitions and unallocated space) and the destination disc layout. Along with the disc number, some additional information is provided: disc capacity, label, partition and file system information. Partition types — primary, logical and unallocated space — are marked with different colors.
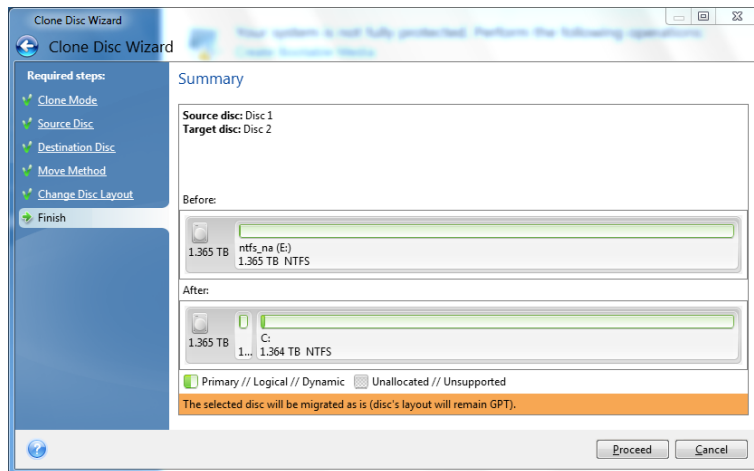
Cloning a disc containing the currently active operating system will require a reboot. In that case, after clicking **Proceed** you will be asked to confirm the reboot. Canceling the reboot will cancel the entire procedure. After the clone process finishes you will be offered an option to shut down the computer by pressing any key. This enables you to change the position of master/slave jumpers and remove one of the hard drives.

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

16 Adding a new hard disc

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

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

16.1 Selecting a hard disc

To start the Add New Disc Wizard, select **Tools & Utilities** → **Add New Disc** in the main program menu.

Select the disc that you've added to the computer.
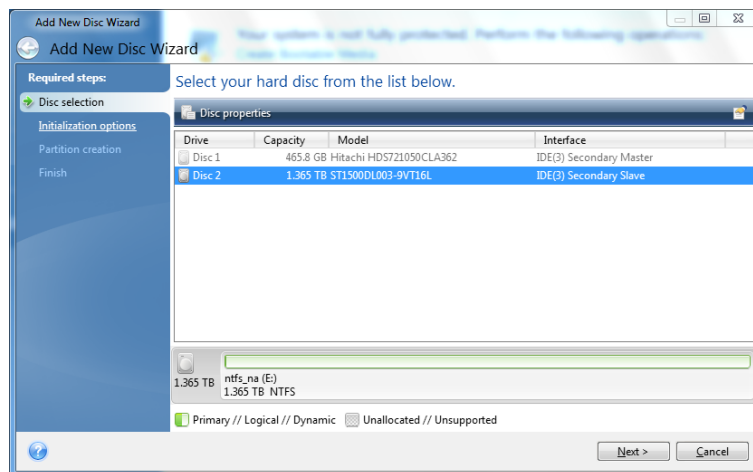
If there are any partitions on the new disc, you will be shown a warning window. For you to be able to add the disc, they must be deleted first, so click **OK** to continue.

16.2 Creating new partitions

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

To create a partition, click **Create new partition** on the toolbar and set the new partition location and size. You can do this both by entering values in the **Free space before**, **Partition size**, **Free space after** fields, and by dragging partition borders or the partition itself.

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

Select a file system for the new partition. You may select a partition letter of your choice (or leave the default one) and input a label for the new partition in the corresponding field. Finally, select a partition type.
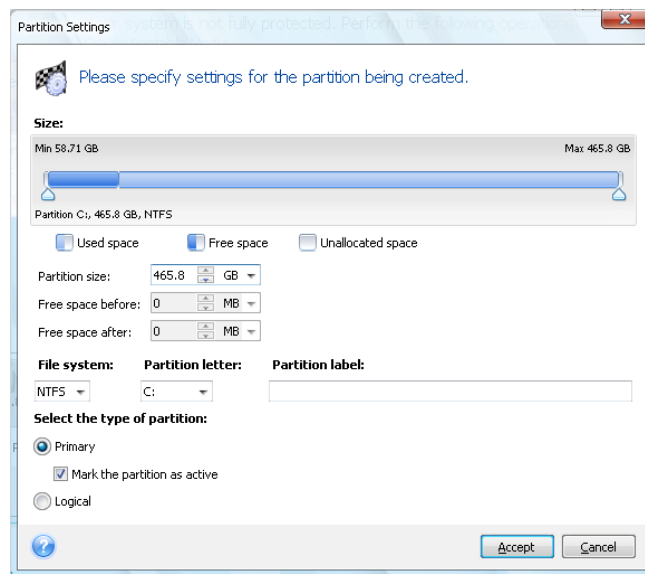
Click the **Accept** button and you will be taken back to the Partition Creation screen. Check the resulting partition's settings and start creating another partition by clicking **Create new partition** again. You can also edit the new partition's settings by clicking **Edit** on the toolbar or delete it by clicking **Delete**.

