PARAGON

Hard Disk Manager

VERSION 17

User Manual

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Product Overview

Hard Disk Manager is an integrated set of powerful tools that is specially designed to tackle most of the problems you might face while using PC. Its functionality covers all aspects of a computer life cycle beginning from carrying out all the necessary partitioning operations to install the system from scratch and providing its data reliable protection to secure utilization of an outdated hard disk.

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, drive partitioning, OS migration, and other operations. It's the main component of the product.

- **WinPE recovery environment** for emergency scenarios. It provides an excellent hardware support and the same interface as the Windows version (recommended for most scenarios).

- **Linux recovery environment** for emergency scenarios. Unlike the Windows and WinPE versions, it includes the "Secure Erase" function. Please note that the Linux recovery image is not included into the installation package and should be downloaded separately. Find more details in **Building Recovery Media**.

> ⚠ This software product may contain components, which are partly subject to the license terms of the GNU General Public License or GNU Lesser General Public License ("LGPL") or any other similar free software licenses which, among other rights, permit the user to copy, modify and redistribute certain programs, or portions thereof, and have access to the source code "Open-Source Software". You can request the modified source code of this software via a contact request: https://www.paragon-software.com/about/#contact_form.

System Requirements
For the Windows installation package

- Windows 7 SP1 and later.

- Opened ports in Firewall: inbound and outbound 80, 443

- Internet Explorer 10.0 or higher

> ⚠ During the installation additional free space (up to 1GB) will be required.
>
> During creating recovery media additional free space (up to 2GB) will be required.

For the WinPE recovery environment

- Intel Pentium III CPU or its equivalent, with 1000 MHz processor clock speed

- At least 4 GB of RAM

- SVGA video adapter and monitor

- Keyboard

- Mouse

For the Linux Recovery environment

- Intel Pentium CPU x64 only

- At least 4 GB of RAM

- SVGA video adapter and monitor

- Keyboard

- Mouse

Additional requirements

- Recordable CD/DVD drive to burn bootable recovery environment to a compact disc
- USB flash drive of at least 512 MB capacity to create USB Recovery Media

Installation

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

> ⚠️ If newer version of the product is detected, you will be asked 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.

> ⚠️ When trying to install our product on older versions of Windows 7 or Windows Server 2008 R2, the installation process may fail with a Windows-specific error. If this is your problem, please try to manually install Visual Studio C++ 2015 Redistributable from https://www.microsoft.com/en-us/download/details.aspx?id=52685, then roll over the installation again.

2. 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.
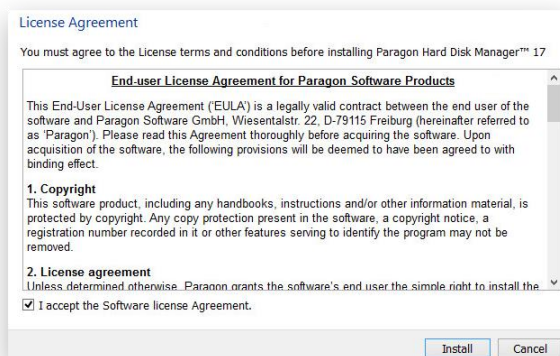
3. The final page reports the end of the setup process. Click **Finish** to complete the wizard.

First Start

After the installation you can see a program icon on the Windows desktop. Double click it to launch the application.
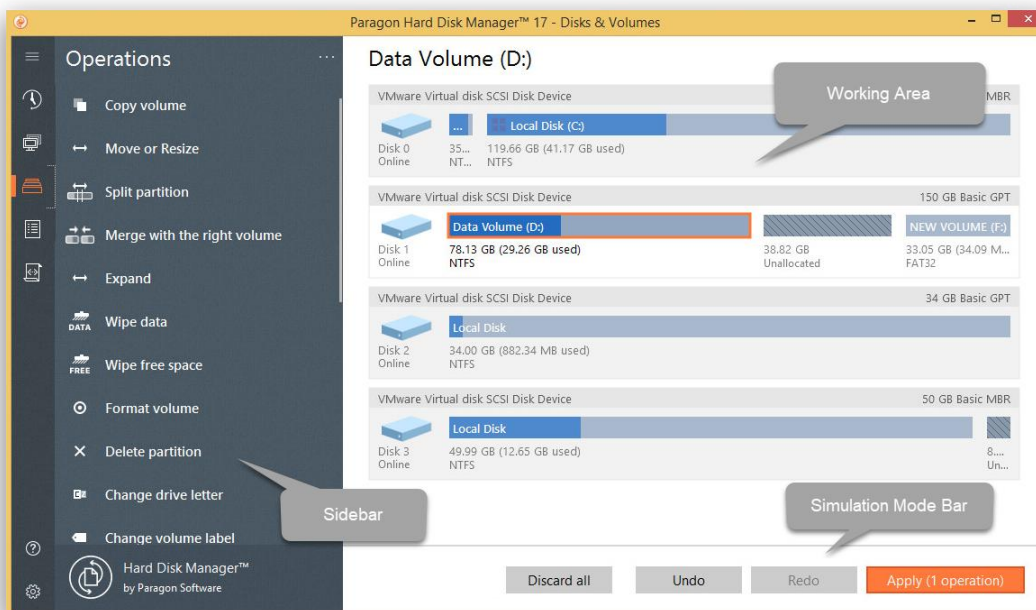
Hard Disk Manager is built around the sidebar that gives you access to action wizards and settings. The sidebar located on the left side of the screen includes several buttons: Home, Backup & Recovery, V2V Migration, Disks & Volumes, Reports, Scripts, Settings & Tools, and Help. By clicking the Home 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 the bottom of the working area you can find the buttons of the so-called simulation mode. It gives you the choice of placing potentially dangerous operations that may destroy the on-disk data (format, delete, restore, etc.) on a special list instead of immediate execution. First it helps to avoid possible mistakes as you should confirm all provided changes. Second it saves your time and effort when executing several operations, as you don't need to wait for each operation to physically complete before proceeding to the next operation.
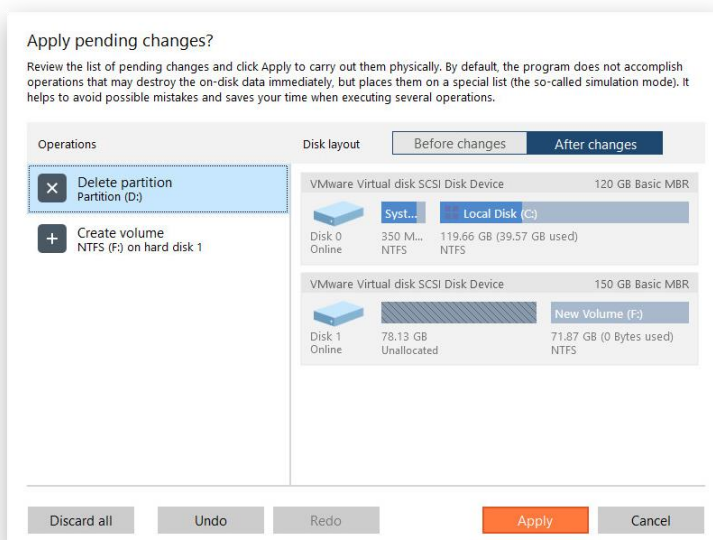
Among the buttons of the simulation mode, you can find the **Generate script** option that helps to create a script out of pending changes. The same option is also available in the backup and restore program wizards.

A script may describe one or several operations with macro-language commands. The program installation package includes an interpreter utility "**hdmengine_scriptsapp.exe**" that allows executing any set of operations automatically in the unattended mode. For more details, please consult Using the Command Prompt.

