



PARAGON

Backup & Recovery

VERSION 17

User Manual

Paragon Software GmbH
Systemprogrammierung
Wiesentalstraße 22
79115 Freiburg, Germany

Tel. +49 (0) 761 59018201
Fax +49 (0) 761 59018130

Web www.paragon-software.com

E-Mail sales@paragon-software.com

Table of Contents

Product Overview	3
Getting Started	3
Product Components	3
System Requirements	3
Installation	4
First Start	4
Activating the Product	4
Navigating the Product	5
Typical Scenarios	6
Configuring Backup Job	6
Building Recovery Media	14
Booting from Recovery Media	18
Restoring Individual Files and Folders	18
Mounting a Backup Image	20
Restoring a Failed System	21
Fixing Boot Problems	24
Checking Backup Integrity	27
Undeleting a Partition	27
Transferring Files between Storages	29
Extra WinPE Scenarios	31
Unlocking Bitlocked Volumes	31
Adding Specific Drivers	32
Configuring Network	33
Network Troubleshooter	35
Using the Command Prompt	37
Troubleshooting	37

Product Overview

Backup & Recovery is an easy-to-use tool for reliable backup of an entire computer, individual volumes or files. It helps to get consistent point-in-time copies of your PC including OS, running applications, user settings and all data in such a way that you don't even feel any discomfort.

Backup & Recovery supports full, incremental and differential backup methods and their combinations as well as various backup retention options, which opens a way to create comprehensive backup strategies that allow keeping backup data precisely up to date with minimal effort and backup storage footprint. Your choice may depend on whether this applies to a home computer for which you may want only a few restore points to roll back, or a production environment that contains sensitive data. In any way, a smart backup configuration wizard simplifies backup routines – all essential setups can be done from one place and all options come with hints and recommendations. The backup timeline view helps to instantly grasp the key properties of selected backup jobs, including availability of restore points and the number of failed backup runs.

Several restore options are available for you to rule out an emergency situation as quickly as possible, from fast retrieval of specific files from a backup image, to complete restore of your computer to an earlier state without losing data, reinstalling and reconfiguring your programs. Even when OS fails to start up, you still have a chance to get everything back on track by loading your PC from a WinPE-based rescue media prepared beforehand.

In this guide you will find the answers to many of the technical questions, which might arise while using our program.



As we continuously update and improve the product, live product screens may not match the screenshots contained in this document, despite the best effort to keep the document consistent with the product outlook.

Getting Started

Product Components

- **Windows installation package** for regular system and data protection. It's the main component of the product.
- **WinPE bootable environment** for emergency scenarios. You can prepare it on a USB thumb drive or in an ISO file with the program's wizard (highly recommended). Additionally to the Windows wizards and dialogs, this media includes several more utilities that help you add missing hardware drivers, set up network environment, and fix OS boot problems.

System Requirements

For the Windows installation package

- Windows 7 SP1 and later. Please note that the list of supported Windows versions may vary for your product.
- Opened ports in Firewall: inbound and outbound 80, 443



During the installation additional free space (up to 1GB) will be required.

For the WinPE bootable environment

- Intel Pentium III CPU or its equivalent, with 1000 MHz processor clock speed
- At least 1 GB of RAM
- SVGA video adapter and monitor
- Keyboard
- Mouse

Additional requirements

- Network card to send/retrieve data to/from a network computer
- Recordable CD/DVD drive to burn data to compact discs
- External USB hard drive to store data

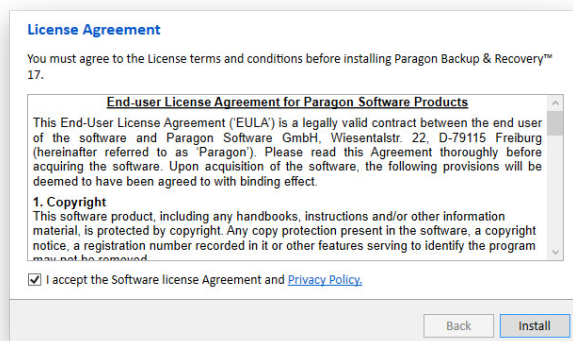
Installation

Before the installation, please make sure the [systems requirements](#) are met. If everything is OK, please do the following to install the product:



In case there is some previous version of the program installed on the computer, the program will offer the user to uninstall it first.

1. Click on the supplied setup file to initiate the installation. First your system will be checked for the presence of Visual Studio C++ 2015 Redistributable and if not found, it will be installed automatically (comes with the installation package). **Note!** Before installing this library in Windows 8.1 or Windows Server 2012 R2, the following OS updates should be present: KB2919442, KB2919355.
2. Then your system will be checked for the presence of Microsoft .NET 4.0 or later and if not found, it will be downloaded from Microsoft's website and then installed.
3. Please Read Paragon License Agreement and Privacy Policy carefully and then select the appropriate option to accept. Otherwise you won't be able to proceed with the installation.



4. The final page reports the end of the setup process. Click **Finish** to complete the wizard.

First Start

Activating the Product

1. After the installation you can see a program icon on the Windows desktop. Double click it to launch.

- Backup & Recovery is a freeware product that you can use with no limitations once activated over the Internet. Enter an email and password of your Paragon's account in the opened dialog, then click **Sign in**. If you don't have an account yet, please create it by clicking the corresponding option. Alternatively, you can sign in with your Facebook, Google, or Twitter account.

Activate Paragon Backup & Recovery 17

Paragon account is required to activate your products, get latest updates, special offers, and contact Paragon Customer support.

Sign in to your Paragon Account

[Forgot your password?](#)

Sign in

Don't have an account?

Create Paragon Account

or sign in with one click using

Facebook
 Google
 Twitter

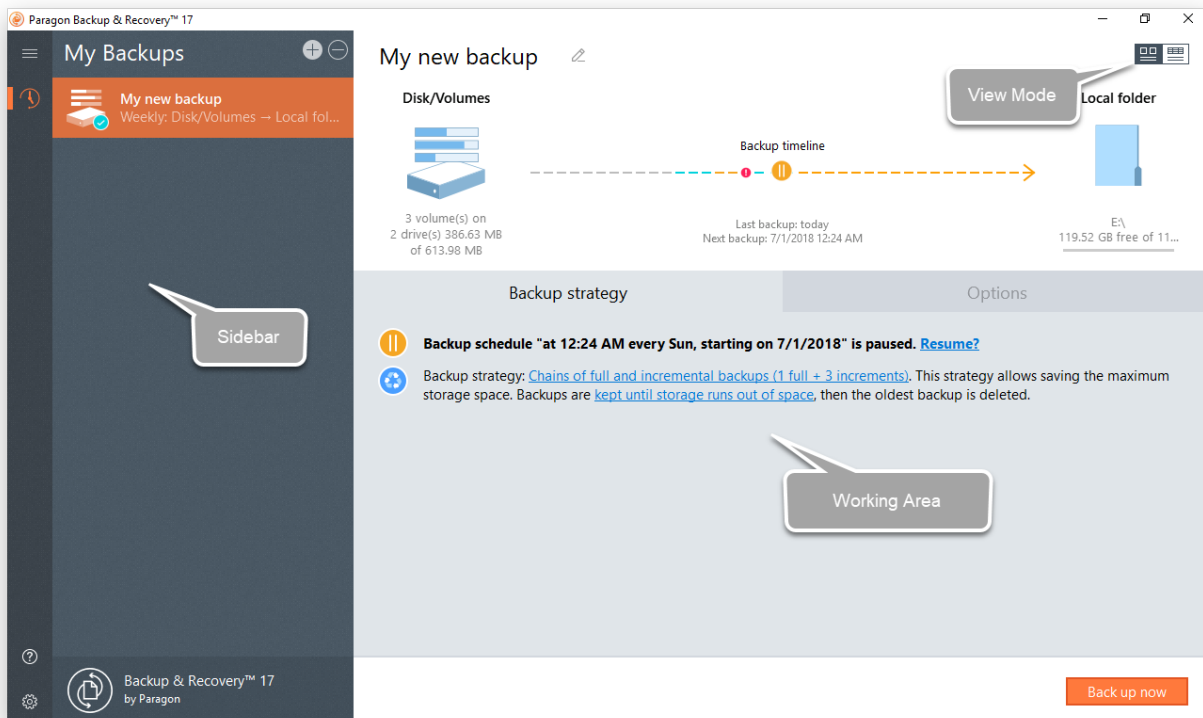
Have a serial number or coupon? [Activate it here](#)

- The product activation completes automatically after signing in to your account.

Navigating the Product

Backup & Recovery is built around the sidebar that gives you access to action wizards and settings. The sidebar located on the left side of the screen includes several buttons: Home, Backup & Recovery, Settings & Tools, and Help. By clicking the Home button, you can see names of these buttons. On the right side is the working area that displays contents of the currently selected item.

At first program start, you will see the backup configuration wizard that will guide you through the process of creating a backup job. All essential setups can be done from one place and all options come with hints and recommendations. The default backup timeline view helps to instantly grasp the key properties of selected backup jobs, including availability of restore points and the number of failed backup runs, while the table view provides information in a more traditional way.



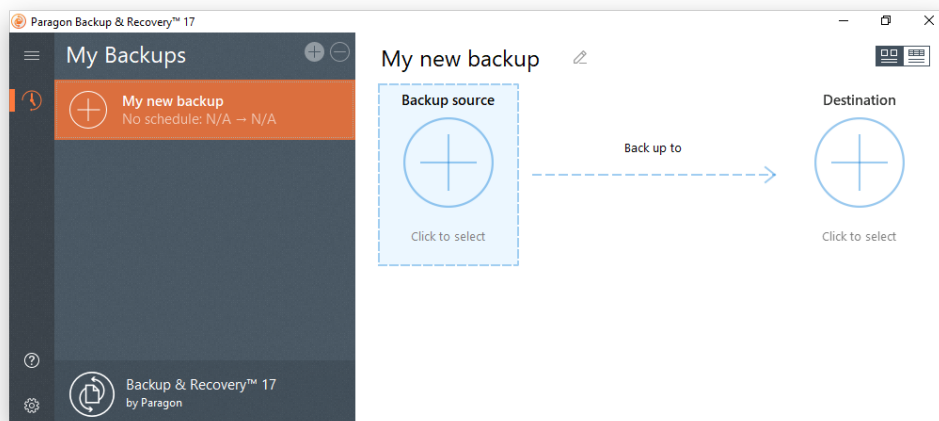
Typical Scenarios

Configuring Backup Job

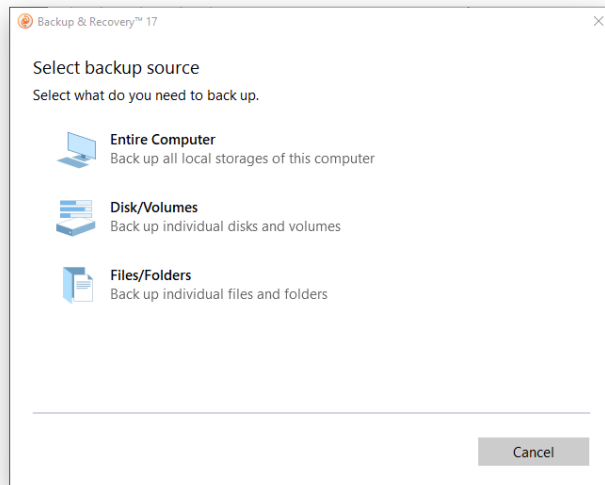
Backup & Recovery includes all technologies to help you effectively protect different types of data. Do you need to secure your software environment, including the operating system, applications and data? Create a full backup image of entire disks or individual volumes to be able to recover your system to a working state within several minutes in case of emergency. Are you looking for an optimal way of securing individual files or folders? Use the file-level backup capabilities to protect family pictures, favorite music, some project or document without wasting time and backup storage on other on-disk data. Are you busy developing a specific project on a day-to-day basis and have to make a backup every evening so as not to lose the progress of your efforts? Just automate your backup routines through scheduling.

Are you a pro in backup technologies? Configure comprehensive backup strategies that utilize full, incremental, and differential backup methods and their combinations as well as various backup retention options, where backup runs can be scheduled from every hour till certain days of the month, or evoked by a certain event. Does your backup policy engage an instant virtualization scenario? Set up the program to back up directly to a virtual container supported by your hypervisor. Do you need a rock-solid shield against unauthorized access to backup data? Several encryption algorithms to choose from, including 256-bit Advanced Encryption Standard (AES), ensure complete safety for sensitive data.

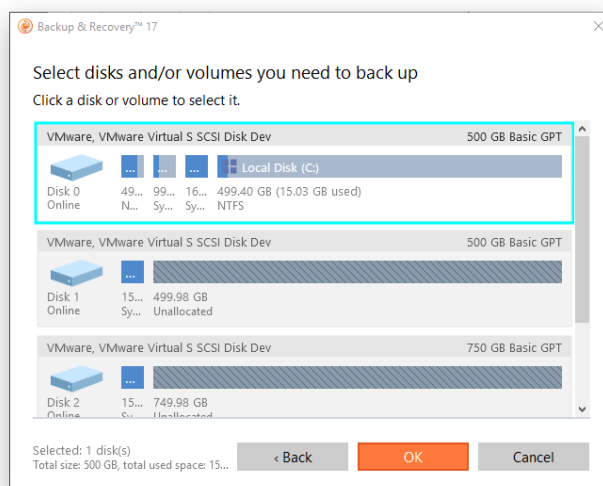
1. Click **Backup & Recovery** on the sidebar.
2. If this is the first time you do backup, you will see the backup configuration wizard. If you already have some backup jobs in the list, then click the plus icon.



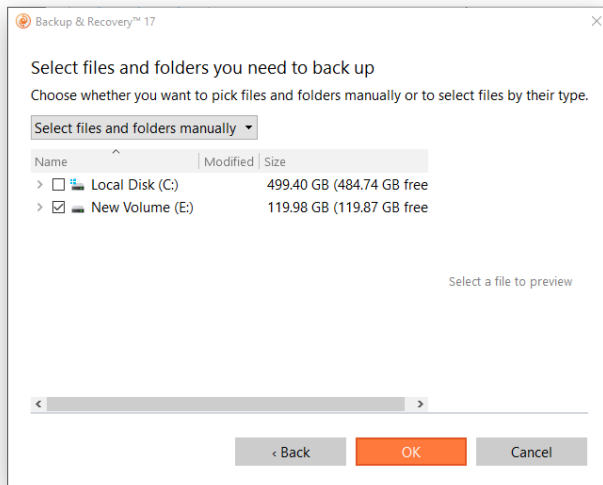
3. Give a catchy name to your backup job.
4. Click the **Backup source** icon, and then the most suitable option.