*If you allocate all unallocated space on the disc to the new partition, the **Create new partition** button disappears.*

16.3 Select partition table

Seagate DiscWizard allows you to select a partition layout for a new disc after adding new hard disc operation completion:

- **GPT (GUID Partition Table)** - a standard for a partition table layout for hard discs. GPT allows discs/partitions size up to 9.4 ZB (9.4 × 10^21 bytes).
- **MBR (Master Boot Sector)** - a 512-byte boot sector, which is the first sector of a hard disc, used to hold a disc's primary partition table.

Using this wizard you may select a partition layout:

- **Create a GPT partition table on the disc** - this option is recommended since GPT hard discs support discs' capacity greater than 2 TB. But note, in this case such a disc will not be available for Windows XP 32 bit;
- **Create a MBR partition table on the disc** - in case your hard disc's capacity is larger than 2 TB, the remaining disc space will be unpartitioned after the adding new hard disc operation. You can run Seagate Extended Capacity Manager after operation completion to allocate the entire disc space.

16.4 Disc add summary

Clicking **Next** after creating a desired partition layout takes you to the disc add summary. The disc add summary contains a list of operations to be performed on discs.
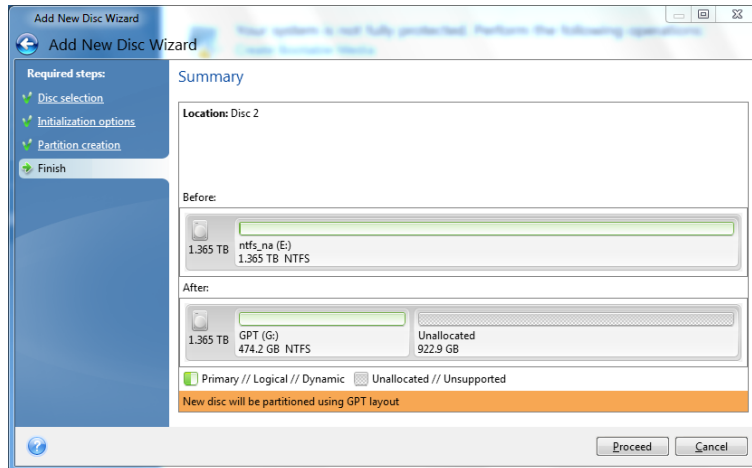
After you click **Proceed**, Seagate DiscWizard will start creating new partition(s), indicating the progress in a special window. You can stop this procedure by clicking **Cancel**. You will then have to repartition and format the new disc or repeat the disc add procedure.

17 Security and Privacy Tools

Seagate DiscWizard includes tools for secure destruction of data on an entire hard disc drive, individual partitions.

These tools ensure the security of your confidential information, as well as maintain your privacy when you work with a PC, because they clean-up the evidence showing your actions (records in various system files) that you don't even know about. This could include usernames and passwords.

If you need to **securely destroy data** on selected partitions and/or discs so it can't be recovered, run **Seagate DriveCleanser**.

17.1 Seagate DriveCleanser

Many operating systems do not provide users with secure data destruction tools, so deleted files can be recovered easily by using simple applications. Even a complete disc reformat cannot guarantee you permanent confidential data destruction.