After clicking **Generate script**, you're first prompted to review and modify default script generation options. If this is not the first time you generate scripts, you need to choose whether to save a new script file or add the script contents to an already existing script, which is currently selected in the scripts library.
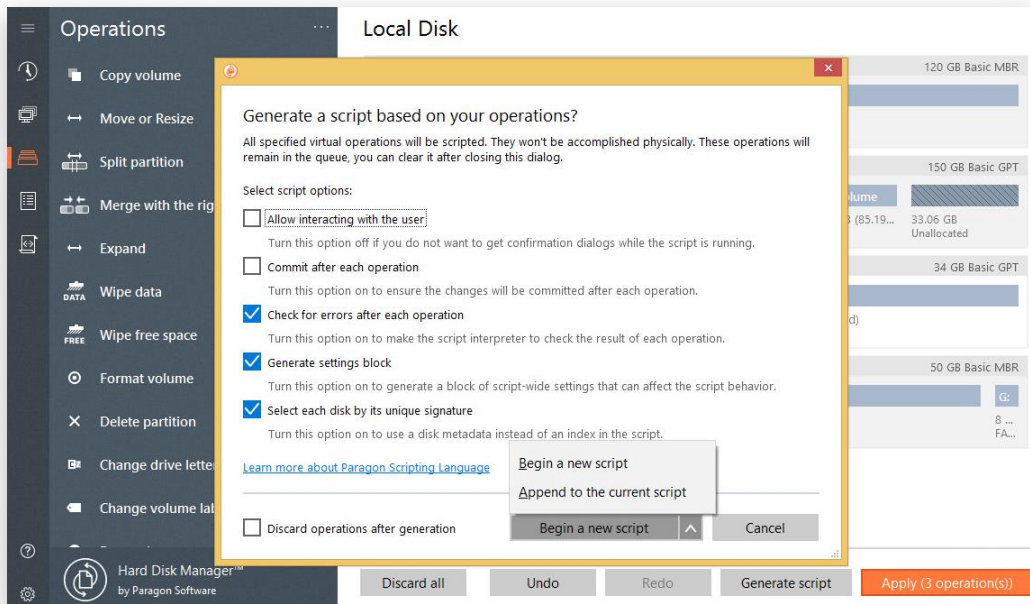
- **Allow interacting with the user**. When enabled, the script interpreter will pause during the execution asking for user confirmation or other input. Otherwise, the program will not stop using default values for parameters if needed.

- **Commit after each operation**. Use this option if you'd like changes to be applied physically after each operation. Otherwise, all scripted operations will first be run virtually and only then applied physically.

- **Check for errors after each operation**. When enabled, a special code inserted into the script will check the status of the last executed operation and stop the script processing when any error occurs.

- **Generate settings block**. When enabled, a special list of settings (depends on the operations you're scripting) will be added to the beginning of the generated script, allowing you to fine-tune the script behavior. You can modify these settings in the script editor at the next step.

- **Select each disk by its unique signature**. When enabled, disk metadata is used instead of information inside the index for selecting disks, so your script can run successfully on computers with different disk structures.

- **Discard all operations after generation**. Use this option to empty the list of pending changes after generating the script.

After selecting the desired operation mode, you will get to the scripts library with the newly generated script opened for editing. The built-in script editor provides a convenient way of reviewing and modifying script contents: search is available, lines are numbered automatically, syntax is highlighted, autocompletion works automatically while writing the code or by pressing *Ctrl+Space.*

On the left you can see a list of all scripts ever generated or added to the library. By selecting a script you can review and edit its contents. By clicking the plus icon, you can either create a new empty script or add an existing script file to the library, while the minus icon helps to delete the currently selected script.
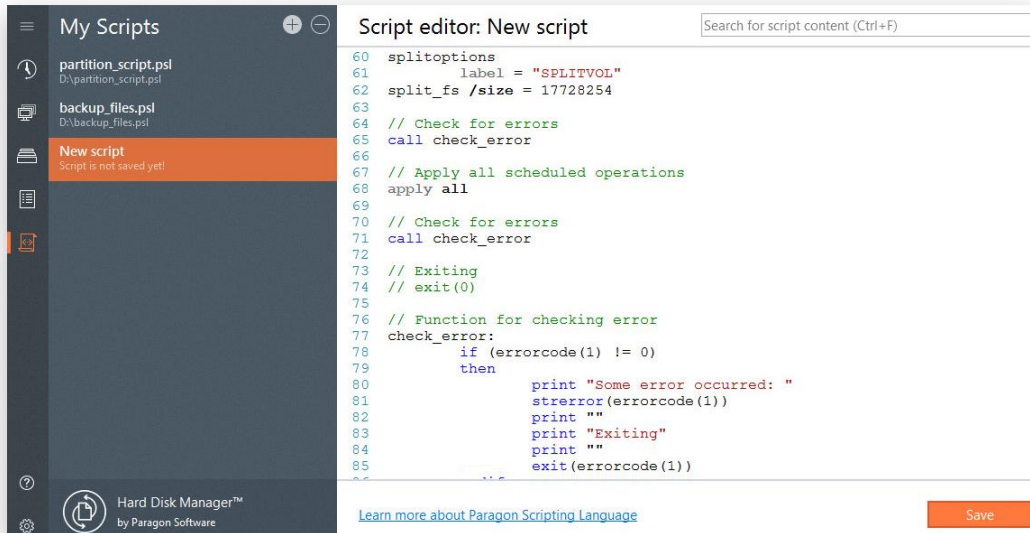
When you're ready, click **Save** to select location and filename for the created script file.
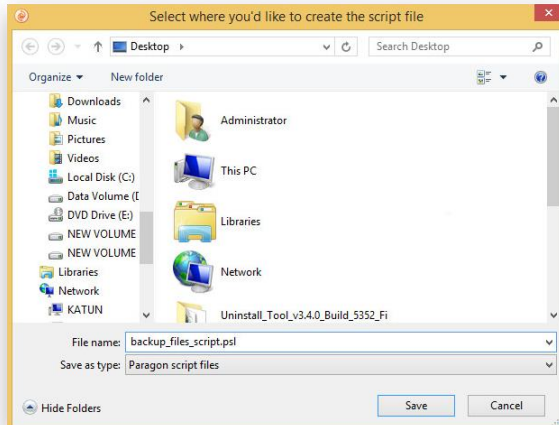
To learn more about scripts, please consult the Paragon Scripting Language manual.

You can always open the scripts library by clicking **Scripts** on the sidebar.

When you delete a script from the library, it is not deleted physically from your storage.

Changing Program Settings

Click **Settings & Tools** on the sidebar to access the program settings. All settings are grouped into several sections, which functions are described in the following paragraphs. By selecting a section from the list, you can open a set of options.

Application Settings

- **Allow to send anonymous statistics**. Disable this option if you don't want to share usage statistics with Paragon Software.

- **Check for updates**. Disable this option if you don't want our program to automatically check company's website for available updates once a day.

- **Close progress dialog automatically**. Enable this option to automatically close the progress dialog after accomplishing operations.

E-mail Settings

In this section you can set up e-mail transport for sending notifications and reports. Our e-mail client can well work with a private or corporate SMTP (Simple Mail Transfer Protocol) server, or one of public e-mail services. Please contact your network administrator or support of your e-mail service provider for detailed settings.

- **SMTP server**. All outgoing messages are first sent to this server, which then delivers them to recipients. The address may be represented as a traditional Internet host name (e.g.: smtp.gmail.com) or as an IP numeric address (e.g. xxx.xxx.xxx.xx).

- **SMTP port**. Non-encrypted connections are usually established through port 25, while port 465 is used for SSL (Secure Socket Layer) connections.

- **Encryption**. Our e-mail client supports non-encrypted, SSL and its successor TLS (Transport Layer Security) connections.

- **Login**. If your SMTP server requires authentication, select the corresponding option, then provide valid user credentials in the opened dialog.

- **E-mail address**. Enter the e-mail address of the user from whom notifications and/or reports will be sent.

When you're done with the settings, enter a destination mailbox in the corresponding field, then click **Send test e-mail** to check whether the e-mail transport is configured properly. You don't need to reply to the test e-mail.

Notifications Settings

Our program can be set up to notify you by e-mail about successful completion and/or failure of most operations. This function is enabled when configuring tasks, while in this section you can specify destination mailboxes (specify each e-mail from a new line using Enter key) and check whether the e-mail transport is configured properly. Find more details in **E-mail Settings**.