- **Entire Computer.** Choose this option to back up all storage devices of your PC.
- **Disk/Volumes.** Left click an object(s) you'd like to back up. When selecting a volume that hosts Windows OS you may be warned that the wizard additionally selects another one that contains boot system files. Though it's not recommended, you can deselect any volume you consider unimportant.

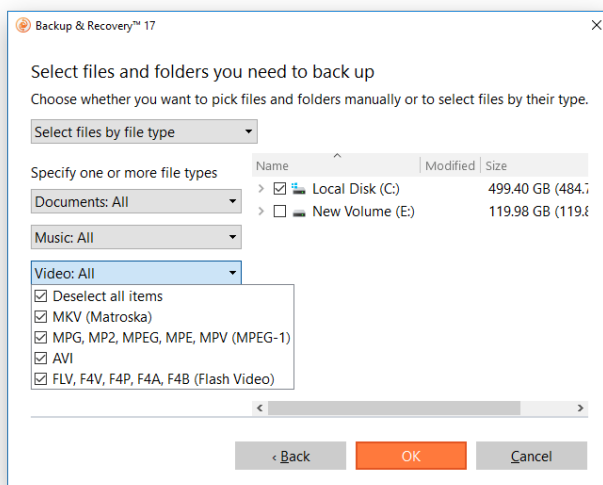


- **Files/Folders.** From a list of all partitions available in the system, mark a checkbox opposite a file, folder or even a whole partition to build up contents of the future backup image.

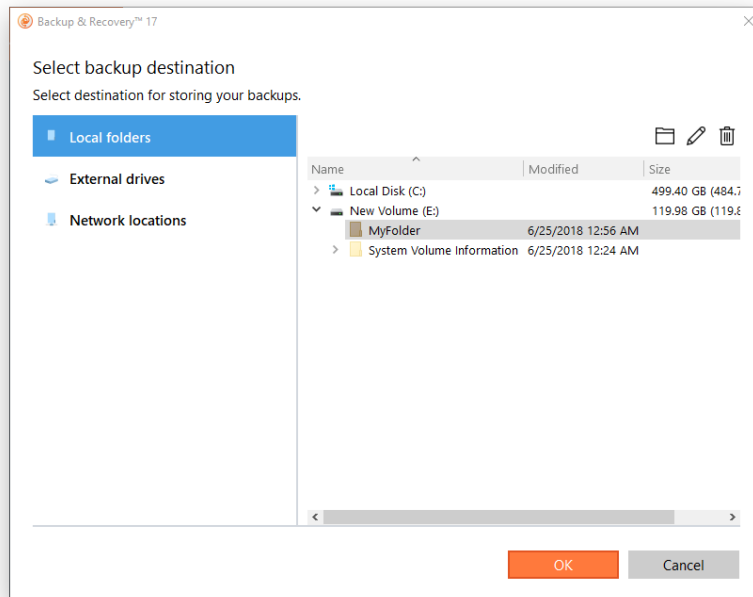


Switch to **Select files by file type** mode if you're planning to back up specific types of files, for example Word documents or Excel workbooks. The wizard includes three predefined categories containing file masks for popular document, music, and video formats. Either select an entire category(ies) or use the arrow icon to expand it and choose a certain file mask(s). If you don't find the required mask, add your own through the **Add your file types...** option.

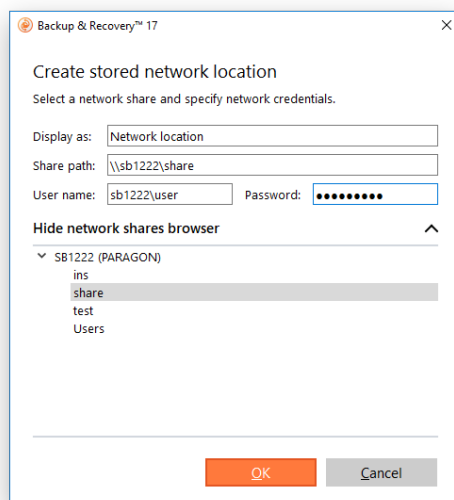
When you're done with the file masks, mark a checkbox opposite a folder or partition where the wizard should look for your files.



5. Click the **Destination** icon, and then specify backup location (local or external storage, or a network share).

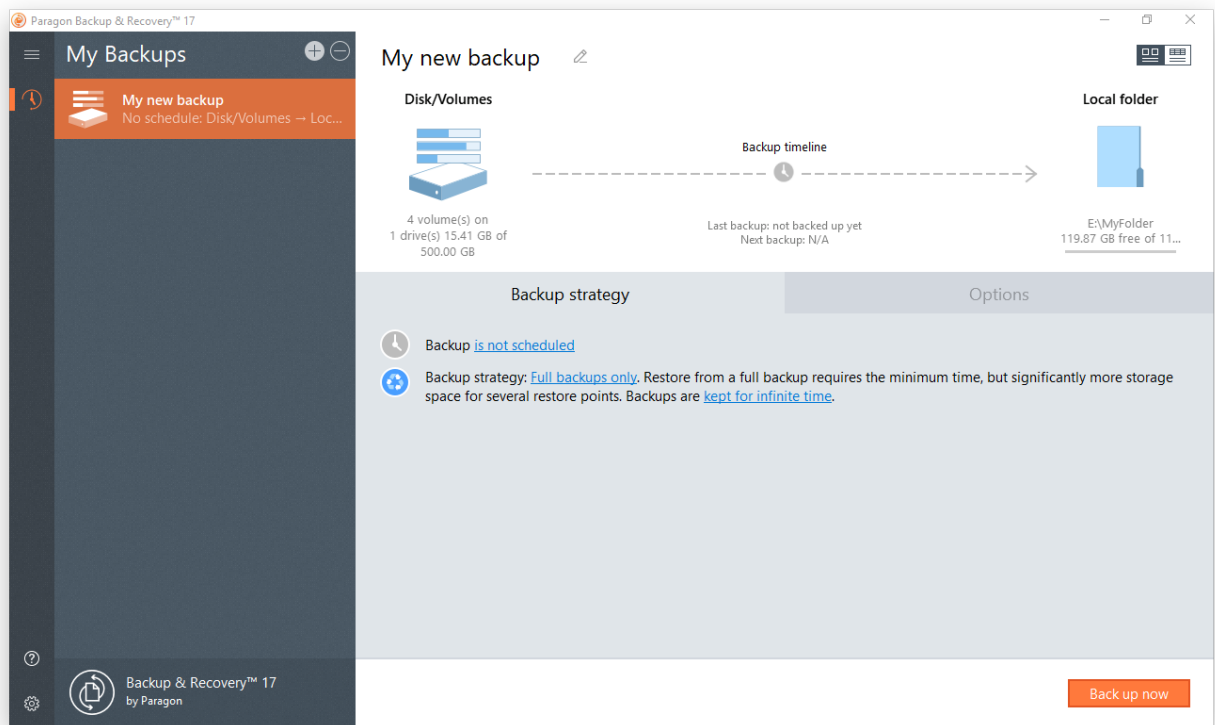


- **Local folders.** Browse your internal disks to find a storage place for the backup data. Use the corresponding buttons to create new, rename, or delete folders.
- **External drives.** Choose an externally connected storage (hard disk, thumb drive, etc.) from the list. If it's not present, please make sure it's available in the system, then try again.
- **Network locations.** Choose a mapped network share from the list or add a new one by specifying its name, location (a full path or through browsing the network), and access credentials.

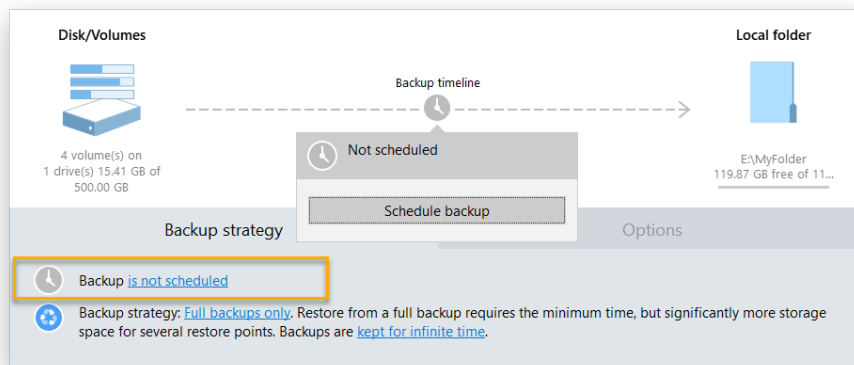


6. At this step you can click **Back up now** to create a full backup image of the specified data. Click this button again in the future and the program will create another full backup image reflecting changes since the initial backup.

Having a full backup is a good start, but we recommend you to continue configuration of the job in order to automate the backup process, optimize utilization of the storage space, protect your backup data from unauthorized access, and do some other useful setups.



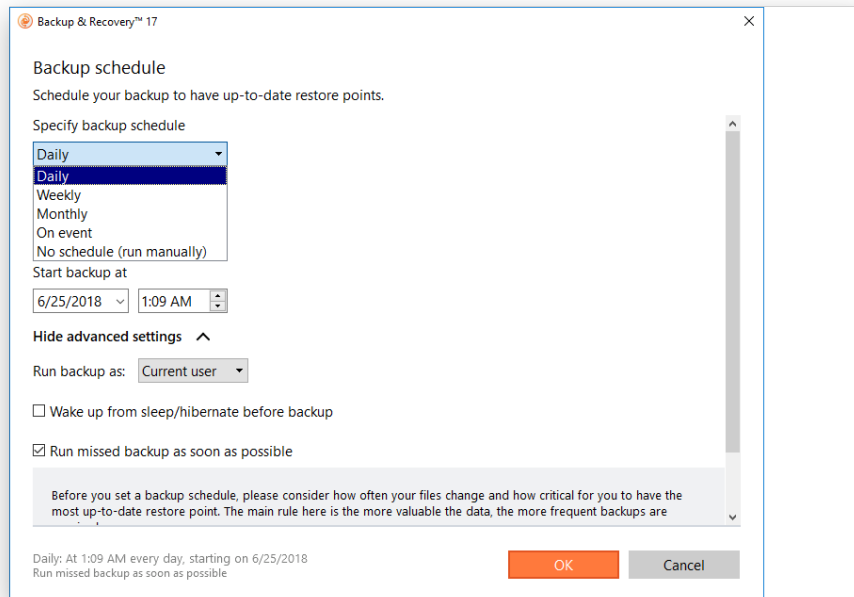
- Schedule your backup job by clicking either the watch icon on the backup timeline or the corresponding hyperlink.



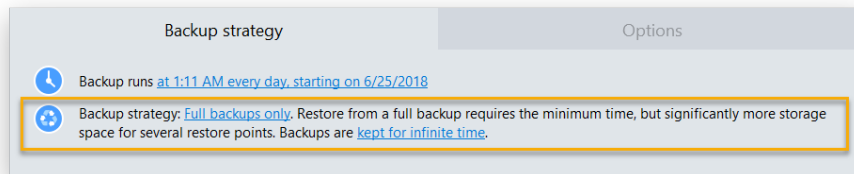
We suggest choosing the daily backup when it comes to protecting valuable information that keeps changing constantly, for example some project or document, or a financial report you're working on every day. The main rule here is the more valuable the data, the more frequent backups are required. For production environments like SQL Server or Exchange Server, where multiple transactions occur every second, the optimal interval between backups is about 30 minutes. By reducing it even further you risk to heavily overload the entire infrastructure.

The weekly or monthly backup comes into play when your data is not changed often. Obviously, there's no need to back up your music collection on a daily basis, as in most cases losing the latest album won't be a huge disaster. The same goes for partitions that host the operating system.

While setting a start time for backup runs, please make sure it is during off hours (at night or early in the morning) or whenever the computer has the least work-load to perform. To allow backup runs when a non-admin user is logged in, or to wake up from sleep or hibernation automatically, click **Show advanced settings** to see and adjust the corresponding options.



8. Set up a backup strategy by clicking one of two hyperlinks in the corresponding section.

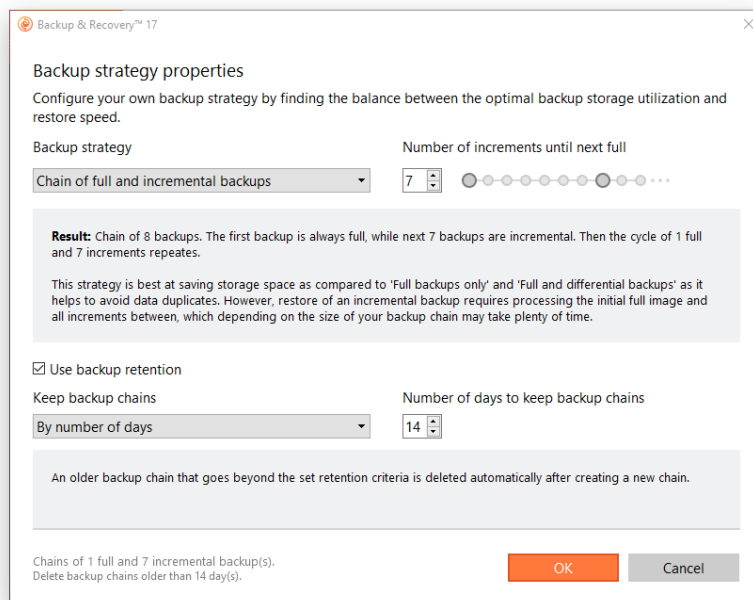


Backup & Recovery supports full, incremental and differential backup methods and their combinations as well as various backup retention options, which opens a way to create comprehensive backup strategies. Your choice may depend on whether this applies to a home computer for which you may want only a few restore points to roll back, or a production environment that contains sensitive data that might be needed for the future forensic analysis and/or it can be subject to compliance requirements.