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

To start Seagate DriveCleanser, select **Tools & Utilities** → **Seagate DriveCleanser** in the main program menu. Seagate DriveCleanser allows you to do the following:

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

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

First, you must select the hard disc partitions where you want to destroy data.
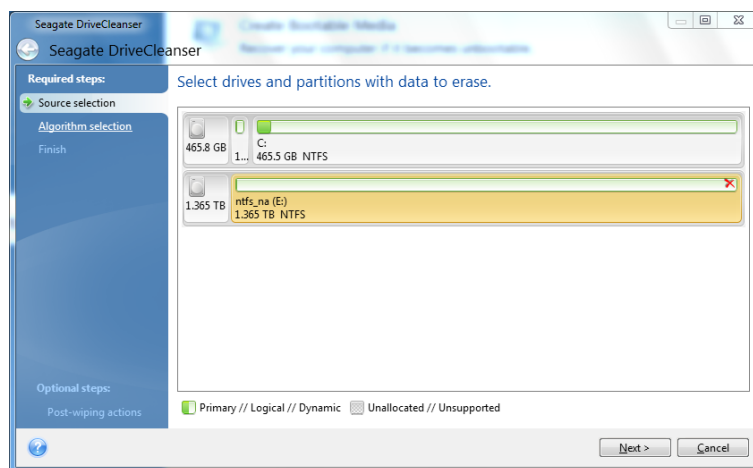
To select a partition, click the corresponding rectangle. You will see a red mark in the upper right corner indicating that the partition is selected.

You can select an entire hard disc or several discs for data destruction. To do this, click the rectangle corresponding to the hard disc (with a device icon, disc number and capacity).

You can simultaneously select several partitions located on different hard disc drives or on several discs, as well as unallocated space on discs.

Click **Next** to continue.

If the discs and/or partitions you have selected include the system disc or partition, you will see a warning window.
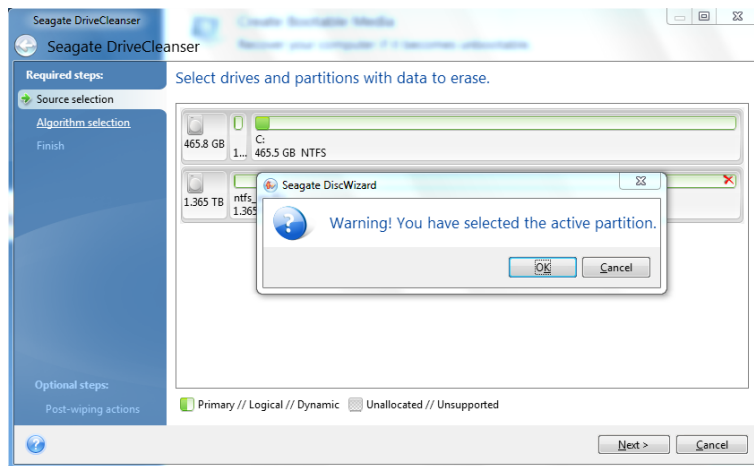
Be careful, because clicking **OK** in this warning window and then **Proceed** in the Summary window will result in wiping the system partition containing your Windows operating system.

Seagate DriveCleanser utilizes a number of the most popular data destruction methods described in detail in Hard Disc Wiping Methods of this manual. If you want to create a custom data destruction algorithm, choose **Custom…** and go to Creating custom algorithms of data destruction.
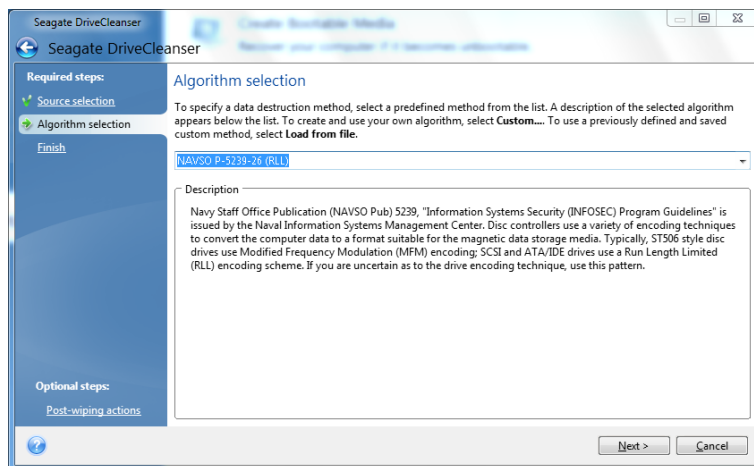
After selecting or creating the disc wiping method click **Next** to continue. Seagate DriveCleanser will display the data destruction task summary. You can click **Proceed** after selecting the **Wipe the selected partitions irreversibly** box or click **Options** to select the post-wiping action on the partitions selected for data destruction, if the default action, namely, **Format** does not suit you.