Reporting Settings

In this section you can specify contents and properties of generated operation reports. This function is enabled when configuring tasks.

- **Company name/Company address/User name**. Fill in these fields for easier report identification.

- **Report format**. Reports can be generated as PDF, HTML, or plain TXT files.

- **Report destination**. Reports can be stored locally or sent by e-mail. The e-mail reporting requires a properly configured SMTP transport. Find more details in **E-mail Settings**.

> ⚠️ Parameters you specify here are used by default for all operations. You can change any property when configuring tasks.

Wipe Report Settings

- **System information**. Use this option to add a computer name, OS and BIOS versions.

- **Sector dump**. If required by your security regulations, use this option to additionally save contents of the first, middle, and last disk sectors as prove the wiping has been accomplished as planned.

- **Supervisor Approval**. Use this option to add a signature field for an executive or supervisor responsible for data sanitization procedures in your company.

> ⚠️ Parameters you specify here are used by default for all wipe operations. You can change any property when configuring wipe tasks.

Building Recovery Media

Our program includes a user-friendly wizard that will guide you through the process of creating a WinPE or Linux-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.

This product feature is locked and should be activated before use. Activation details are provided on the first page of the wizard.

1. Click **Settings & Tools** on the sidebar, then select **Recovery Media Builder**.

2. Request a license file from Paragon Support Team as described on the first page of the wizard. If the provided data is valid, "LicenseSet.xml" will be send to your account email address. Just copy it to the target computer, then use the **Import license** option for the import.
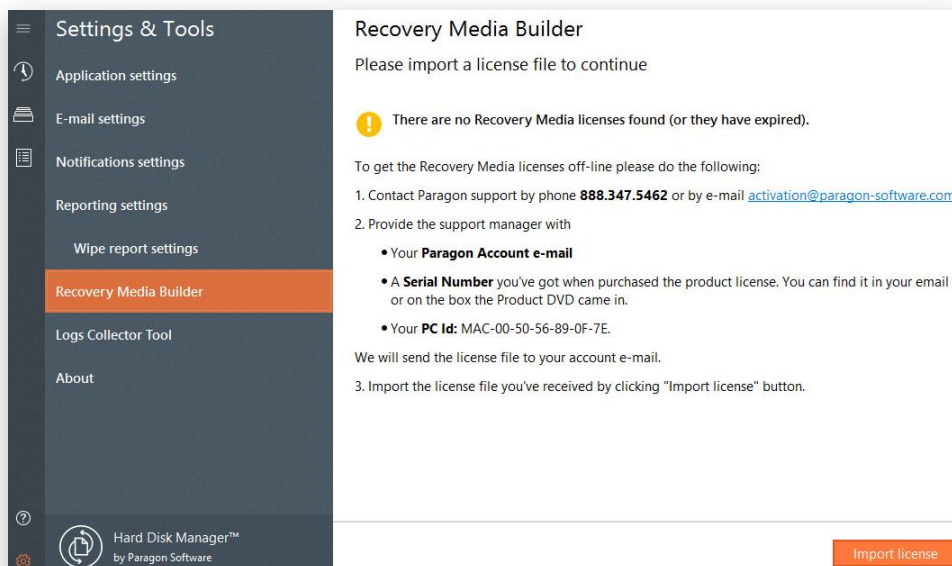
> Please note that one consumer license can be activated and used on one device at a time.
>
> Recovery media, built in our program, is usually licensed for one-year. Please don't forget to rebuild it periodically.

3. Select the desired recovery environment platform. Depending on your choice, the wizard prompts you to specify a number of options. Since the WinPE environment takes more steps to complete, let's take this scenario as an example.

Select recovery media platform

→ **Microsoft Windows PE**
A Windows PE-based recovery media has a familiar user interface and all common tools and utilities. Recommended for most scenarios.

→ **Linux**
A Linux-based recovery media includes advanced functions like Secure Erase for SSD and NVME SSD storage devices.

Please note that the Linux recovery image is not included into the installation package and should be downloaded separately. By selecting **Linux**, the wizard first prompts you to start the downloading. Click **Yes** to confirm.

Download the Linux recovery environment image now?
The program is about to download an ISO image of the Linux-based recovery environment from the company's website. It's a one-time action.

Yes   No

4. 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 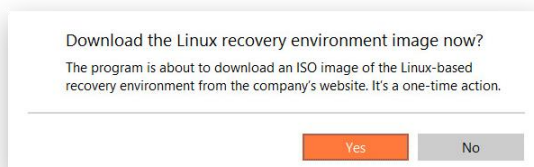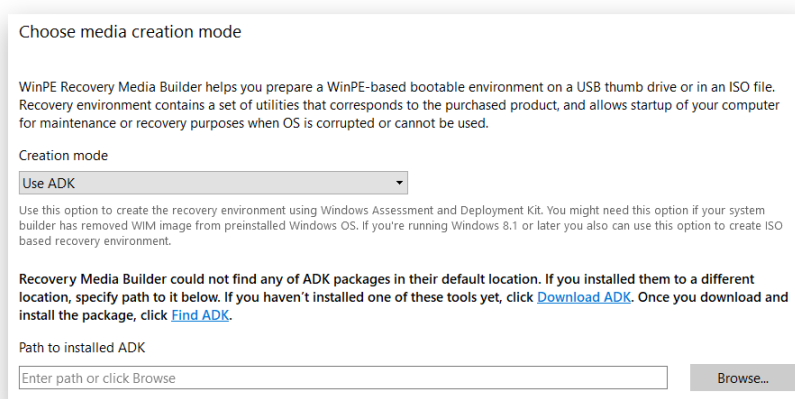folder. If you haven't installed this toolkit yet, click **Download ADK** to get it directly from the Microsoft website. Please note that ADK is a Microsoft's proprietary tool and can be obtained from its Download Center for free, provided you have a genuine Windows installation. Moreover, you need to 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.**

Choose media creation mode

WinPE Recovery Media Builder helps you prepare a WinPE-based bootable environment on a USB thumb drive or in an ISO file. Recovery environment contains a set of utilities that corresponds to the purchased product, and allows startup of your computer for maintenance or recovery purposes when OS is corrupted or cannot be used.

Creation mode

Use ADK ▼

Use this option to create the recovery environment using Windows Assessment and Deployment Kit. You might need this option if your system builder has removed WIM image from preinstalled Windows OS. If you're running Windows 8.1 or later you also can use this option to create ISO based recovery environment.

Recovery Media Builder could not find any of ADK packages in their default location. If you installed them to a different location, specify path to it below. If you haven't installed one of these tools yet, click Download ADK. **Once you download and install the package, click** Find ADK.

Path to installed ADK

Enter path or click Browse   Browse...

5. 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.

Choose media destination

→ ISO file

→ Removable flash media
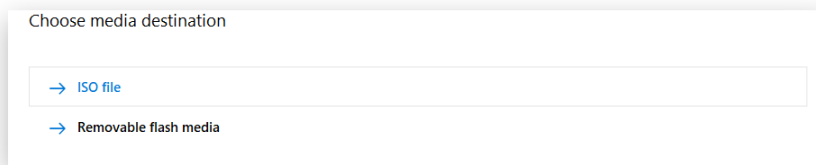
6. Inject additional drivers for specific storage controllers or network card if needed. First click on the required link.

Add device drivers (optional)
Inject additional drivers for specific storage controllers or network cards.

Add storage device driver

No drivers added

Add network device driver

No drivers added

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

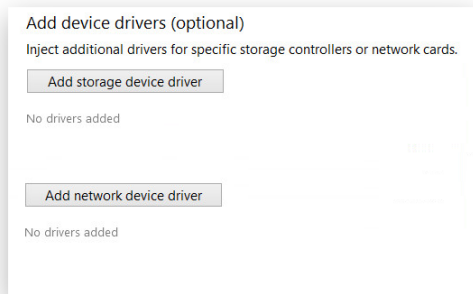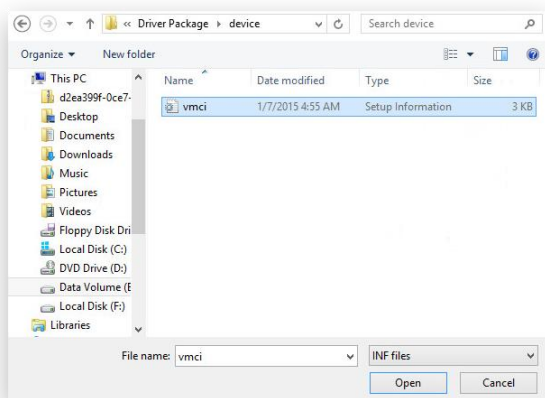If successfully injected, you can see the specified driver on the list. If you'd like to add another driver, please repeat the procedure.