For important files you choose to back up daily, we suggest a seven-day backup cycle of one full backup image followed by six incremental updates. It is a reasonable compromise between backup storage consumption and restore performance. To avoid the situation when backup data eats up the entire storage space, we also suggest enabling a retention policy that will only keep seven latest restore points.

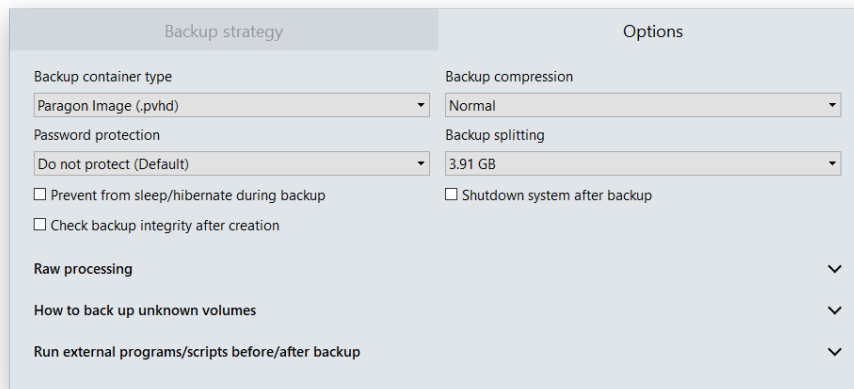
For non-critical information protected on a weekly basis, we consider the use of the incremental imaging not optimal, as the amount of data changes may be so huge, so it can nullify primary benefits of this backup method, i.e. small backup times and image files. Furthermore, restore from this type of backup chain may take plenty of time. Thus, we recommend it to create full backups only and keep no more than three latest restore points.

If you prefer an external storage device as backup media and don't need to have several restore points, we suggest creating and keeping one full backup. The same goes for backups done before applying OS patches or installing new software.

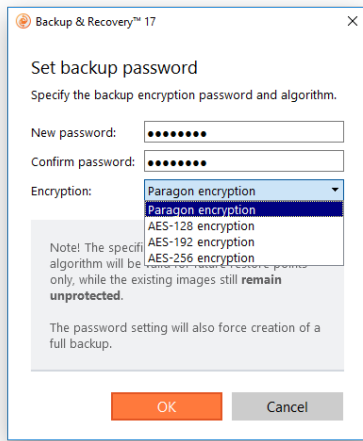


If you need our help in working out an optimal backup cycle for your environment, please contact our Support Team.

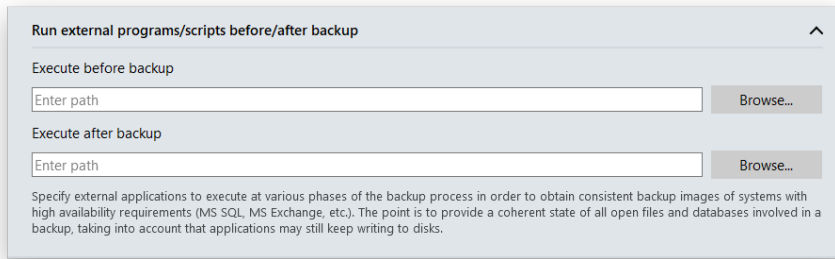
- Click **Options** to modify advanced backup settings. Please note that all parameters set right here will be relevant for this backup job only.



- Backup container type.** By default, the program is configured to back up to pVHD (Paragon Virtual Hard Drive), but you can switch it to VHD, VHDX, or VMDK. Please note that pVHD-based full backups are several times smaller than the original objects, while incremental updates – dozens of times smaller when comparing to VHD, VHDX or VMDK, which have some fixed size of blocks, not dynamic. Besides, password protection, backup compression and splitting options are only available for pVHD. However, if you're having a VMware or Microsoft hypervisor and are planning to do instant virtualization, make sure the used backup container type matches your hypervisor.
- Password protection.** Specify a password and encryption algorithm to protect backup data from unauthorized access (recommended). Please note that setting, changing, or resetting password or encryption algorithm forces creation of a full backup. This option is only available for pVHD containers.



- **Backup compression.** Select the desired compression level (none, fast, normal, best). Please note that the better compression level you choose, the more time backup takes. This option is only available for pVHD containers.
- **Backup splitting.** By default, created backup images are split to files of 4GB. This helps to avoid problems caused by a maximum file size limitation of FAT32 file system. Use the spinner control to set another size or disable the backup splitting. This option is only available for pVHD containers.
- **Prevent from sleep/hibernate during backup.** Use this option prevent your computer from going into sleep or hibernation mode until the backup is done.
- **Check backup integrity after creation.** Use this option to make sure the created backup data is 100 percent flawless.
- **Shut down system after backup.** Use this option if you want the computer to automatically shut down when the backup is completed. Please note however that in some cases you may lose unsaved data of the running apps because of this action:
 - If you don't have running apps with unsaved data, the shutdown is absolutely safe;
 - If you do have running apps with unsaved data and your Windows session is not locked (interactive mode), the program initiates a 10-minute countdown, then the 'soft OS shutdown'. This means that the operating system will ask you what to do with unsaved data and wait for you to save the data inside the running apps or confirm the shutdown without saving. So in this case the shutdown is also absolutely safe;
 - If you do have running apps with unsaved data and your Windows session is locked, then your computer will be shut down after a 10-minute countdown and all unsaved data will be lost. Please avoid this scenario.
- **Handling unknown volumes.** Set behavior for processing unsupported or unformatted partitions (skip from backup, process in sector-by-sector mode, or ask the user each time this type of partition has been found).
- **Run during backup options.** Specify external applications to execute at various phases of the backup process in order to obtain consistent backup images of systems with high availability requirements (MS SQL, MS Exchange, etc.). The point is to provide a coherent state of all open files and databases involved in a backup, taking into account that applications may still keep writing to disks.



- **Execute before backup.** Specify an executable file (through browsing or typing a full path to it) that helps you to prepare running applications for backup. It may include specific commands/programs to delete unnecessary files, suspend services, flush transactions or caches, etc.
- **Execute after backup.** Specify an executable file to run after backup. It may include commands/programs to resume the previously suspended services, etc.

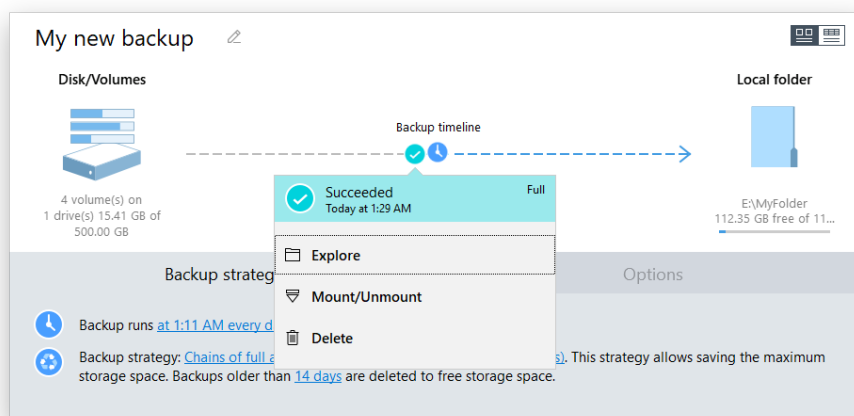
The program supports three types of executable files (.exe, .bat, .cmd). You can set parameters for your files directly from the line. However, if a file path contains word gaps, you need to enclose it in quotes in order to let the program distinguish between the path and the used parameters.

Requirements for batch files:

- All programs and commands must execute sequentially and finish before your .bat file completes its work.
- We recommend you to use external commands/programs in the following format - **Start/wait program.exe**. The wait option allows starting an application and waiting until it completes its work. This guarantees all included commands complete their execution before your .bat file does.

10. Review all parameters of the operation and modify them if necessary. Click **Back up now** to save the changes and start the backup.

11. If everything went smooth, the resulted status on the backup timeline would be 'Succeeded' (the green OK icon).



Building Recovery Media

The program includes a user-friendly wizard that will guide you through the process of creating a WinPE-based recovery media on a USB thumb drive or in an ISO file to later burn it to CD/DVD. For advanced users, there are capabilities to add drivers for specific hardware devices, configure network settings, and map network shares in the process.

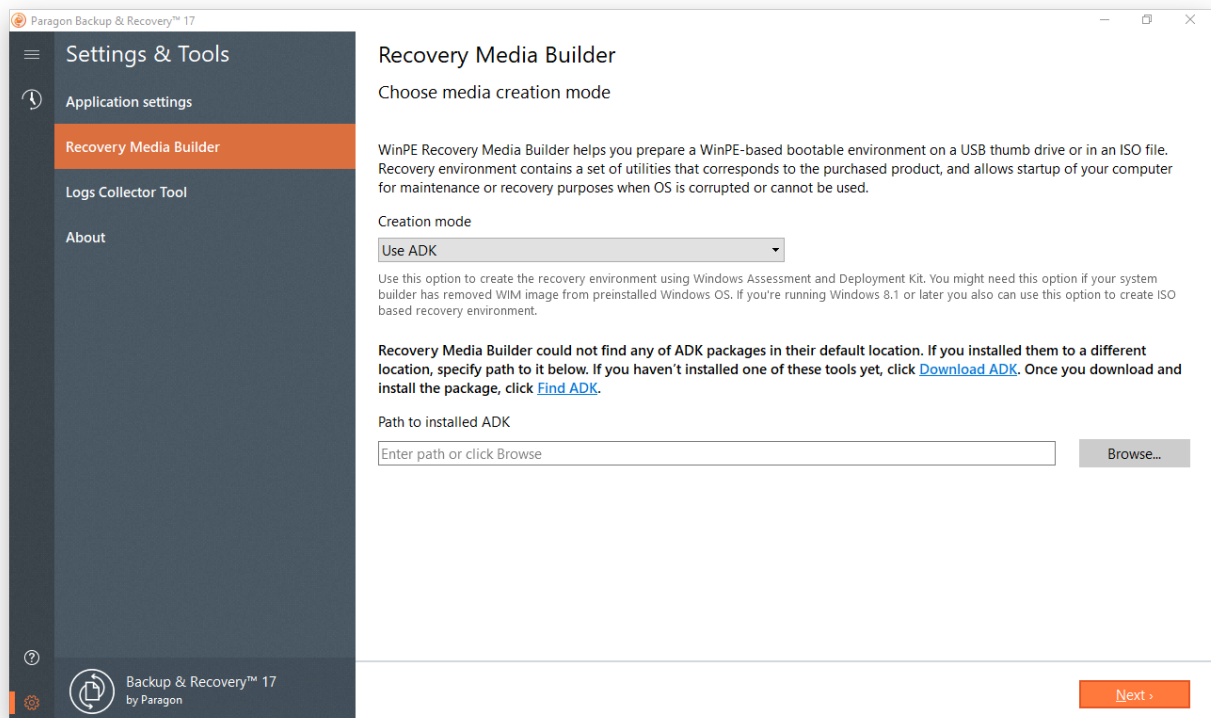
1. Click **Settings & Tools** on the sidebar, then select **Recovery Media Builder**.
2. The welcome page introduces the wizard's functionality. Recovery Media Builder doesn't require Windows Assessment and Deployment Kit (ADK) to be installed in the system to build a WinPE-based environment, as it can directly use WIM image inside the operating system. However, some system builders remove this image from preinstalled Windows OS. If this is your case, select **Use ADK**. You will also need it to create an ISO image of the WinPE environment.

If you have installed ADK by its default location, the wizard automatically detects it. Otherwise, you will need to browse for the required folder. If you haven't installed this toolkit yet, click **Download ADK** to get it directly from the Microsoft website. Please note that ADK is a Microsoft's proprietary tool and can be obtained from its [Download Center](#) for free, provided you have a genuine Windows installation. Moreover, you need to download a version, which is suitable for your Windows OS.

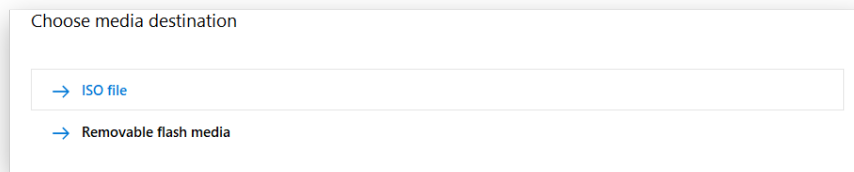


The wizard won't continue until you install ADK.

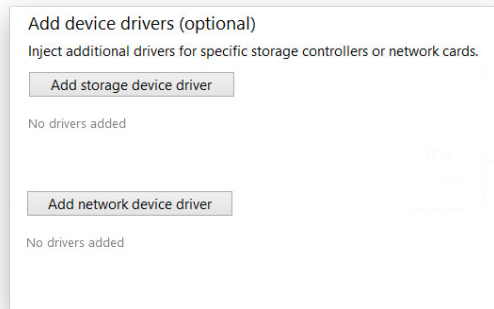
Please use ADK 8.1 if you run RMB under Windows 7, 8, 8.1, Server 2008 R2, Server 2012 R1/R2.



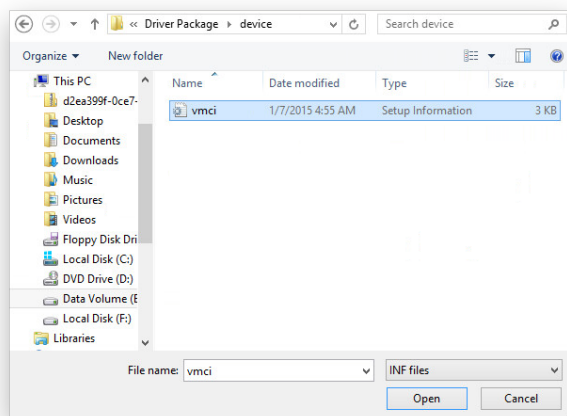
3. Click on **Removable flash media**, then select a thumb drive of at least 512MB in size from the list of flash memory devices available in the system at the moment (if several). Please note that all data on it will be deleted during the operation. If you'd like to create an ISO image of the WinPE environment, please use the corresponding option.



- Inject additional drivers for specific storage controllers or network card if needed. First click on the required link.



Then browse for an .INF file of the required driver package.



If successfully injected, you can see the specified driver on the list. If you'd like to add another driver, please repeat the procedure.