In the **Post-wiping actions** window Seagate DriveCleanser offers you three choices:

- **No action** — just destroy data using the method selected below
- **Delete partitions** — destroy data and delete partition(s)
- **Format** — destroy data and format partition (default)

In this example, the switch is set to **Format**. This will allow you to see the results of partition and data destruction, along with the reformatting of the partition.

You cannot delete partitions on dynamic and GPT discs.

Up to this point, you can make changes in the created task. Clicking **Proceed** after you select a post-wiping action will launch the task execution (if the **Proceed** button is unselectable, click **Finish** on the sidebar and select th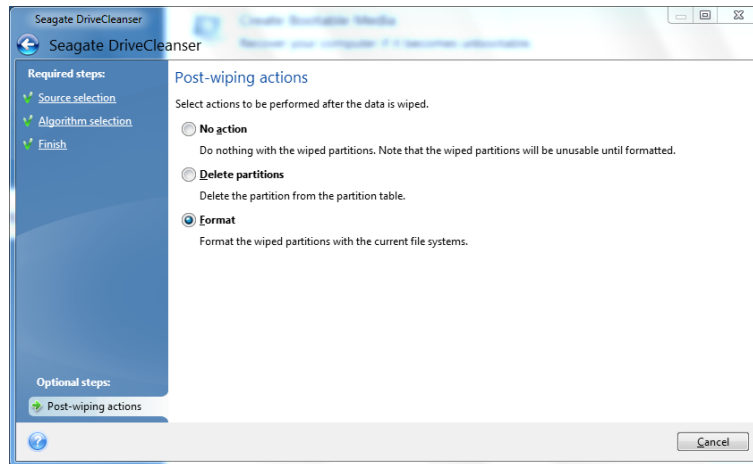e **Wipe the selected partitions irreversibly** box to enable the **Proceed** button). Seagate DriveCleanser will perform all actions necessary for destroying the contents of the selected partition or disc. After this is done, you will see a message indicating the successful data destruction.

Seagate DriveCleanser offers you another useful capability — to estimate the results of executing a data destruction method on a hard disc or partition. To view the state of your cleaned discs or partitions, choose **Tools & Utilities** on the sidebar. The Seagate DriveCleanser area in the right pane contains the **View the current state of your hard drives** link. Click on the link and then choose the partition whose cleaning results you wish to view. This opens an integrated Seagate Disc Editor (in read-only mode).

The aforementioned algorithms offer various levels of confidential data destruction. Thus the picture you might see on a disc or partition depends on the data destruction method. But what you actually see are disc sectors filled with either zeros or random symbols.
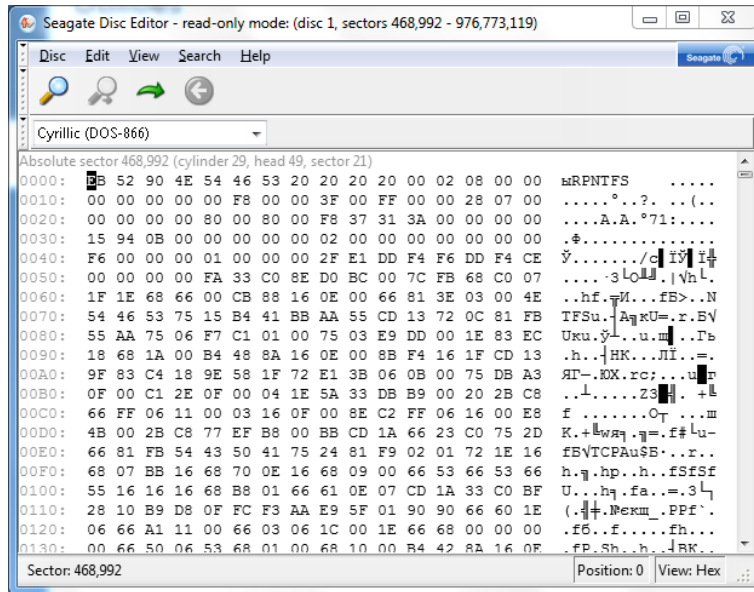
17.2 Creating custom algorithms of data destruction

Seagate DriveCleanser gives you the opportunity to create your own algorithms for wiping hard discs. Although the software includes several levels of data destruction, you can choose to create your own. This is recommended only for users familiar with the principles of data destruction used in secure disc wiping methods.