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.

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

Network settings

- **Connect to network automatically**… Specify the following parameters if you'd like to have an active network connection once the recovery 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 recovery media.

- **Do not set up network…** Please use this option if you don't need network support on the recovery 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 recovery 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 recovery media.

8. 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. Select an operation to start. While the user interface of the WinPE recovery media is identical to that of the Windows version, the Linux media has a little different working environment.

WinPE media
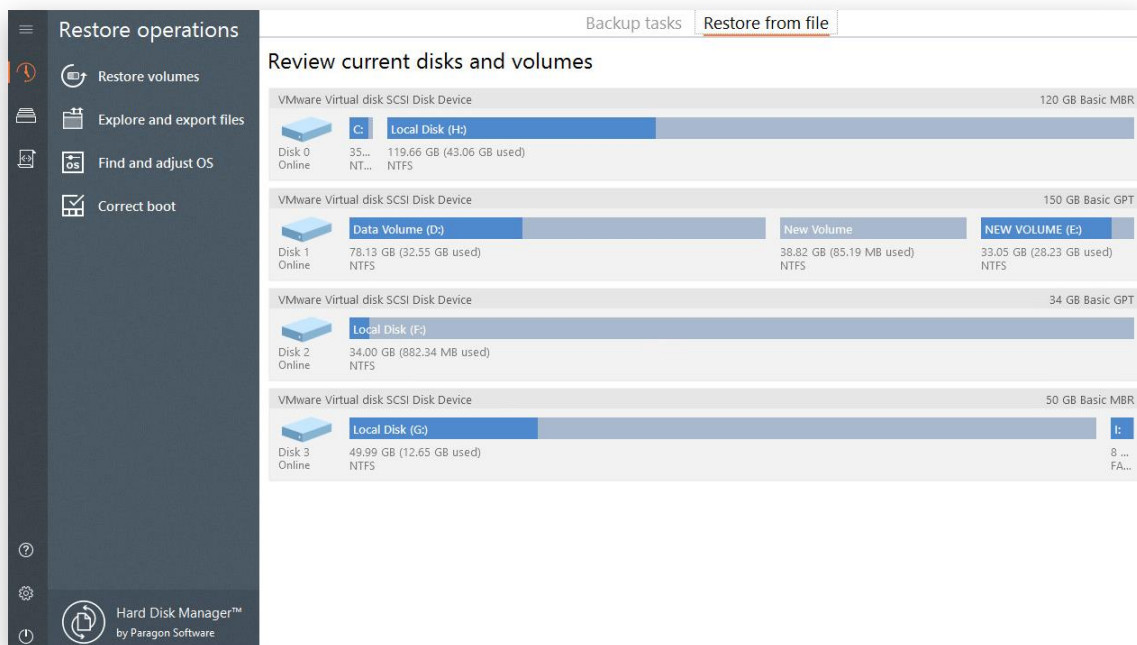
Linux media
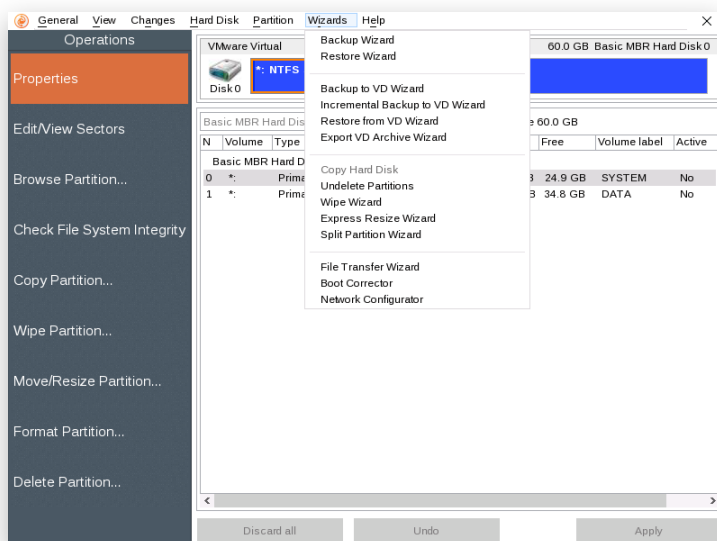
Find more details in:

- **Restoring a Failed System**

- **Fixing Boot Problems**

- **Transferring Files between Storages**

If you have questions on how to use our program, please refer to the embedded help system.

While utilities included into the Windows and Windows PE versions vary for your product, the Linux recovery environment is one for the entire product line.

Protecting System and Data

Backup Tasks

Configuring Backup Job

Hard Disk Manager 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. You can also configure backup for virtual machines from available Hyper-V Manager. 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 our 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.
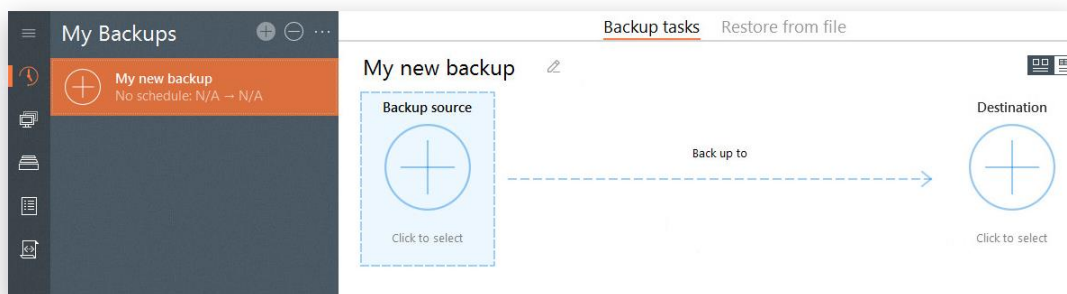
3. Give a clear name to your backup job.

4. Click the **Backup source** icon, and then the most suitable option.
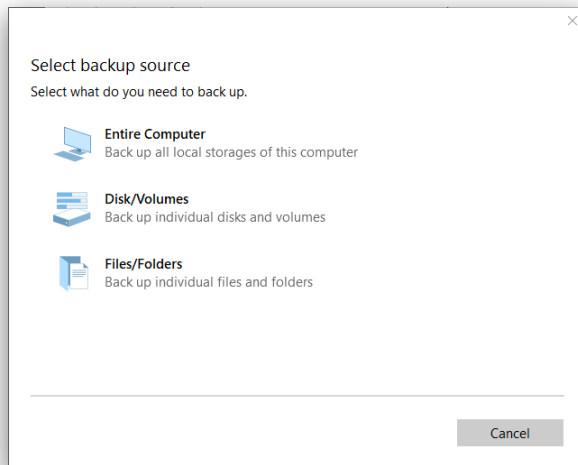
- **Entire Computer**. Choose this option to back up all storage devices of your PC.