Recovery Media Builder can build 32-bit WinPE media configured to the uEFI mode, which is the only type compatible with Windows pads running on Intel Atom.



By default, WinPE environment doesn't support touch screens, thus Windows pads can only be managed by mouse and/or keyboard. You can add required drivers however through our driver injector.

- Set up a network connection and map a network share if needed.

Network connection settings

Connect to network automatically

Specify the following parameters if you'd like to have an active network connection once the bootable environment has been started up:

Detect network interface automatically

Network adapter to use: 1

Obtain an IP address from a DHCP server

Specify an address

IP address: . . . Subnet mask: . . . DNS address: . . .

Mount network share

Do not mount a network share

Choose this option if you don't need to map network resources.

Network settings

- **Connect to network automatically...** Specify the following parameters if you'd like to have an active network connection once the bootable environment has been started up:
 - **A network adapter to use.** Select a network adapter (if several in the system) to be used for the network connection.
 - **IP address settings.** Choose whether to get an IP address automatically from a DHCP server or set it manually.
- **Connect to network manually...** If selecting this option you will be prompted to configure network properties each time the computer has been started up from the bootable media.
- **Do not set up network...** Please use this option if you don't need network support on the bootable media.

Mount options

- **Do not mount a network share.** Please use this option if you don't need to map network resources.
- **Mount a network share automatically...** Mark this option if you'd like to have a mapped network resource once the computer has been started up from the bootable media. Manually type in a path to the required network share or click **Browse** to find it, then provide user credentials if necessary.

With no pre-defined user credentials your network share will be attempted to map under the Guest account.



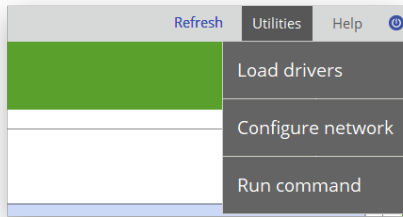
Please use back slashes for WinPE-based media, like \\server\share, while for Linux – forward slashes, like //server/share.

- **Mount a network share manually...** If selecting this option you will be prompted to map a network resource each time the computer has been started up from the bootable media.
6. When done with all parameters, please confirm the operation to proceed.

Booting from Recovery Media

The recovery media helps to boot your PC to load in an existing backup, secure important data, or rectify booting errors when Windows OS fails to start up.

1. Start up the computer from the prepared recovery media. To automatically boot from it, you should configure the on-board BIOS to start up from CD/USB first.
2. Once loaded, you will see the already familiar interface of Hard Disk Manager 16 product line.
3. Additionally to the Windows wizards and dialogs, the recovery media includes several more utilities.



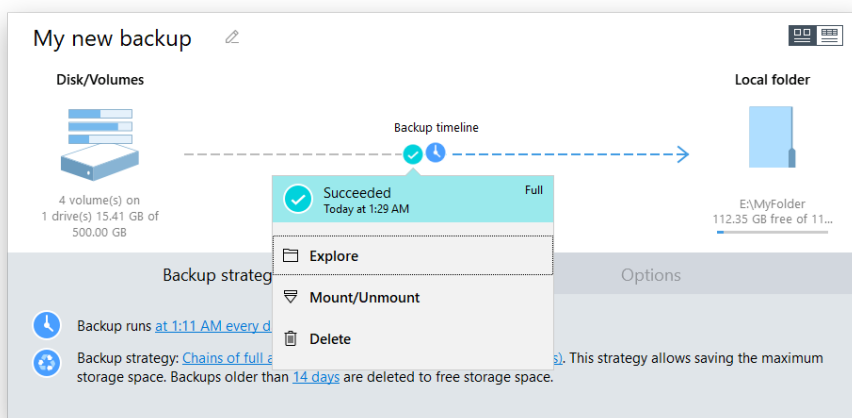
4. Select an operation to start. If you have questions on how to use the program, please refer to the embedded help system, you can find in the right top corner of the window.

Find more details in:

- [Fixing Boot Problems](#)
- [Adding Specific Drivers](#)
- [Configuring Network](#)
- [Using the Command Prompt](#)

Restoring Individual Files and Folders

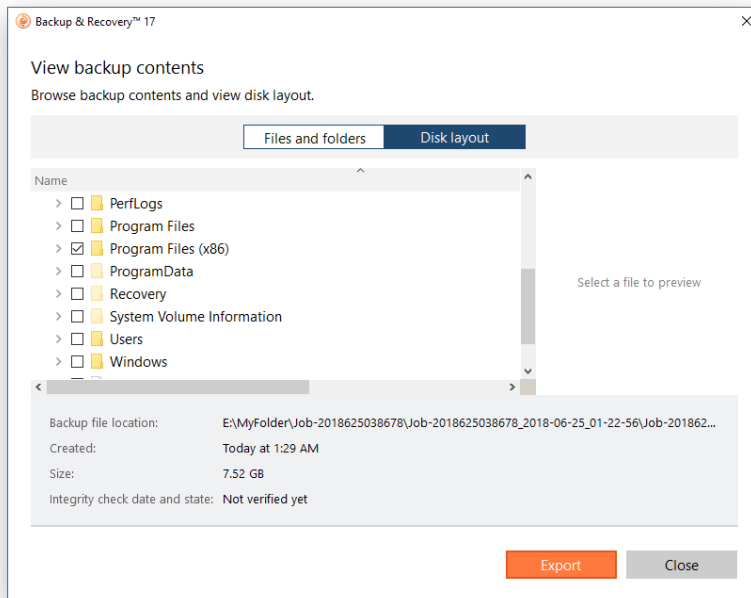
1. Click **Backup & Recovery** on the sidebar.
2. Select an existing backup job, click the desired restore point on the backup timeline, then select **Explore**.



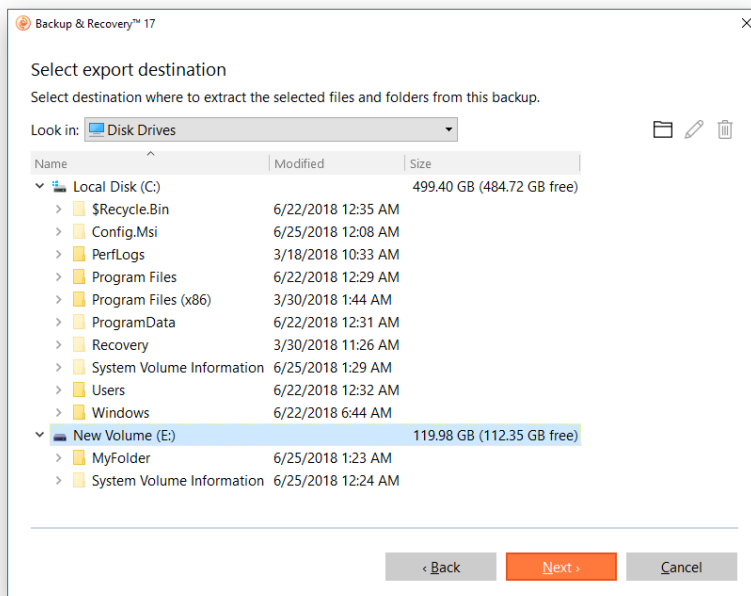


Be ready to provide a valid password to access contents of an encrypted backup image.

3. Browse the backup image to specify what you need to extract by marking checkboxes next to the required data items. Click **Export** when ready.



4. Specify where you'd like the selected files to be restored. Use the corresponding buttons to create new, rename, or delete folders.



Restore to the original location with overwriting existing files requires exclusive access rights to the entire target volume. By default, if the target volume cannot be locked, our program ends this type of operation with a corresponding error.

If selecting files with security attributes that cannot be restored at file-level correctly, the wizard will prompt you to restore the corresponding volume entirely.

- The operation starts immediately after confirmation.

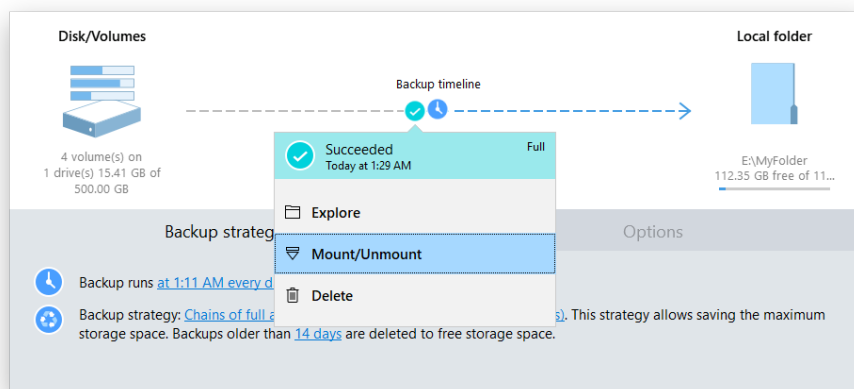
Mounting a Backup Image

You can assign a drive letter to any partition inside an existing backup image. As a result of the operation you will get a new partition in the system to easily browse through its contents and copy the required information even with the standard Windows tools.

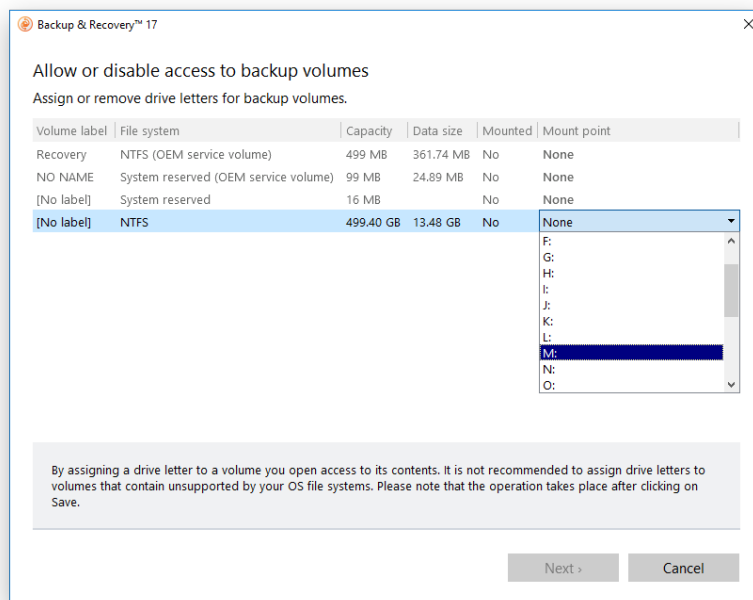
Before you start, please read the following limitations:

- System restart is required after the product installation to correctly mount backup images in Windows Server environment;
- Backup partitions will only be mounted for the current session and won't be available after the system restart;
- Backup images containing Windows Storage Spaces are not supported;
- Backup images containing ReFS partitions are not supported;
- Backup images located on physical (unmounted) partitions or in the backup capsule cannot be mounted;
- Backup images containing LVM/LDM volumes are not supported.

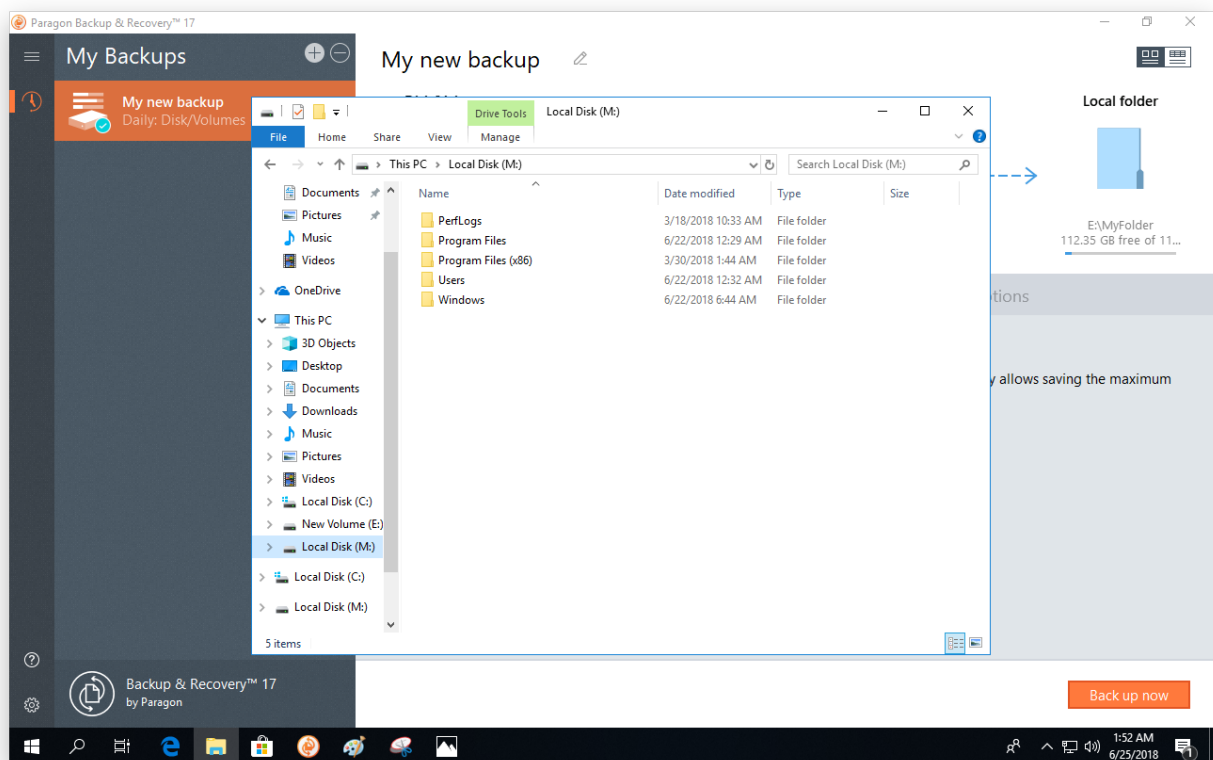
- Click **Backup & Recovery** on the sidebar.
- Select an existing backup job, click the desired restore point on the backup timeline, then select **Mount/Unmount**.



- In the opened dialog you can see contents of the selected backup image. Select a partition you'd like to mount, then one of the vacant drive letters from the list to associate with the partition. Click **Next** to confirm.



- Once mounted, you can treat the backup partition as you would any other Windows volume (browse, retrieve files, modify files).