Creating a custom method of hard disc wiping is possible after choosing "**Custom…**" from the drop-down list in the **Algorithm selection** window. In this case some new required steps appear in the DriveCleanser wizard and you will be able to create a data destruction algorithm matching your security requirements.
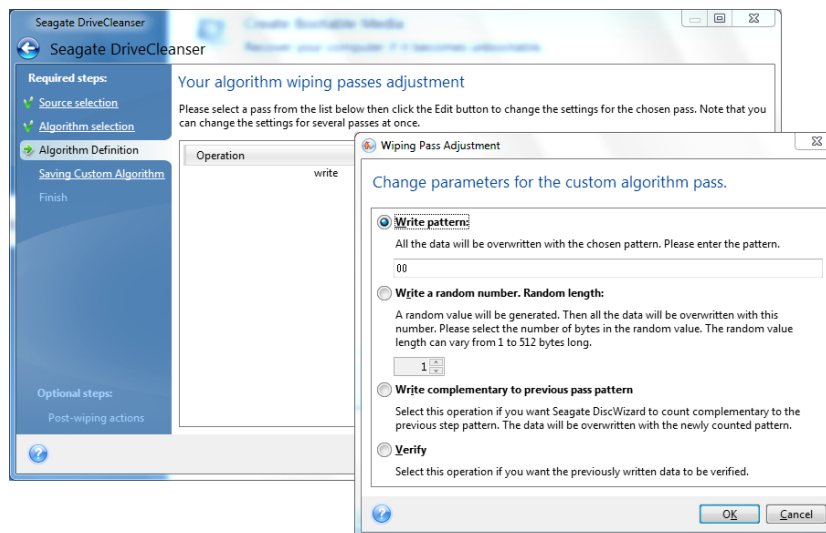
Having created a custom method, you can save the algorithm you created. This will be handy if you are going to use it again.

To save your algorithm, you need to give it a filename and show the path to the folder you want to store it in by selecting the folder from the tree shown in the left pane.

Each custom algorithm is stored in a separate file with its own name. If you try to write a new algorithm to a pre-existing file, the existing file's contents will be erased.

If you created and saved your algorithm for data destruction while working with Seagate DriveCleanser, you can use it later in the following way:

- In the **Algorithm selection** window, choose **Load from file…** from the drop-down list and select the file with custom data destruction algorithm parameters. By default, such files have a *.alg extension.

18 Troubleshooting

In this section

18.1 General

The below sections may help you in troubleshooting issues encountered during installation and use of Seagate DiscWizard.

Seagate Support personnel may request you to provide the system report. To create the report, select Generate System Report in the Help menu (if you are able to start the program in Windows), then save the report and send it to Seagate support team. If the issue prevents booting to Windows, try booting from Seagate rescue media and create the report in the standalone version of Seagate DiscWizard, selecting the same item in the Help menu.

You can also start system report generation by simultaneously pressing the Ctrl+F7 keys both in Windows and the standalone version of Seagate DiscWizard, even when a wizard is opened, a task is running or an error message is displayed.

Furthermore, now you can add to your rescue media Seagate System Report tool that allows you to generate the system report after booting from the rescue media when both Windows and Seagate DiscWizard (full version) cannot start. In this case you will need a USB flash drive that will be used for saving the report.

Quite often the cause of an issue may be trivial, for example, a loose connection of an external hard drive. Before trying other solutions described in this chapter, it is advisable to check if the issue is caused by one of the following:

- loose connections to the external drive;
- poor quality connecting cable;

When using an external USB hard drive, try the following additional suggestions:

- if the drive is connected through a hub, connect it directly to a rear connector of your PC;
- to prevent conflict with other USB devices attached to your PC, try disconnecting all the USB devices (except the mouse and keyboard).

18.2 Installation issues

When you cannot install Seagate DiscWizard, try the following solutions:

1. If you selected "Install for the current user only" during the installation, try to select "Install for all users that share this computer" and vice versa.
2. Launch the installation file in the following way: right-click on the file and select "Run as administrator".
3. Log in to Vista's built-in administrator account and try to install the program:

   a. Click **Start** → **All Programs**, then find and open the "Accessories" folder.

   b. Right-click on the "Command Prompt" item and select "Run as administrator".

   c. Type the following command line in to the opened window:

   net user administrator /active:yes

   Take note that there is a space between "Administrator" and "/active:yes".

   d. Log off the current account and log in to the "Administrator" account.

   e. Try to install the application again.