- **Hyper-V virtual machines. Back up Hyper-V virtual machines hosted on this computer**
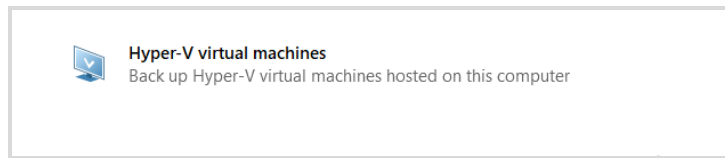
After connecting to Hyper-V Manager, you can choose available virtual machine from the list to add it to the backup. It's recommended to set backup job name in accordance with the name of the selected VM.
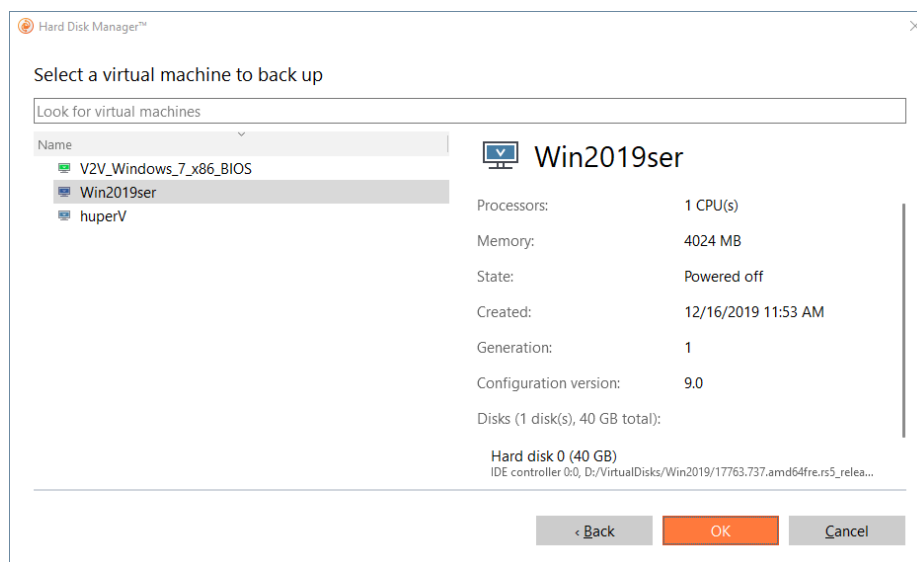
- **Disk/Volumes**. Left click an object(s) you'd like to back up. When selecting a volume that hosts Windows OS you may be warned that the wizard additionally selects another one that contains boot system files. Though it's not recommended, you can deselect any volume you consider unimportant.
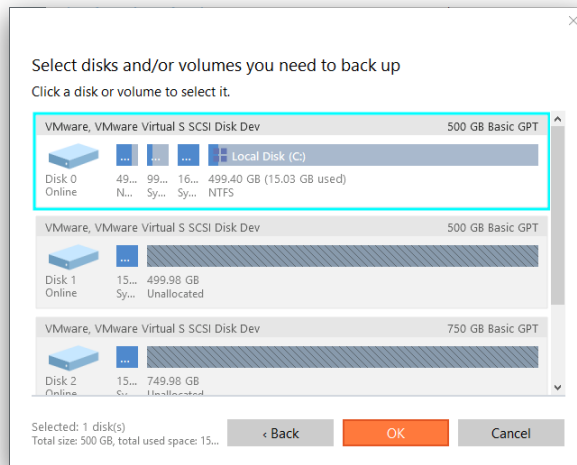
- **Files/Folders**. From a list of all partitions available in the system, mark a checkbox opposite a file, folder or even a whole partition to build up contents of the future backup image.
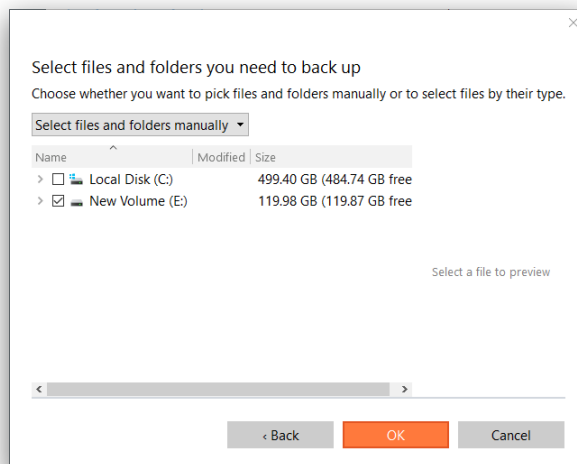
Switch to **Select files by file type** mode if you're planning to back up specific types of files, for example Word documents or Excel workbooks. The wizard includes three predefined categories containing file masks for popular document, music, and video formats. Either select an entire category(ies) 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.
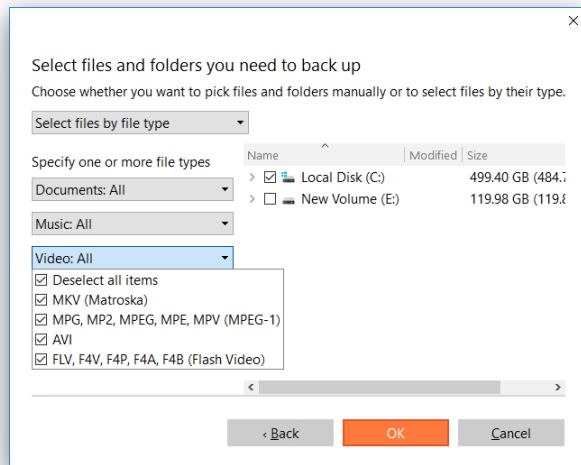
5. Click the **Destination** icon, and then specify backup location (local or external storage, or a network share).
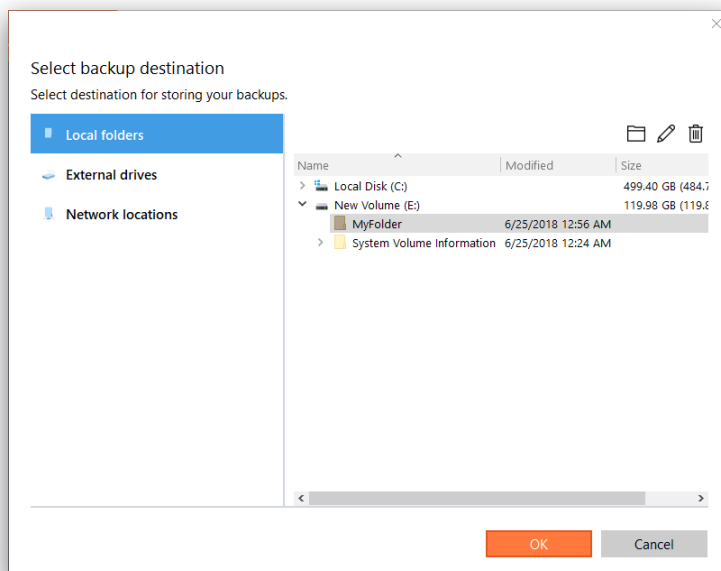
- **Local folders**. Browse your internal disks to find a storage place for the backup data. Use the corresponding buttons to create new, rename, or delete folders.

- **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.
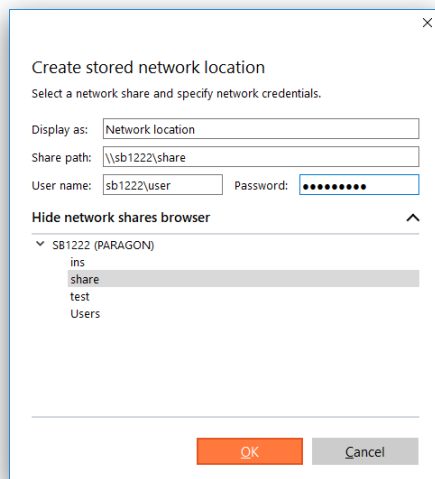
6. At this step you can click **Back up now** to create a full backup image of the specified data. Click this button again in the future and our program will create another full backup image reflecting changes since the initial backup. Here you can also find the **Generate script** option that helps to create a script out of the configured backup job to run it later from the command prompt. For more details, please consult First Start and Using the Command Prompt.