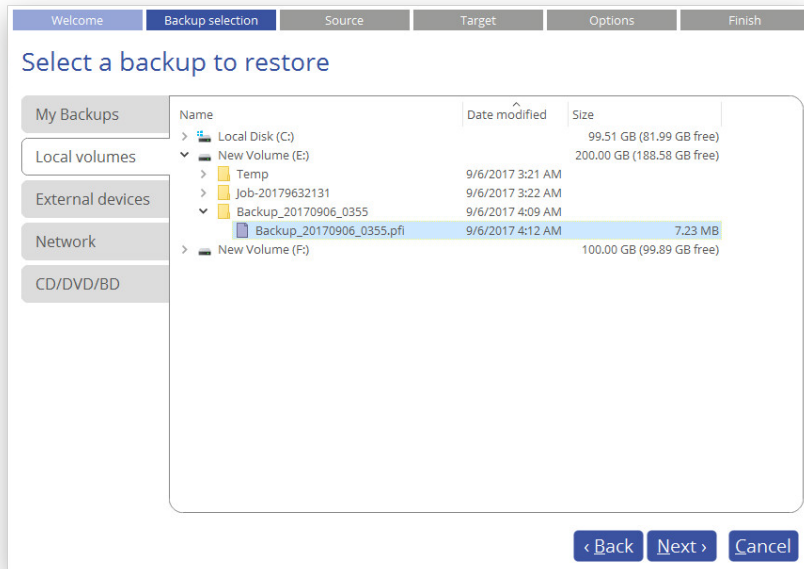
- Use the same algorithm to unmount the backup image when not required any more.

Restoring a Failed System

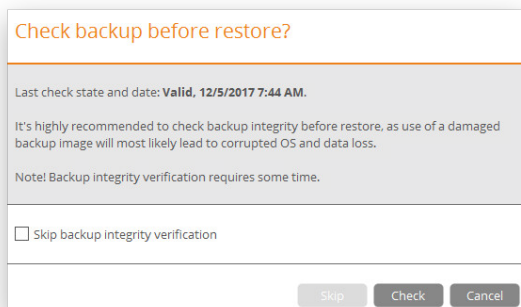
If your computer fails to start up because of a software glitch or after you accidentally deleted the entire Windows partition or some system files, you can get it back on track by utilizing a previously prepared recovery media and one of available backup images.

- [Start up the computer from the WinPE recovery media.](#)
- Select **Restore backup** in the Wizards pane.

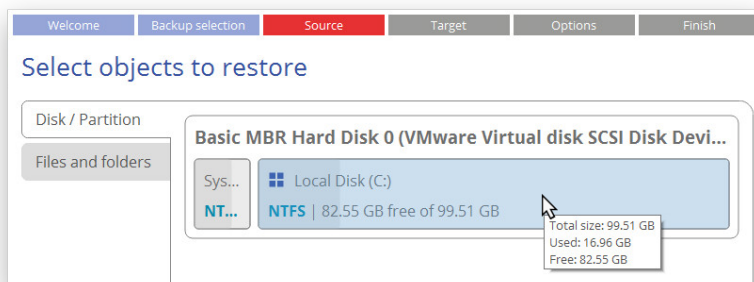
- The welcome page introduces the wizard's functionality. Click **Next** to continue.
- Specify a backup image for restore. Depending on the location, first select a corresponding tab on the left, then browse for the required backup image file. To learn how to map a network share, please consult [Configuring Network](#).



- You will be prompted to check the selected backup for errors (recommended). Mark the corresponding option to skip this action if you're sure in its viability.



- Initially the wizard prompts you to specify an entire backup image or individual volumes or disks for restore – that's exactly what we need. If you need to restore individual files, select **Files and folders**, then backup data you want to recover. For more details, please consult [Restoring Individual Files and Folders](#).



- The program offers to restore the selected backup object exactly where it belongs. However, you can choose any disk of enough capacity available in your system.

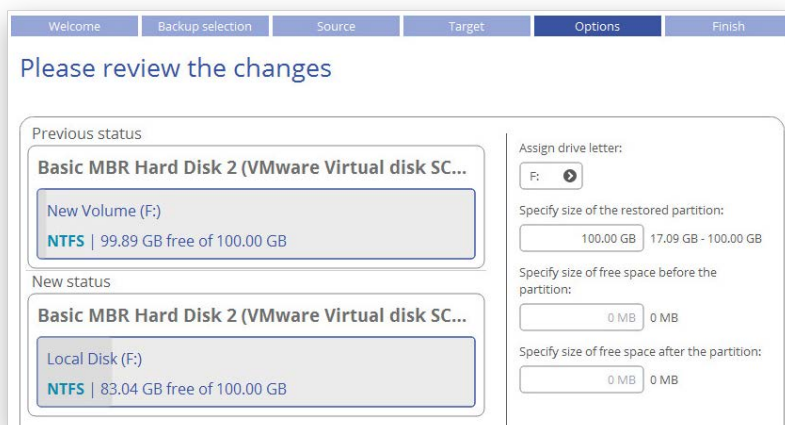


You will get a corresponding warning when trying to rewrite a bootable partition.

- Next you can see the resulted disk layout. If necessary, specify a number of additional parameters (depends on the selected backup object).

Restoring a partition

Change size of the partition and its location as well as assign a particular drive letter. If you've got to do with a 64-bit Windows configured to the uEFI boot mode, the Switch EFI to boot from destination drive option will become available for you to define what instance of Windows OS you'd like to boot from once the operation is over. Anyway you can specify a bootable device at any time through [Boot Corrector](#).



Restoring a disk

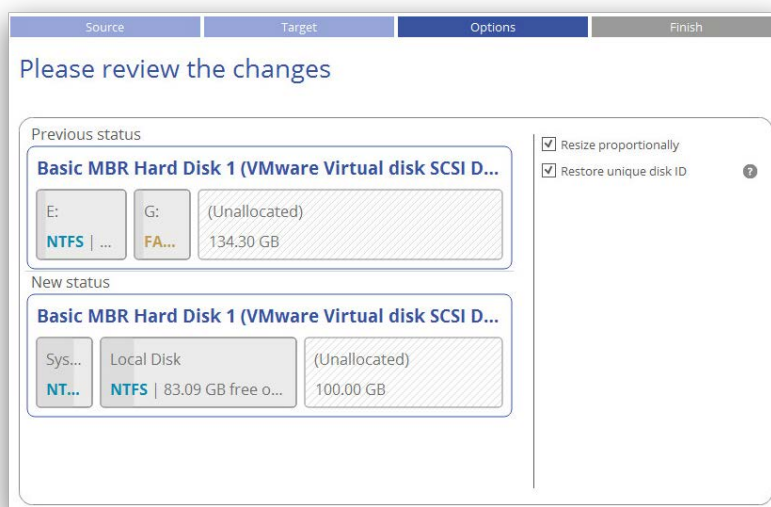
If attempting to restore to a larger disk, use the corresponding option to resize on-disk partitions proportionally to occupy the entire target disk.

The program also provides you the option to preserve the original Disk Identifier (also Disk ID or Disk Signature) during restore. A Disk Identifier is a four-byte long number, randomly generated and written to

the first disk sector during creation of the Master Boot Record. Windows OS since Vista uses disk signatures for location of boot devices in Boot Configuration Database (BCD), which stores information on boot critical files and settings. Windows requires the signatures to be unique, so if you try to connect a disk that has the same signature as the already connected storage device, Windows keeps this disk in offline mode and refuses to assign drive letters to its volumes – this problem is known as disk signature collision. This is why it is not recommended to preserve the original disk ID during restore, as in most cases it doesn't affect anything. For Windows Embedded and similar installations however, the change of the disk signature renders Windows OS completely unbootable, because these systems are linked to it.

For more details, please consult the following resources:

- <https://www.logicsupply.com/explore/io-hub/windows-embedded-matter-now/>
- <https://blogs.technet.microsoft.com/markrussinovich/2011/11/06/fixing-disk-signature-collisions/>



9. Choose whether to execute the operation immediately after finishing the wizard or set up another restore operation(s) and then run all at once. Click **Finish** to initiate the operation.
10. In the Progress window you can see in real-time a detailed report on all actions carried out by the program. Mark the checkbox at the bottom of the window to automatically switch off the computer on the successful accomplishment of the restore operation.
11. After completing the operation, please reboot the computer.

Fixing Boot Problems

If Windows OS doesn't boot after replacing a failed hardware device or you have any other boot issue resulting from a human or program error, or a boot virus activity, first try our boot repair tools before taking more radical actions.

1. [Start up the computer from the WinPE recovery media.](#)
2. Select **Boot Corrector** in the Wizards pane.
3. The welcome page introduces the wizard's functionality. Click **Next** to continue.
4. Click on the required operation to select.

What operation to execute

Windows installation to correct

View the list of all Windows installations and correct boot parameters

Correct the Master Boot Record (MBR)

View the list of all hard disks and correct MBR executable code on some of them

Edit/View Sectors

View, edit, backup and restore sectors or a group of sectors on the hard disk or partition of your choice

Correct boot parameters (boot.ini, BCD)

Automatically correct boot.ini and BCD on all hard disks in system

Correct EFI boot parameters

Fix EFI boot entry or switch EFI boot entry to another GPT bootable hard drive with Windows OS installed

- **Windows installation to correct.** Fix your Windows startup ability, if it fails to complete the startup procedure due to an unknown reason.

Choose a failed Windows installation from the list of found installations (if several). If necessary, click on the plus icon to get more info on the selected item.

What operating system to correct

The wizard has searched your computer for valid Windows installations. You can see results of the operation below. Note: The status "System" stays for a system partition, "Bootable" - for a boot partition.

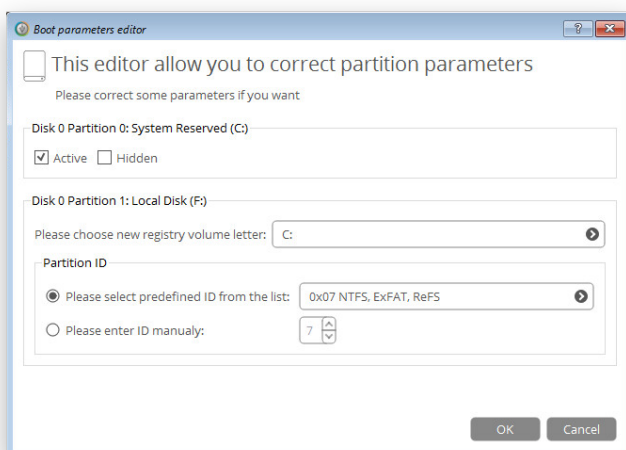
Microsoft Windows 10 64-bit Edition (Destination: Disk Microsoft Windows 10 64-bit Edition, Partition 0)

[Correct boot parameters](#)

Partition 0: System Reserved (C:)
Current values: Partition ID 8; Active

Partition 1: Local Disk (F:) Status: Bootable
Current values: Registry volume letter: C; Partition ID 7;

If you want to manually correct the chosen installation, click **Correct boot parameters**, then edit the required parameters. Otherwise, click **Next** to let the wizard fix the installation automatically.



- **Correct the Master Boot Record.** Use this option to overwrite the current bootable code in the MBR (Master Boot Record) by the standard bootstrap code, thus repairing a corrupted bootable code after a boot virus attack or a malfunction of boot management software.

Correct the Master Boot Record (MBR)

You can see the list of all hard disks in your system. All disks, where MBR correcting is available, can be chosen. Please choose hard disks to correct their Master Boot Records:

Name	Type	Size
<input checked="" type="checkbox"/> Basic MBR Hard Disk 0 (VMware Virtual disk SCSI Disk Dev...	Internal Hard Disk Drive	100 GB
<input type="checkbox"/> Basic MBR Hard Disk 1 (VMware Virtual disk SCSI Disk Dev...	Internal Hard Disk Drive	200 GB
<input type="checkbox"/> Basic MBR Hard Disk 2 (VMware Virtual disk SCSI Disk Dev...	Internal Hard Disk Drive	100 GB

- **Edit/View Sectors.** You can directly access and modify sectors of an entire disk drive or individual partition, save and restore sectors from specified files as well as navigate through the system metadata.

Edit/View Sectors

You can see the list of all hard disks and partitions in your system. Please choose the object to correct its Sectors:

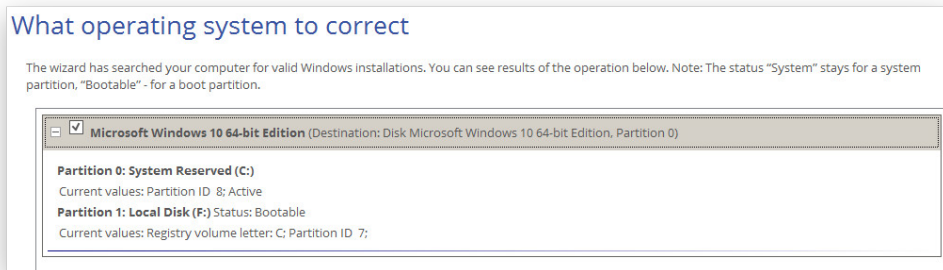
Name	Type	Size
My Computer	My Computer	
Basic MBR Hard Disk 0 (VMware Virtual disk SCSI Disk Dev...	Internal Hard Disk Drive	100 GB
System Reserved (C:)	Primary	
Local Disk (F:)	Primary	
Basic MBR Hard Disk 1 (VMware Virtual disk SCSI Disk Dev...	Internal Hard Disk Drive	200 GB
New Volume (D:)	Primary	
Basic MBR Hard Disk 2 (VMware Virtual disk SCSI Disk Dev...	Internal Hard Disk Drive	100 GB
New Volume (E:)	Primary	

Edit/View Sectors

Current sector is 0 of 209,715,199.