18.3 Backup and validation issues

1) When you get a problem with backup or validation, first of all make sure that you have the latest build of Seagate DiscWizard. The latest build may contain bug fixes and provide enhanced hardware compatibility.

2) Errors encountered while backing up data or validating backup archives may be caused by hard disc errors and/or bad sectors, so check the source and destination discs if you encounter an issue when backing up or check the backup archive storage disc when validating a backup archive. To do this, use the Windows chkdsk utility as follows:

- Go to the Command Prompt (Start → Run → cmd)

- Enter the following command: "chkdsk DISK: /r" (where DISK is the partition letter you need to check, e.g. D:). Please note, that checking the C: drive may require you to reboot the PC.

3) The reason for errors may be defective RAM modules. To test the memory modules of your PC, please download one of the archives depending on what media type you are going to use:

- memtest archive for diskette

- memtest archive for USB Flash drive

- memtest archive for CD

Unpack the archive and create bootable media with the memory test. Instructions on how to do it can be found in README.txt in the archive.

18.4 Recovery issues

System and/or data recovery after a disaster is the most important operation performed with Seagate DiscWizard. Indeed what's the value of a backup program that cannot recover backed up data? If you have problems with recovery, try the following actions:

1) First of all make sure that you have the latest build of Seagate DiscWizard.

2) If you recover the image from an external drive, try to copy that image to another storage and retry recovery as the issue may be related to the hardware.

3) If you have tried recovery in Windows, boot to the rescue media and try the recovery procedure once more.

4) If this is a data partition backup, you can try mounting it to recover at least some files and folders.

18.5 Bootability after recovery issues

If a system was bootable at the time of backup, you expect that it will boot after recovery. However, the information the operating system stores and uses for booting up may have become outdated at the time of recovery, especially if you change partition sizes, locations or destination drives. Seagate DiscWizard automatically updates Windows loaders after recovery. Other loaders might also be fixed, but there are cases when you have to re-activate the loaders. Specifically when you recover Linux volume in a dual boot configuration, it is sometimes necessary to apply fixes or make booting changes so that Linux can boot and load correctly. Below is the summary of typical situations that require additional user actions when the recovered operating system becomes unbootable.

The machine BIOS is configured to boot from another hard disc drive (HDD).

Solution: Configure the BIOS to boot from the HDD where the operating system resides.

In some cases BIOS has two menus for setting the boot sequence: one for setting the boot devices priority and the other - for setting the HDD boot order.

A system partition was recovered to a disc that does not have MBR

When you configure recovery of a system partition to a disc that does not have MBR, the program prompts whether you want to recover the MBR along with the system partition. Opt for not recovering only if you do not want the system to be bootable.

Solution: Recover the partition once again along with the MBR of the corresponding disc.

19 Hard Discs and Boot Sequence

19.1 Arranging boot sequence in BIOS

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

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

Among other things, the BIOS menu allows you to adjust the **boot sequence**. **Boot sequence** management differs for various BIOS versions, e.g. for AMI BIOS, AWARDBIOS, and brand-name hardware manufacturers.

Computer BIOS allows booting operating systems not only from hard discs, but also from CD-ROMs, DVD-ROMs, and other devices. Changing the boot sequence may be required, for example, to make your rescue media (CD, DVD or USB stick) device the first booting device.

If there are several hard discs installed in your computer labeled as C:, D:, E:, and F:, you can reorder the boot sequence so that an operating system is booted from, for example, disc E:. In this case, you have to set the boot sequence to look like E:, CD-ROM:, A:, C:, D:.

*This does not mean that booting is done from the first device in this list; it only means that the **first attempt** to boot an operating system will be from this device. There may be no operating system on disc E:, or it may be inactive. In this case, BIOS queries the next device in the list.*

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

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

After you have installed the hard disc in your computer and have configured it in BIOS, one can say that the PC (or the motherboard) "knows" about its existence and its main parameters. However, it is still not sufficient for an operating system to work with the hard disc. In addition, you have to create partitions on the new disc and format the partitions using Seagate DiscWizard. See Adding a new hard disc (p. 96).