   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.
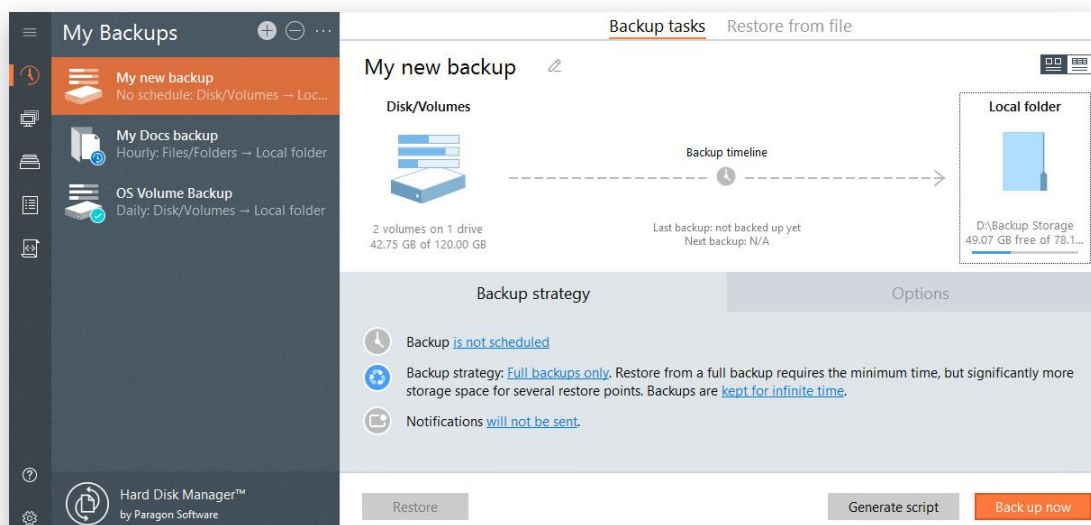
7. Schedule your backup job by clicking either the watch icon on the backup timeline or the corresponding hyperlink.
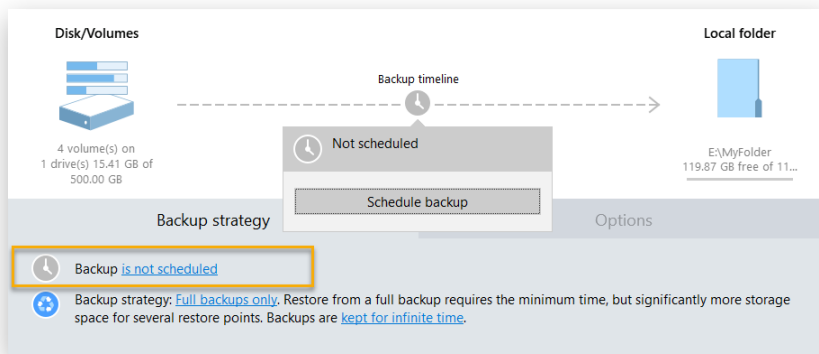
We suggest choosing the daily backup when it comes to protecting valuable information that keeps changing constantly, for example some project or document, or a financial report you're working on every day. The main rule here is the more valuable the data, the more frequent backups are required. For 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.
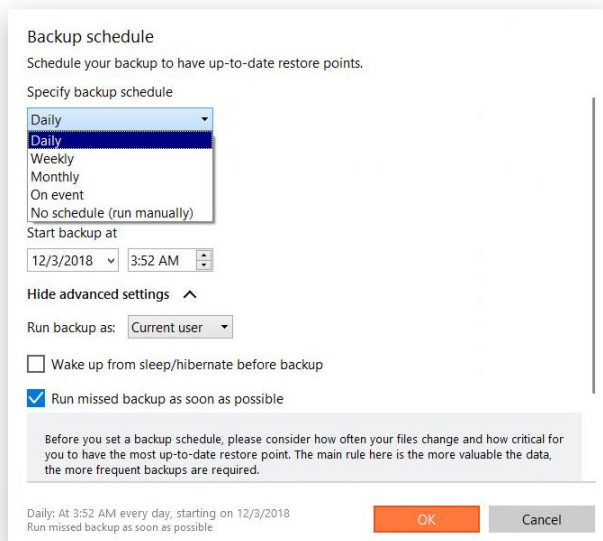
While setting a start time for backup runs, please make sure it is during off hours (at night or early in the morning) or whenever the computer has the least work-load to perform. To allow backup runs when a non-admin user is logged in, or to wake up from sleep or hibernation automatically, click **Show 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.
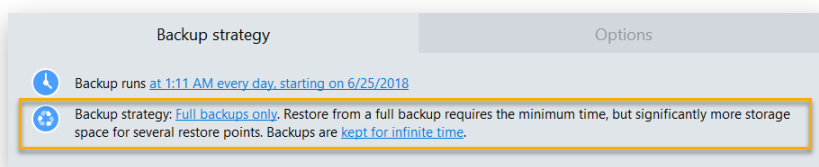
Hard Disk Manager supports full, incremental and differential backup methods and their combinations as well as various backup retention options, which opens a way to create comprehensive backup strategies.

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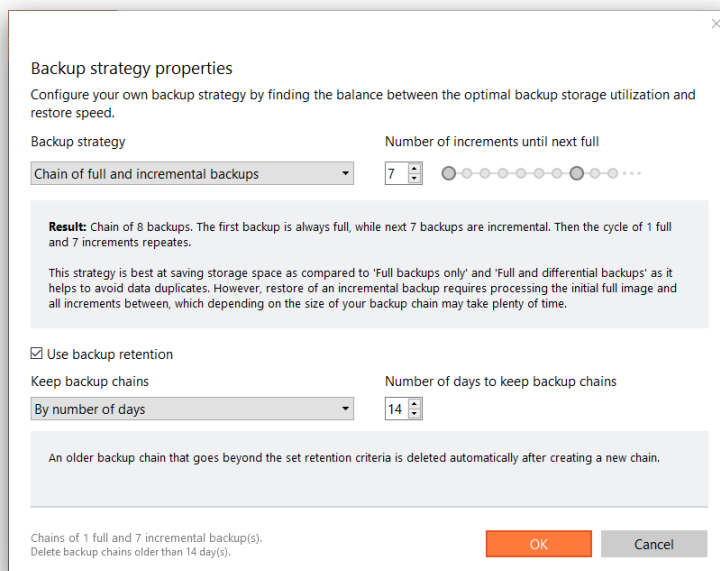
If you need our help in working out an optimal backup cycle for your environment, please contact our Support Team.

9. If necessary, set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.
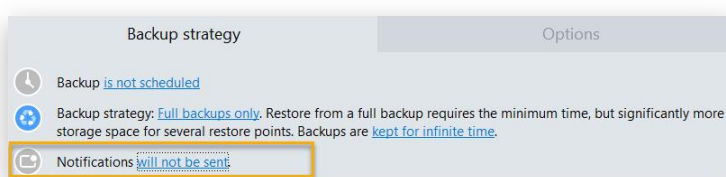
10. Specify data you don't want to back up by excluding certain folders, creating new or using existing file masks.
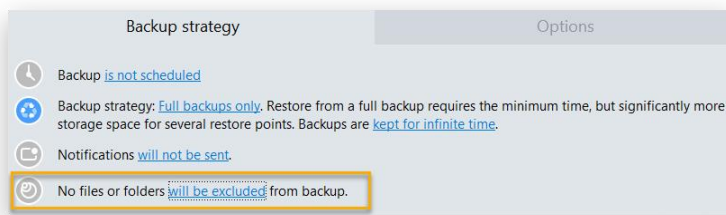
Excluding folders:

Browse for the requited folder(s), then mark a checkbox opposite its name to exclude from backup processing.

Excluding files by masks:

Hard Disk Manager includes several predefined categories containing file masks for popular document, music, video and picture 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.
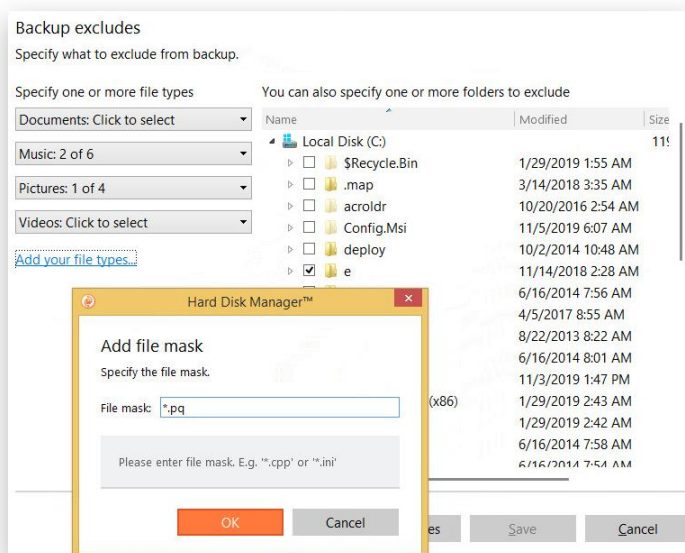
> We do not recommend you to exclude system files.