Please select sector number:		
0x00000000	00000000	33 c0 8e d0 bc 00 7c 8e c0 8e d8 be 00 7c bf 00 3.....
0x00000000	00000010	06 b9 00 02 fc f3 a4 50 68 1c 06 cb fb b9 04 00Ph.....
0x00000000	00000020	bd be 07 80 7e 00 00 7c 0b 0f 85 0e 01 83 c5 10~
0x00000000	00000030	e2 f1 cd 18 88 56 00 55 c6 46 11 05 c6 46 10 00U.U.F...F..
0x00000000	00000040	b4 41 bb aa 55 cd 13 5d 72 0f 81 fb 55 aa 75 09 .A..U.]r...U.u.
0x00000000	00000050	f7 c1 01 00 74 03 fe 46 10 66 60 80 7e 10 00 74t..f..f...t
0x00000000	00000060	26 66 68 00 00 00 66 ff 76 08 68 00 00 68 00 &Fh...f.u.h..h.
0x00000000	00000070	7c 68 01 00 68 10 00 b4 42 8a 56 00 8b f4 cd 13 h..h...B.U....
0x00000000	00000080	9f 83 c4 10 9e eb 14 b8 01 02 bb 00 7c 8a 56 00U.
0x00000000	00000090	8a 76 01 8a 4e 02 8a 6e 03 cd 13 66 61 73 1c fe .u..N..n...fAS..
0x00000000	000000a0	4e 11 75 0c 80 7e 00 80 0f 84 8a 00 b2 80 eb 84 N.u..~.....
0x00000000	000000b0	55 32 e4 8a 56 00 cd 13 5d eb 9e 81 3e fe 7d 55 U2..U... ...> U
0x00000000	000000c0	aa 75 6e ff 76 00 e8 80 00 75 17 fa b0 d1 e6 64 .un.u...u.....d
0x00000000	000000d0	e8 83 00 b0 df e6 60 e8 7c 00 b0 ff e6 64 e8 75d.u
0x00000000	000000e0	00 fb b8 00 bb cd 1a 66 23 c0 75 3b 66 81 fb 54#..u;f..T
0x00000000	000000f0	43 50 41 75 32 81 f9 02 01 72 2c 66 68 07 bb 00 CPau2...r,Fh...
0x00000000	00000100	00 66 68 00 02 00 00 66 68 08 00 00 66 53 66 .Fh...Fh...FSF
0x00000000	00000110	53 66 55 66 68 00 00 00 66 68 00 7c 00 00 66 SFUFh...Fh... ..f
0x00000000	00000120	61 68 00 00 07 cd 1a 5a 32 f6 ea 00 7c 00 00 cd ah.....Z2... ...
0x00000000	00000130	18 a0 b7 07 eb 08 a0 b6 07 eb 03 a0 b5 07 32 e42..
0x00000000	00000140	05 00 07 8b f0 ac 3c 00 74 09 bb 07 00 b4 0e cd<.t.....
0x00000000	00000150	10 eb f2 f4 eb fd 2b c9 e4 64 eb 00 24 02 e0 f8+.d...\$...
0x00000000	00000160	24 02 c3 49 6e 76 61 6c 69 64 20 70 61 72 74 69 \$.Invalid parti
0x00000000	00000170	74 69 6f 6e 20 74 61 62 6c 65 00 45 72 72 6f 72 tion table.Error
0x00000000	00000180	20 6c 6f 61 64 69 6e 67 20 6f 70 65 72 61 74 69 loading operati
0x00000000	00000190	6e 67 20 73 79 73 74 65 6d 00 4d 69 73 73 69 6e ng system.Missin
0x00000000	000001a0	67 20 6f 70 65 72 61 74 69 6e 67 20 73 79 73 74 g operating syst

- **Correct boot parameters (boot.ini, BCD).** If you have several operating systems on your disk (Windows Vista and later) after copying a system partition for instance, update their BCD (Boot Configuration Data) files to be able to choose an OS to start up.
- **Correct EFI boot parameters.** The wizard will detect and list all available GPT partitions that accommodate 64-bit Windows OS. Choose the one you need to boot from, to let the wizard modify the EFI boot entry correspondingly. Please note that this option is available on the 64-bit WinPE media only.



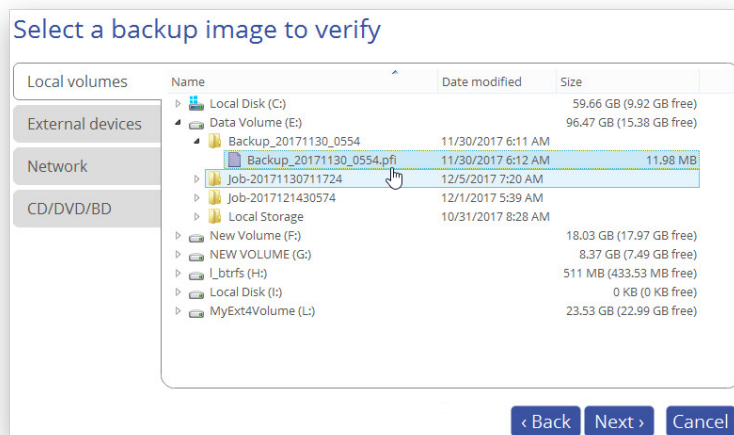
- When done with all parameters, please confirm the operation to proceed.
- After completing the operation, please reboot the computer.

Checking Backup Integrity

Unfortunately, backup media may fail at any moment. You can't predict when this will happen, but you can be certain it will. We suggest verifying integrity of backup images on a regular basis to make sure of their ongoing viability.

There's a separate wizard that helps you to check pVHD containers and legacy PBF images created by previous versions of our product.

- [Start up the computer from the WinPE recovery media.](#)
- Select **Verify backup** in the Wizards pane.
- Click **Next** on the Welcome page of the wizard.
- Browse for the required backup image file (pVHD or PBF) or index file (PFI), then click **Next** to start the operation, which takes a couple of minutes.



Undeleting a Partition

When simply deleting a partition (without additional wiping) disk management software only removes references to it in the Partition Table, thus leaving the possibility to recover it later.

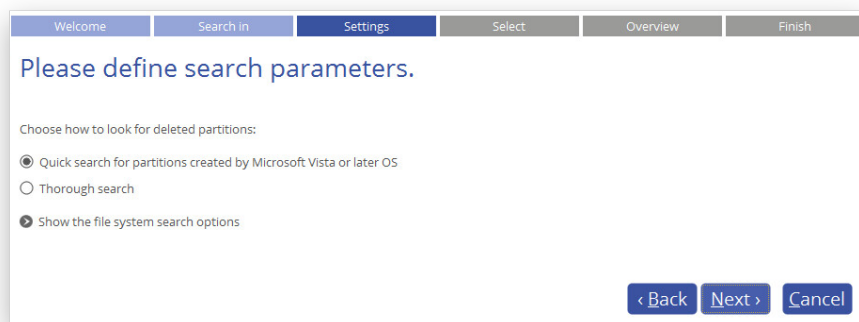
The Undeleted Partitions Wizard can help you find and recover these partitions. A restored partition will be fully functional, as long as other partitions were not created, moved or exceeded the disk space occupied by that partition. That is why the program offers this function only for blocks of free space.

- [Start up the computer from the WinPE recovery media.](#)
- Open **Partition Manager** scope.

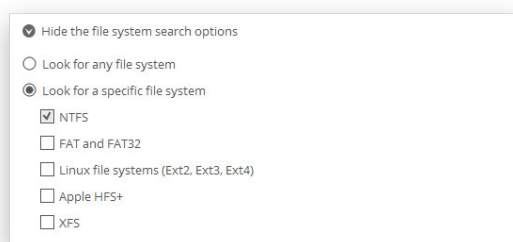
3. Select **Undelete partitions** in the Wizards pane, then click **Next** on the Welcome page of the wizard.
4. The wizard only displays disks that contain unallocated space. Choose a free block that used to be a partition.



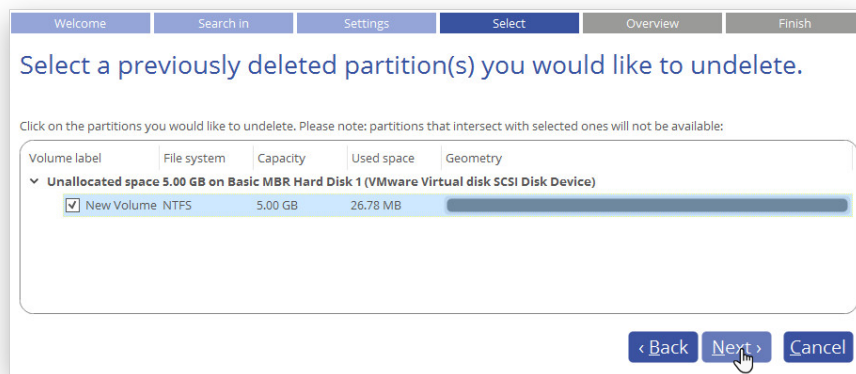
5. By default, the wizard selects the quick search method. In most cases it's enough to find an accidentally deleted partition. However, if the wizard fails to find the partition you need, you can select the 'Thorough search' option to scan every single sector in the specified search area to get the most accurate results.



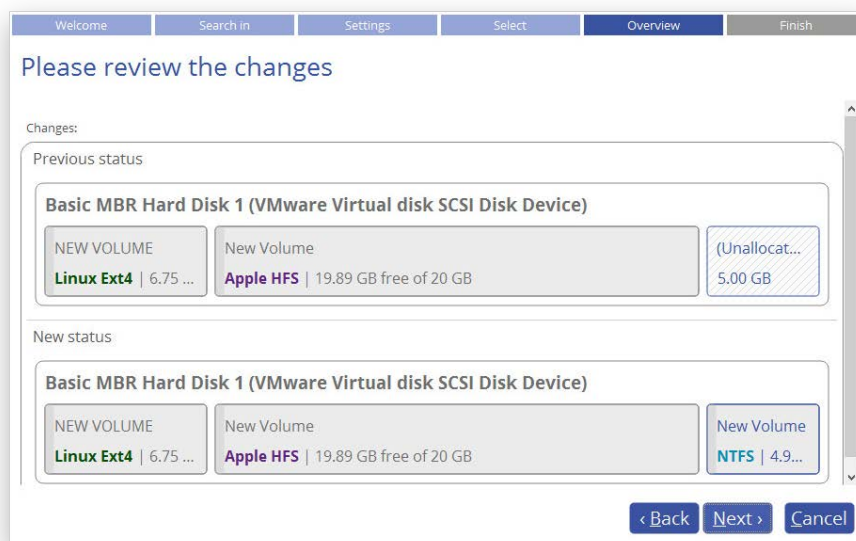
If you'd like to narrow the search results, select the corresponding option and mark a checkbox opposite the required file system.



6. By default, the program searches records of any deleted partition ever existed on the selected block of free space. So you can get several partitions to choose from. Most likely the required partition will be found first.



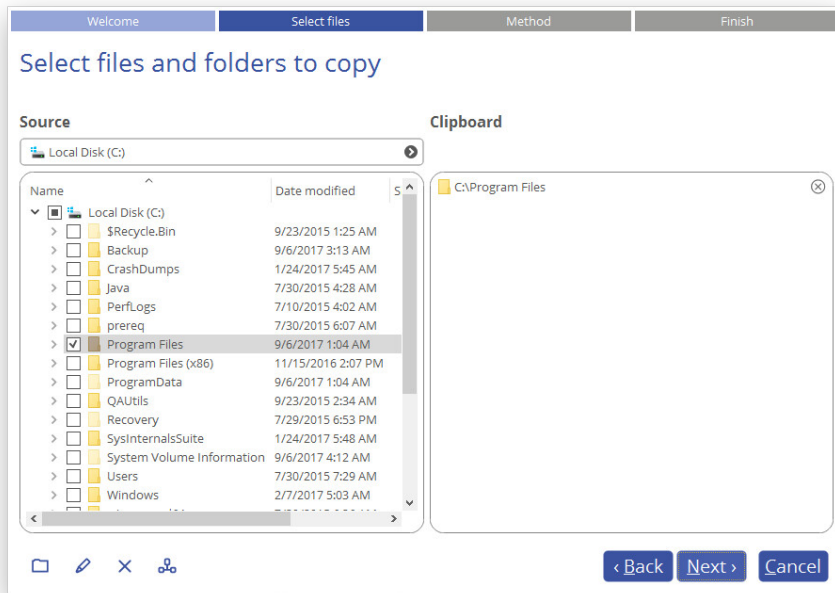
7. Check the resulting disk layout, then click **Next** to confirm.



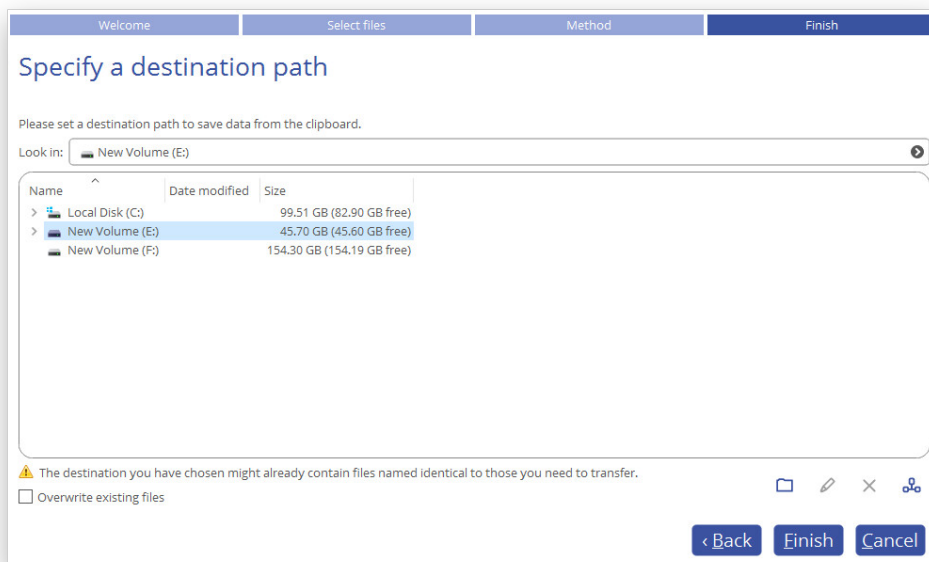
8. Click **Finish** to complete.

Transferring Files between Storages

1. [Start up the computer from the WinPE recovery media.](#)
2. Select **File transfer** in the Wizards pane.
3. Select a source disk, then mark files and directories you want to copy. The wizard enables you to browse both mounted and unmounted (without a drive letter) partitions. It is also possible to map a network drive. All selected files get to the Clipboard.