19.2 Installing hard disc drives in computers

19.2.1 Installing an IDE hard disc drive, general scheme

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

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

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

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

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

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

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

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

8. Quit BIOS setup and save changes. Seagate DiscWizard will automatically start after reboot.

9. Use Seagate DiscWizard to configure hard discs by answering the wizard's questions.

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

19.2.2 Motherboard sockets, IDE cable, power cable

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

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

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

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

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

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

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

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

***

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

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

19.2.3 Configuring hard disc drives, jumpers

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

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

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

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

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

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

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

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

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

19.2.4 Installing a SATA hard drive

Most recently manufactured PCs use the SATA interface for hard drives. In general, installing a SATA hard drive is easier than an IDE drive, as it is not necessary to configure master-slave jumpers. SATA drives use a thin interface cable with seven-pin keyed connectors. This improves airflow through the PC case. Power is supplied to SATA drives through 15-pin connectors. Some SATA drives also support legacy four-pin power connectors (Molex) — you can use a Molex or SATA connector but do not use both at the same time, because this could damage the hard drive. You'll also need a free power lead fitted with a SATA power connector. Most systems that come with SATA ports have at least one SATA power connector. If this is not the case, you will need a Molex-to-SATA adapter. In case your system has the SATA power connector but it is already occupied, use a Y-adapter that splits a lead in two.

19.2.5 Steps for installing a new internal SATA drive

1. Find an unused SATA port using the documentation provided with your PC. If you are going to connect your new SATA drive to a SATA controller card, install the card. If you are going to connect the SATA drive to the motherboard, enable applicable motherboard jumpers, if any. Most hard drive kits include a SATA interface cable and mounting screws. Attach one end of the SATA interface cable to a SATA port on the motherboard or interface card, and the other to the drive.

2. Then plug the power-supply lead or use a Molex-to-SATA adapter.

3. Prepare your drive. If you're installing a SATA 300 hard drive, check your PC's (or SATA host adapter's) documentation to make sure it supports SATA 300 drives. If it doesn't, you might need to change a jumper setting on the drive (see the drive's manual for instructions). If you have a SATA 150 hard drive, you don't need to change any settings.

4. Turn on the PC and look for the new drive in the boot-up messages. If you don't see it, enter the PC's CMOS setup program and search the BIOS configuration menu for an option that will let you enable SATA for the ports you are using (or maybe you will just need to enable SATA). See your motherboard documentation for instructions specific to your BIOS.

5. If the operating system does not recognize the SATA drive, you need the appropriate drivers for your SATA controller. If the drive is recognized, go to step 8.

    Usually, it is best to obtain the latest driver version from the motherboard or SATA controller manufacturer's Web site.

    If you download a copy of the SATA controller drivers, place the driver files to a known location on your hard drive.

6. Boot from the old hard drive.

The operating system should detect the SATA controller and install the appropriate software. You might need to provide the path to the driver files.

7. Ensure that the SATA controller and the connected SATA hard drive are correctly detected by the operating system. To do this, go to the Device Manager.

   SATA controllers usually appear under the SCSI and RAID controllers section of Device Manager, while hard drives are listed under the Disc drives section.

   The SATA controller and SATA hard drive must not be displayed in the Device Manager with a yellow exclamation mark or any other error indication.

8. After you have installed the hard disc in your computer and have configured it in BIOS, one can say that the PC "knows" about its existence and its main parameters. However, it is still not enough for the operating system to work with the hard disc. In addition, you have to create partitions on the new disc and format the partitions using Seagate DiscWizard. See Adding a new hard disc (p. 96). Then configure your BIOS to boot from the SATA controller and boot from the SATA hard drive to ensure it works.

19.3 Hard Disc Wiping methods

Information removed from a hard disc drive by non-secure means (for example, by simple Windows delete) can easily be recovered. Utilizing specialized equipment, it is possible to recover even repeatedly overwritten information. Therefore, guaranteed data wiping is more important now than ever before.

The **guaranteed wiping of information** from magnetic media (e.g. a hard disc drive) means it is impossible to recover data by even a qualified specialist with the help of all known tools and recovery methods.

This problem can be explained in the following way: Data is stored on a hard disc as a binary sequence of 1 and 0 (ones and zeros), represented by differently magnetized parts of a disc.