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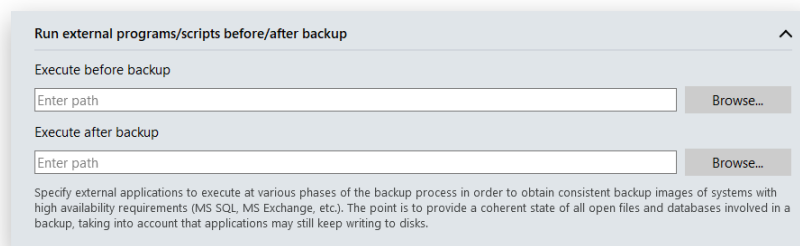
  - **Execute before backup.** Specify an executable file (through browsing or typing a full path to it) that helps you to prepare running applications for backup. It may include specific commands/programs to delete unnecessary files, suspend services, flush transactions or caches, etc.

  - **Execute after backup**. Specify an executable file to run after backup. It may include commands/programs to resume the previously suspended services, etc.

  Our 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 our 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.

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

13. If everything went smooth, the resulted status on the backup timeline would be "Succeeded" (the green OK icon).
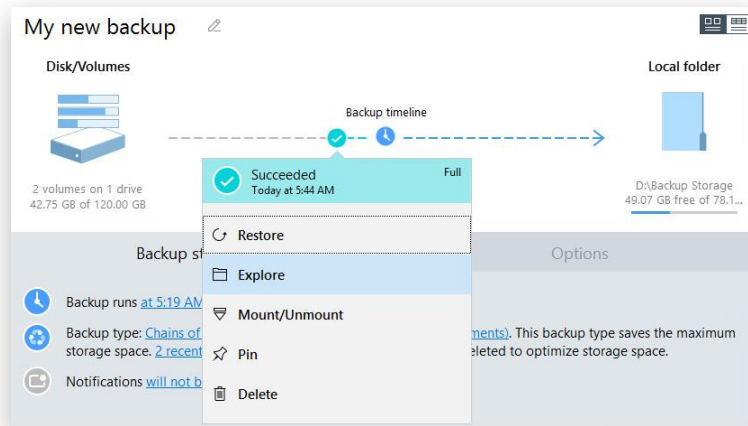
Hyper-V Backup options
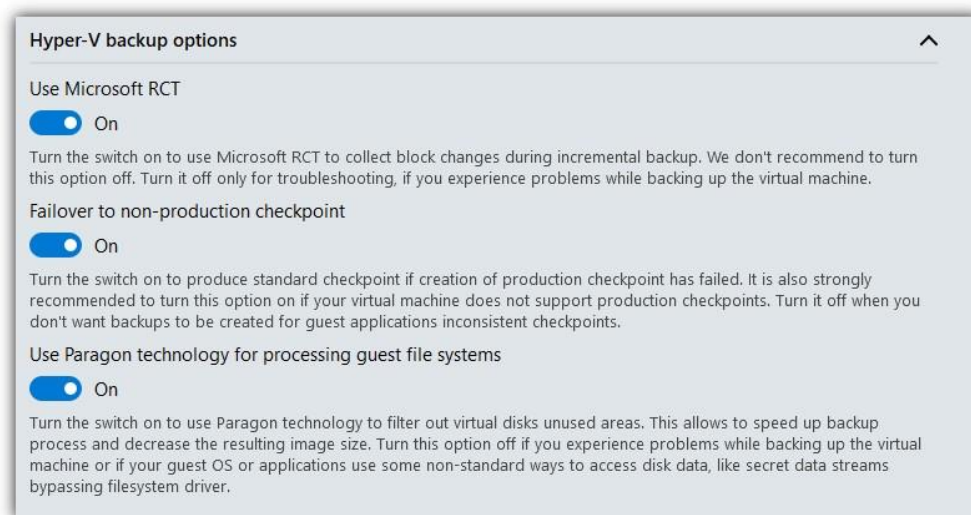
- Use Microsoft RCT (Enabled by default. Not recommended to disable this option unless you're troubleshooting). This setting will be applied on next full backup.

- UseParagon technology for processing guest file systems. This technology allows for significant backup size reduction thanks to using more complex data processing mechanism in both full and incremental copy operations. Not recommended to disable this option when protecting machines with preallocated virtual disks. This setting will be applied on next full backup.

- Failover to non-production checkpoint (enabled by default). Disable this setting if strict control of VM data state synchronization is required (i.e. if you don't require crash-consistent only snapshots). Enable if target VM doesn't support production checkpoints.

Managing Backup Jobs

By selecting an existing backup job from the list on the sidebar, you can see its properties and available operations in the working area. The backup timeline helps to instantly grasp the key properties of selected job, including availability of restore points and the number of failed backup runs.
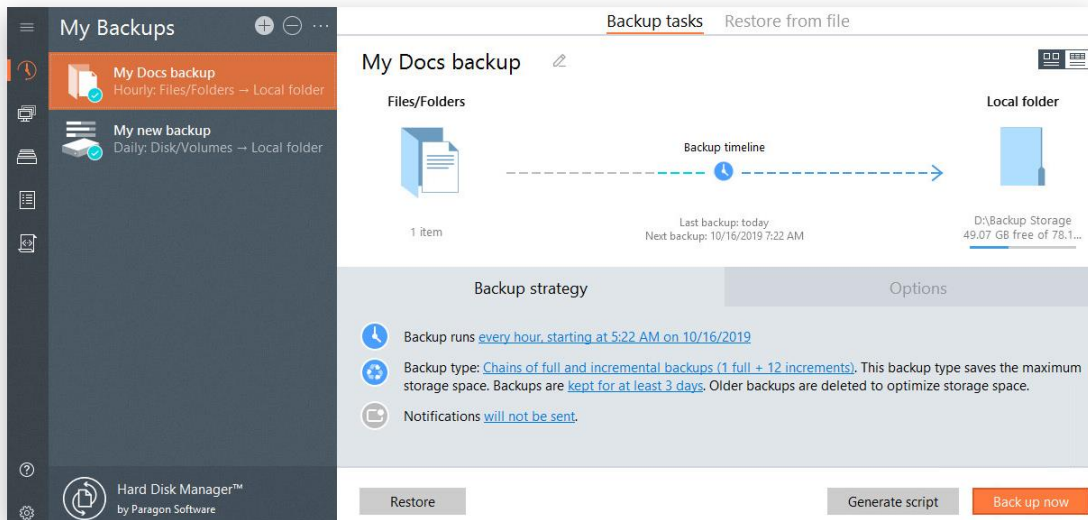
- Click **Files and folders** (**Disk and volumes** or **Entire Computer** for a volume-level backup job) to change backup objects.

- Click **Local folder** (**Network folder** or **External Drives**) to change backup location. Please note that after changing the backup location, Hard Disk Manager forces creation of a full backup in the new place. All backup data in the old location remains intact and can be used for restore without limitations.

- By clicking corresponding links, you can change the current backup schedule and/or backup strategy properties.

- Click **Backup up now** to force running the backup job.

- Click **Generate script** to create a script out of the configured backup job to run it later from the command prompt. For more details, please consult First Start and Using the Command Prompt.

- Click the desired restore point on the backup timeline, then select the require operation (**Restore**, **Explore**, **Mount/Unmount**, **Pin/Unpin**, **Delete**). The restore operation can also be called by clicking **Restore** in the lower left corner of the working area.