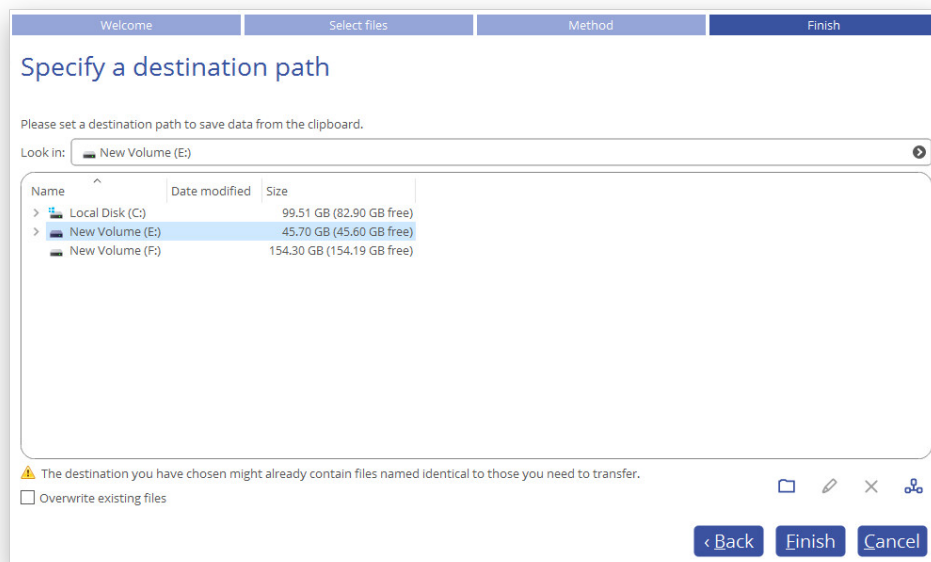


4. The wizard enables you to copy data to a local or external drive, a network share, a physical partition (without a drive letter), or burn it to a CD/DVD/BD disc. Choose the most suitable option.



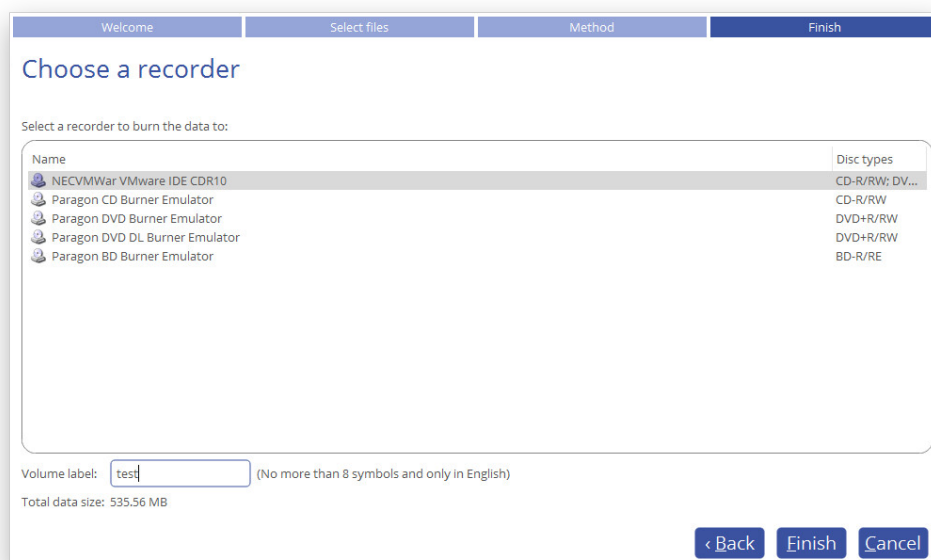
Local/Network

Select a local, external, or network drive to copy the data to. If you'd like to replace files with identical names, mark the corresponding option.



CD/DVD/BD

Select a recorder from the list of available devices and then set a volume label by entering it in the appropriate field.



5. Click **Finish** to initiate the operation.

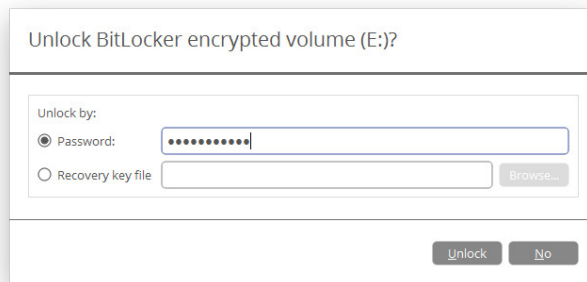
Extra WinPE Scenarios

Unlocking Bitlocked Volumes

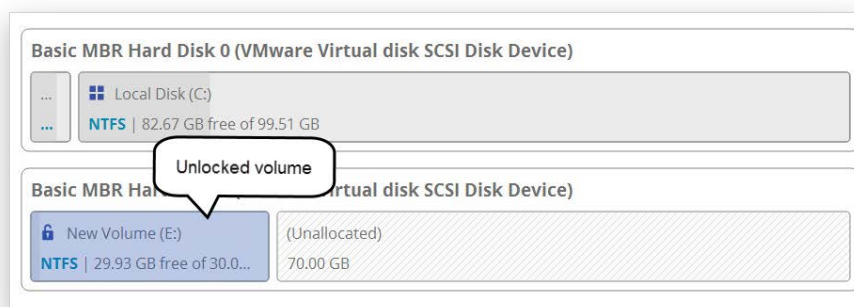
The program allows you to accomplish backup, restore, or copying of Windows BitLocker encrypted volumes, but only when they are unlocked. Until that the locked volumes will be recognized in the program's interface as "Bitlocked".

1. [Start up the computer from the WinPE recovery media.](#)
2. Open **Tools > My Computer**. Left click a volume detected as "Bitlocked", then select **Unlock Bitlocker encrypted volume** in the opened menu.

3. Either enter a password or provide a path to a recovery key (**recoverykey.bek**). For more details, please consult documentation provided by Microsoft.



4. Click **Unlock** when ready. All introduced changes to the disk layout will be pending until confirmed.
5. As a result of the operation the volume gets correctly recognized and is available to work with.



The same action can be accomplished in the Windows version of the program.



Resize or free space redistribution that leads to shrinking of an unlocked bitlocked volume may fail due to limitations of a Microsoft service used for accomplishing this type of operations.

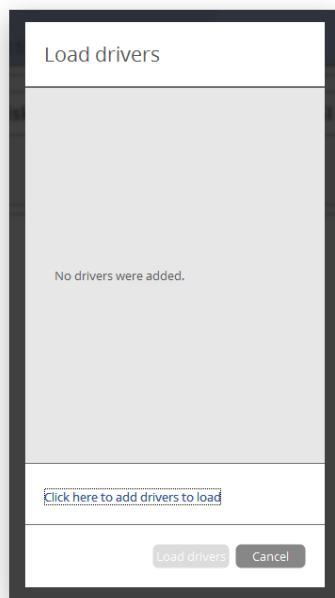
Adding Specific Drivers

The WinPE recovery media offers excellent hardware support. However, in case of not having a driver for your disk controller, for example, your hard disks will be unavailable to work with. Please use this scenario to inject drivers for unknown storage controllers, network cards, or other devices.



To avoid this action every time you start up the recovery media, we recommend you to inject additional drivers during its creation. For more details, please consult [Building Recovery Media](#).

1. [Start up the computer from the WinPE recovery media.](#)
2. Select **Utilities > Load drivers.**
3. Use the corresponding link to browse for an .INF file of the required driver package on a floppy disk, local disk, CD/DVD or a network share. To learn how to map a network share, please consult [Configuring Network](#).



The chosen package gets on the list. Repeat this action to inject more drivers. Click **Load drivers** to accomplish the operation.



The WinPE environment can either be 32- or 64-bit, so are to be drivers for injection.

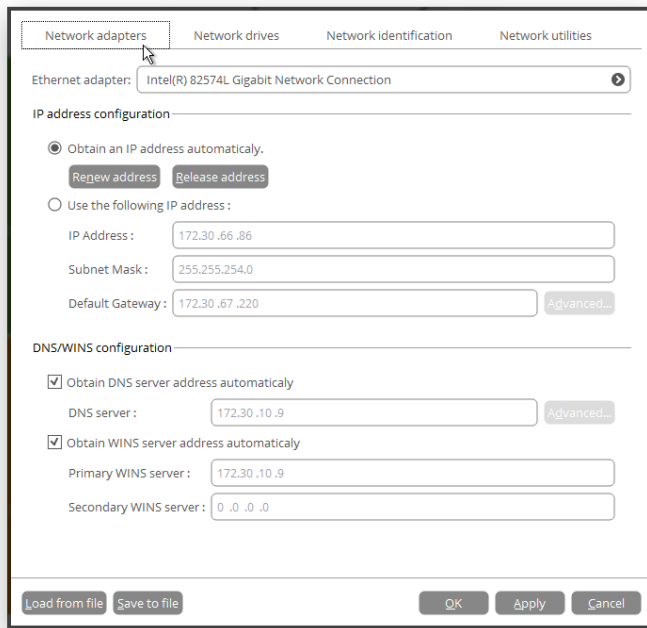
Configuring Network

If your local network has a DHCP server, a network connection will be automatically configured once the WinPE recovery media has loaded. Otherwise, you will need to do it manually by providing an IP address, a network mask, default gateway, etc. in Network Configurator. Additionally, this wizard will help you map a network share, ping a network resource, or measure transit delays of packets across an Internet Protocol (IP) network to track down problematic nodes.

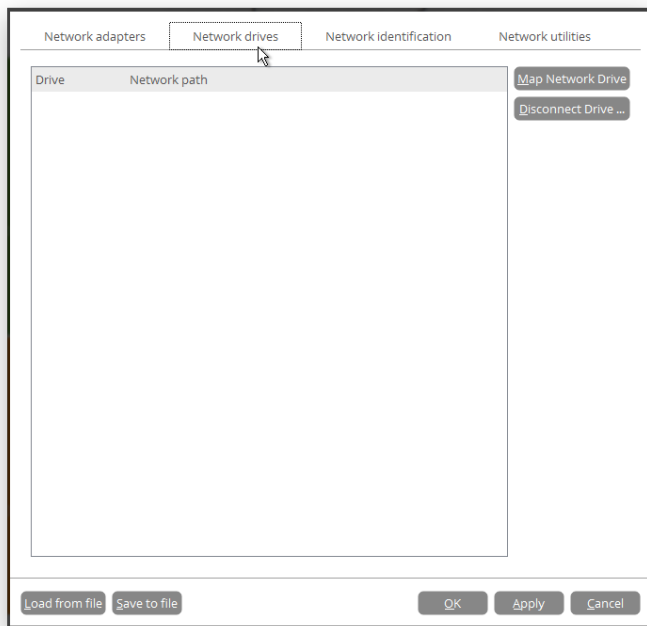


To avoid this action every time you start up the recovery media, we recommend you to pre-configure network settings and map network resources during its creation. For more details, please consult [Building Recovery Media](#).

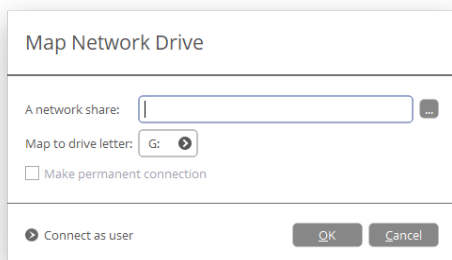
1. [Start up the computer from the WinPE recovery media.](#)
2. Select **Utilities > Configure network**.
3. Provide an IP address, a network mask, default gateway, etc. to configure your network device according to network environment.



4. Use the **Network drives** tab to manage network shares.

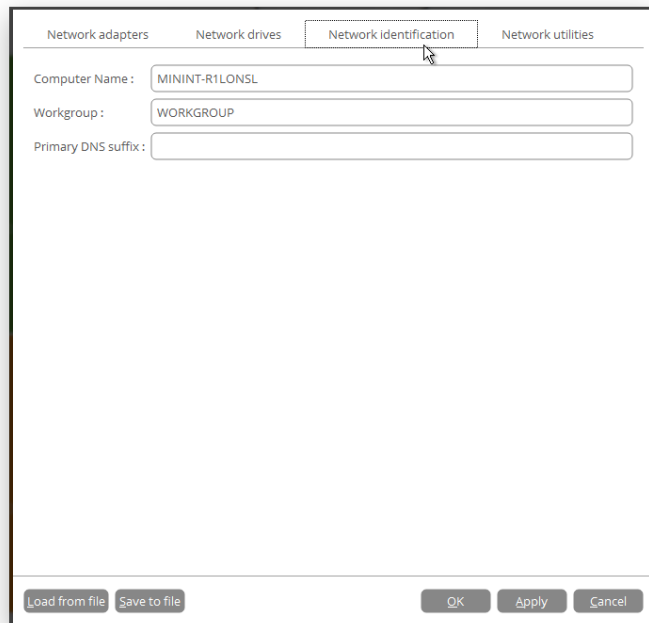


5. Click **Map Network Drive** to map a network share.



- Click the standard browse button [...] to browse for the required network share or manually enter a path to it;
- Define a letter from the pull-down list of available drive letters;

- If you'd like to make this connection permanent, mark the corresponding checkbox. Otherwise it will only be available for the current session;
 - Click the **Connect as user** button at the foot of the dialog page to specify a user name and password to access the selected network share, if necessary.
6. Use the **Network identification** tab to change a network name of your computer (generated automatically) and a workgroup name.



7. By default, the wizard saves all network settings in the "netconf.ini" file located on the WinPE RAM drive, thus it will only be available until you restart the computer. However, you can just once configure your network device and then save this file to some other destination, for instance a local drive, and this way avoid constant re-configuration, just by providing a path to it. So click **Save to file** to save the "netconfig.ini" file to the required destination.

Network Troubleshooter

Network Configurator includes a traceroute/ping utility that enables to get detailed information on particular routes and measure transit delays of packets across an Internet Protocol (IP) network. So with its help you can easily track down problematic nodes.

1. [Start up the computer from the WinPE recovery media.](#)
2. Select **Utilities > Configure network**.
3. Click on the **Network identification** tab, then select **Ping** to ping a network host. Click **Start** when you're ready with all parameters.