Generally speaking, a 1 written to a hard disc is read as 1 by its controller, and 0 is read as 0. However, if you write 1 over 0, the result is conditionally 0.95 and vice versa – if 1 is written over 1 the result is 1.05. These differences are irrelevant for the controller. However, using special equipment, one can easily read the «underlying» sequence of 1's and 0's.

It only requires specialized software and inexpensive hardware to read data "deleted" this way by analyzing magnetization of hard disc sectors, residual magnetization of track sides and/or by using current magnetic microscopes.

Writing to magnetic media leads to subtle effects summarized as follows: every track of a disc stores **an image of every record** ever written to it, but the effect of such records (magnetic layer) becomes more subtle as time passes.

19.3.1 Functioning principles of Information wiping methods

Physically, the complete wiping of information from a hard disc involves the switching of every elementary magnetic area of the recording material as many times as possible by writing specially selected sequences of logical 1's and 0's (also known as samples).

Using logical data encoding methods in current hard discs, you can select **samples** of symbol (or elementary data bit) sequences to be written to sectors in order to **repeatedly and effectively wipe confidential information.**

Methods offered by national standards provide (single or triple) recording of random symbols to disc sectors that are **straightforward and arbitrary decisions, in general**, but still acceptable in simple situations. The most effective information-wiping method is based on deep analysis of subtle features of recording data to all types of hard discs. This knowledge speaks of the necessity of complex multipass methods to **guarantee** information wiping.

The detailed theory of guaranteed information wiping is described in an article by Peter Gutmann. Please see:

Secure Deletion of Data from Magnetic and Solid-State Memory.

19.3.2   Information wiping methods used by Seagate

The table below briefly describes information wiping methods used by Seagate. Each description features the number of hard disc sector passes along with the number(s) written to each sector byte.

The description of built-in information wiping methods

No.	Algorithm (writing method)	Passes	Record
1.	United States Department of Defense 5220.22-M	4	1st pass – randomly selected symbols to each byte of each sector, 2 – complementary to written during the 1st pass; 3 – random symbols again; 4 – writing verification.
2.	United States: NAVSO P-5239-26 (RLL)	4	1st pass – 0x01 to all sectors, 2 – 0x27FFFFFF, 3 – random symbol sequences, 4 – verification.
3.	United States: NAVSO P-5239-26 (MFM)	4	1st pass – 0x01 to all sectors, 2 – 0x7FFFFFFF, 3 – random symbol sequences, 4 – verification.
4.	German: VSITR	7	1st – 6th – alternate sequences of: 0x00 and 0xFF; 7th – 0xAA; i.e. 0x00, 0xFF, 0x00, 0xFF, 0x00, 0xFF, 0xAA.
5.	Russian: GOST P50739-95	1	Logical zeros (0x00 numbers) to each byte of each sector for 6th to 4th security level systems. Randomly selected symbols (numbers) to each byte of each sector for 3rd to 1st security level systems.
6.	Peter Gutmann's method	35	Peter Gutmann's method is very sophisticated. It's based on his theory of hard disc information wiping (see Secure Deletion of Data from Magnetic and Solid-State Memory).
7.	Bruce Schneier's method	7	Bruce Schneier offers a seven-pass overwriting method in his Applied Cryptography book. 1st pass – 0xFF, 2nd pass – 0x00, and then five times with a cryptographically secure pseudo-random sequence.

No.	Algorithm (writing method)	Passes	Record
8.	Fast	1	Logical zeros (0x00 numbers) to all sectors to wipe.

20 Startup Parameters

Additional parameters that can be applied prior to booting Linux kernel.

20.1 Description

Additional parameters that can be applied prior to booting Linux kernel

Description

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

- **acpi=off**

Disables ACPI and may help with a particular hardware configuration.

- **noapic**

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

- **nousb**

Disables loading of USB modules.

- **nousb2**

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

- **quiet**

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

- **nodma**

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

- **nofw**

Disables FireWire (IEEE1394) support.

- **nopcmcia**

Disables PCMCIA hardware detection.

- **nomouse**

Disables mouse support.

- **[module name]=off**

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

- **pci=bios**

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

- **pci=nobios**

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

- **pci=biosirq**

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

- **vga=ask**

Gets the list of the video modes available for your video card and allows selecting a video mode most suitable for the video card and monitor. Try this option, if the automatically selected video mode is unsuitable for your hardware.