The screenshot shows the 'Network utilities' tab of a software interface. The 'Utility' dropdown is set to 'Ping'. Below it is a 'Target' text input field. There are three checkboxes: 'Ping the specified host until stopped' (unchecked), 'Resolve addresses to hostnames' (unchecked), and 'Number of echo requests to send:' (checked) with a spinner box set to '1'. To the right of these options are 'Clear output' and 'Start' buttons. At the bottom, there are 'Load from file', 'Save to file', 'OK', 'Apply', and 'Cancel' buttons.

- **Target.** Type in the required IP address or its DNS name.
 - **Ping the specified host until stopped.** Mark the option to ping the chosen host for indefinite time.
 - **Resolve addresses to hostnames.** Mark the option to display hostnames instead of IP addresses.
 - **Number of echo requests to send.** By default, the utility sends 1 echo request, which you can modify however.
4. Select **Trace route** to trace a route to a network host. Click **Start** when you're ready with all parameters.

The screenshot shows the 'Network utilities' tab of a software interface. The 'Utility' dropdown is set to 'Trace route'. Below it is a 'Target' text input field. There are three checkboxes: 'Do not resolve addresses to hostnames' (unchecked), 'Maximum number of hops to search for target:' (checked) with a spinner box set to '1', and 'Wait timeout milliseconds for each reply:' (checked) with a spinner box set to '1'. To the right of these options are 'Clear output' and 'Start' buttons. At the bottom, there are 'Load from file', 'Save to file', 'OK', 'Apply', and 'Cancel' buttons.

- **Do not resolve addresses to hostnames.** Mark the option to display IP addresses instead of hostnames.
- **Maximum number of hops to search for target.** By default the utility goes through maximum 30 hops when searching for the target host, which you can modify however.

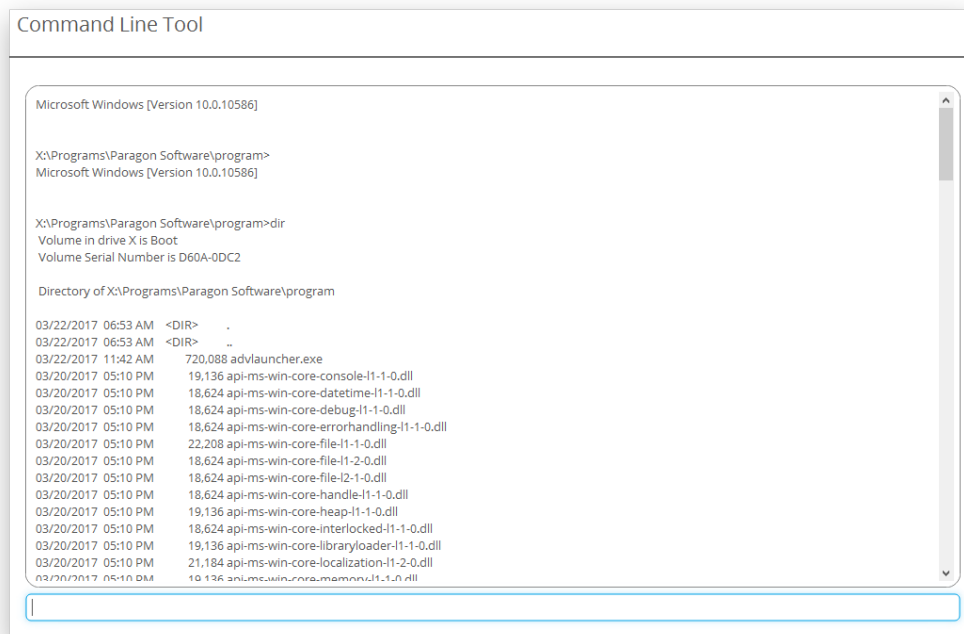
- **Wait timeout milliseconds for each reply.** By default the utility waits 4 seconds for each echo reply message. If not received within the timeout, an asterisk (*) is displayed.

Using the Command Prompt

The primary function of the command prompt is running generated program scripts with different parameters. Additionally, it can help you with opening Notepad or Diskpart, running batch files, or solving a variety of issues such as failure to connect to the internet or website loading problems.

1. [Start up the computer from the WinPE recovery media.](#)
2. Select **Utilities > Run command.**
3. The embedded command prompt utility is similar to Windows CMD. It supports the auto-complete and commands history features:
 - **Arrow up/Arrow down** to navigate the history,
 - **Tab** to complete or select a path,
 - **Esc** to clear a text field,
 - **Return** to run a command.

Type in **hdmengine_scriptsapp.exe <path to a generated script file> --multiple** to run the required program script.



```

Command Line Tool

Microsoft Windows [Version 10.0.10586]

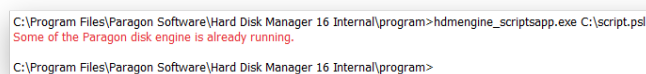
X:\Programs\Paragon Software\program>
Microsoft Windows [Version 10.0.10586]

X:\Programs\Paragon Software\program>dir
Volume in drive X is Boot
Volume Serial Number is D60A-0DC2

Directory of X:\Programs\Paragon Software\program

03/22/2017 06:53 AM <DIR> .
03/22/2017 06:53 AM <DIR> ..
03/22/2017 11:42 AM          720,088 advlauncher.exe
03/20/2017 05:10 PM          19,136 api-ms-win-core-console-l1-1-0.dll
03/20/2017 05:10 PM          18,624 api-ms-win-core-datetime-l1-1-0.dll
03/20/2017 05:10 PM          18,624 api-ms-win-core-debug-l1-1-0.dll
03/20/2017 05:10 PM          18,624 api-ms-win-core-errorhandling-l1-1-0.dll
03/20/2017 05:10 PM          22,208 api-ms-win-core-file-l1-1-0.dll
03/20/2017 05:10 PM          18,624 api-ms-win-core-file-l2-1-0.dll
03/20/2017 05:10 PM          18,624 api-ms-win-core-file-l1-2-0.dll
03/20/2017 05:10 PM          18,624 api-ms-win-core-handle-l1-1-0.dll
03/20/2017 05:10 PM          19,136 api-ms-win-core-heap-l1-1-0.dll
03/20/2017 05:10 PM          18,624 api-ms-win-core-interlocked-l1-1-0.dll
03/20/2017 05:10 PM          19,136 api-ms-win-core-libraryloader-l1-1-0.dll
03/20/2017 05:10 PM          21,184 api-ms-win-core-localization-l1-2-0.dll
03/20/2017 05:10 PM          10,126 api-ms-win-core-memory-l1-1-0.dll
  
```

The 'multiple' parameter is obligatory to use in WindowsPE. To learn more about scripts, please consult the Paragon Scripting Language manual.



```

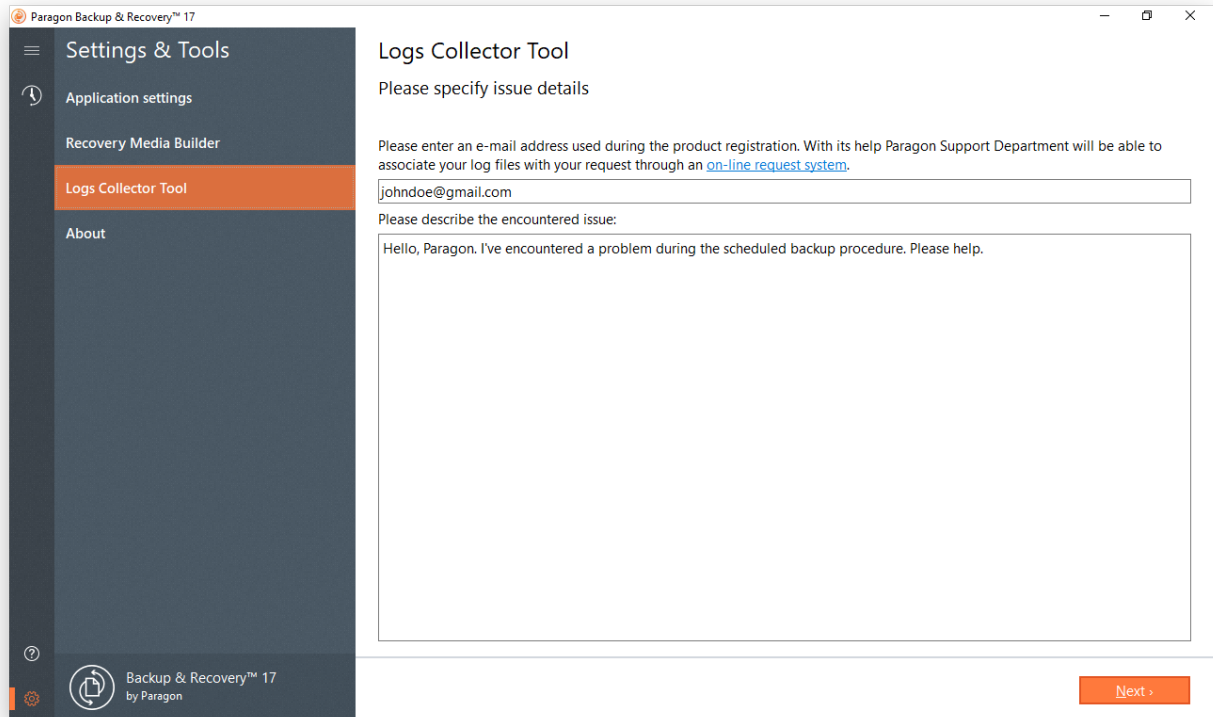
C:\Program Files\Paragon Software\Hard Disk Manager 16 Internal\program>hdmengine_scriptsapp.exe C:\script.psl
Some of the Paragon disk engine is already running.
C:\Program Files\Paragon Software\Hard Disk Manager 16 Internal\program>
  
```

Troubleshooting

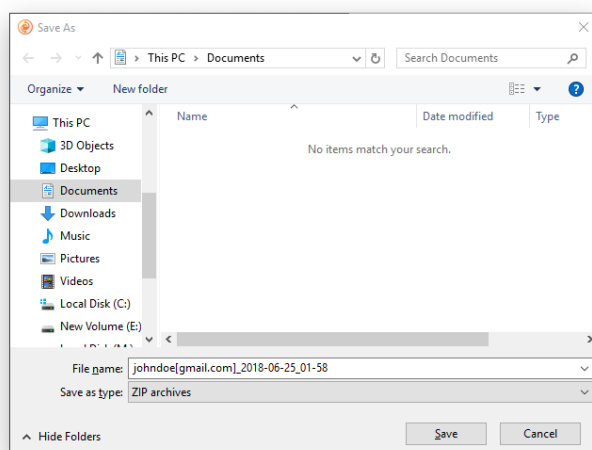
In case of having difficulties with handling the product first visit our Knowledge Base to find an existing remedy: <https://kb.paragon-software.com/>.

If your issue is not described there, please address our support engineers for assistance. To help you solve your problem with minimal time, our engineers need operation logs and your brief description.

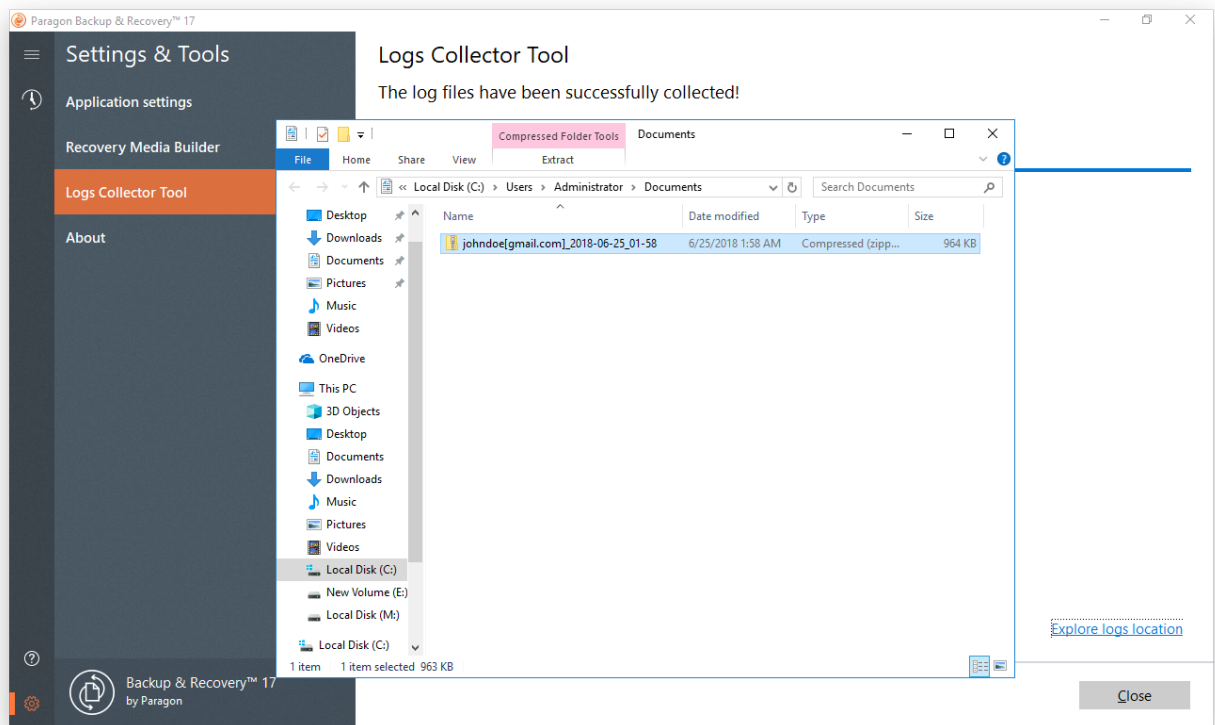
1. Reproduce your issue (make it happen again).
2. Click **Settings & Tools** on the sidebar, then select **Logs Collector Tool**. Provide an e-mail address used for registering the product, then describe the encountered problem. Please don't worry - we respect your privacy, so none of your confidential data will be exposed.



3. Browse for the required location of the log files package and edit the default file name, if necessary. Click **Save** when ready.



4. Once the operation is over, click **Explore logs location** to check the prepared package doesn't contain anything confidential, but layouts of your disks, performed operations, etc.



5. Use the link on the first page of the wizard to sign in to MyParagon Account.
6. Go through the first-level ticket request form, then click **Submit request**.
7. Go through the second-level ticket request form, attach the prepared logs package, then click **Post request**. That's all. Our support engineers will get in touch with you in a little while.