  Find more details in:

  - **Exporting Individual Files from Backup**

  - **Restoring a File-level Backup**

  - **Restoring a Volume-level Backup**

  - **Mounting a Backup Image**

  - **Pinning a Backup Image**

  - **Checking Backup Integrity**

- Use the minus icon on the sidebar to delete the selected job and all restore points produced by that job or only the job.
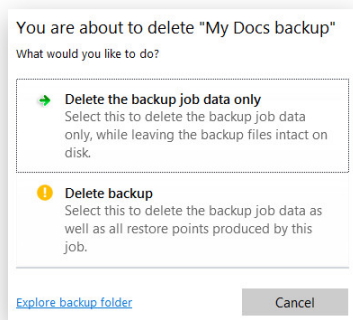
Pinning a Backup Image

By pinning a backup image, you protect backup data it contains from both accidental and planned deletion caused by backup storage retention.

Key peculiarities:

- If you pin an incremental update, the initial full image and all increments between in the corresponding chain will be pinned as well.

- If you pin a differential update, the initial full image will be pinned as well.

- If you delete a backup job with pinned restore points, they will not be deleted.

1. Click **Backup & Recovery** on the sidebar.

2. Select an existing backup job, click the desired restore point on the backup timeline, then select **Pin**.
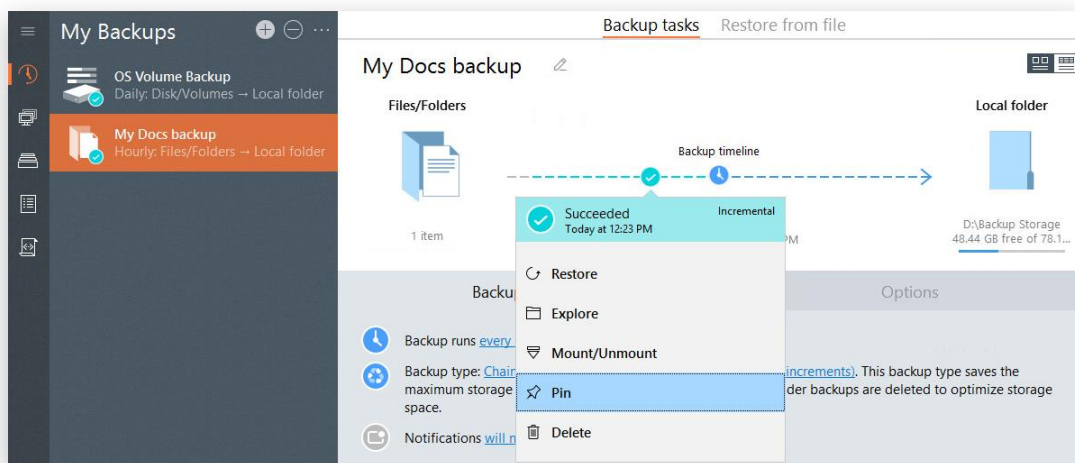
3. If the specified restore point is a member of a backup chain and requires additional backup elements for restore, all these images will also be pinned, acquiring the corresponding icon. Click **Pin now** to confirm.
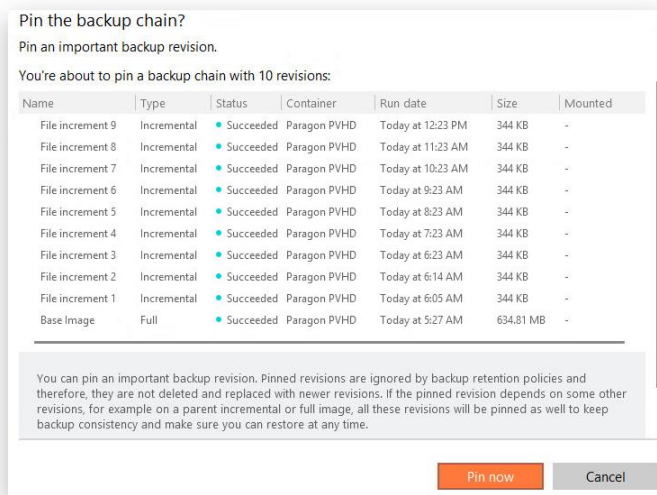
4. Use the same algorithm to unpin the backup when not required any more.

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.

> ⚠ Only pVHD containers are available to check for errors in the current version.

1. Click **Backup & Recovery** on the sidebar.

2. Select an existing backup job, click the desired restore point on the backup timeline, then select **Check integrity**.
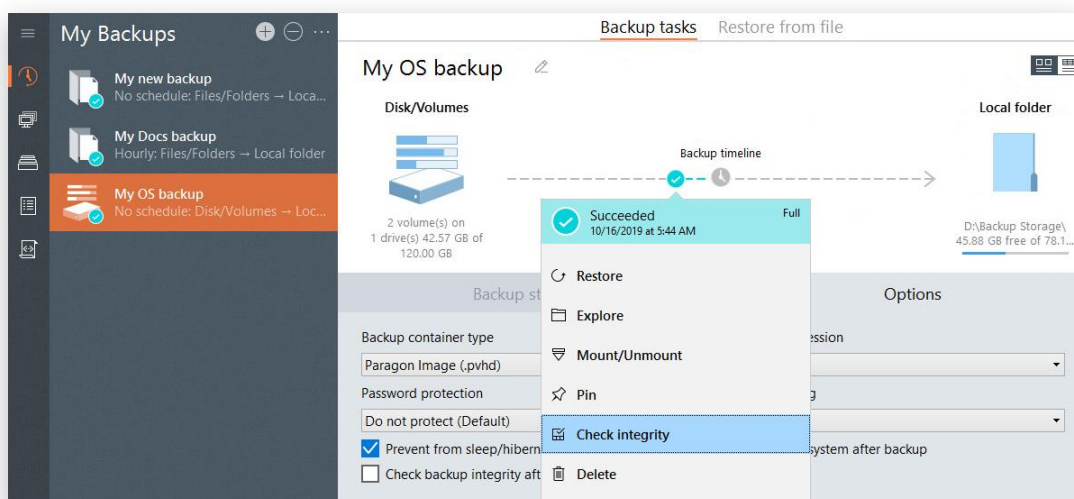
3. Confirm the operation to start. Depending on the amount of data to process, it may take several minutes.

Check restore point integrity?

Restore point to be checked: Base Image, Full, created 10/16/2019 5:44 AM.
Last verification date and result: Not verified yet

Make sure the restore point integrity is sound. Restoring damaged backup can lead to data loss or make your system unable to start.

Check now   Cancel

Hyper-V Backup technology

The current version can only protect entire virtual machines (online or offline) registered on a local Hyper-V host, where our product is deployed. Hyper-V machines can be backed up directly to pVHD, VMDK, VHD, or VHDX virtual containers. If using VHD/VHDX as target backup format, you can attach the resulted backup image to an existing virtual machine of Hyper-V and OS will be launched successfully. If using pVHD – there will be available additional options like high-level compression, encryption, or image splitting. Resulted virtual containers can be stored on a local 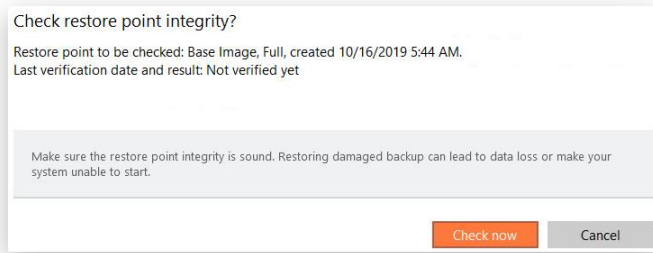disk (mounted/unmounted), a mapped network share, or by UNC path. To optimize storage capacities our product supports the incremental imaging, where each new increment describes the changes between the current state of the backup object and the previous state.

When time comes for disaster recovery, our solution enables to restore a previously backed up virtual machine to a new location according to a certain time stamp (if several available).

During creation of incremental and differential backup chains for virtual machines (created using Microsoft Hyper-V 2016 and newer, including Windows 10), Microsoft Resilient Change Tracking (RCT) technology is utilized. Virtual machines must meet the following conditions:

- VM config version 6.2 or higher

- Microsoft RCT option is not disabled in our product (enabled by default)
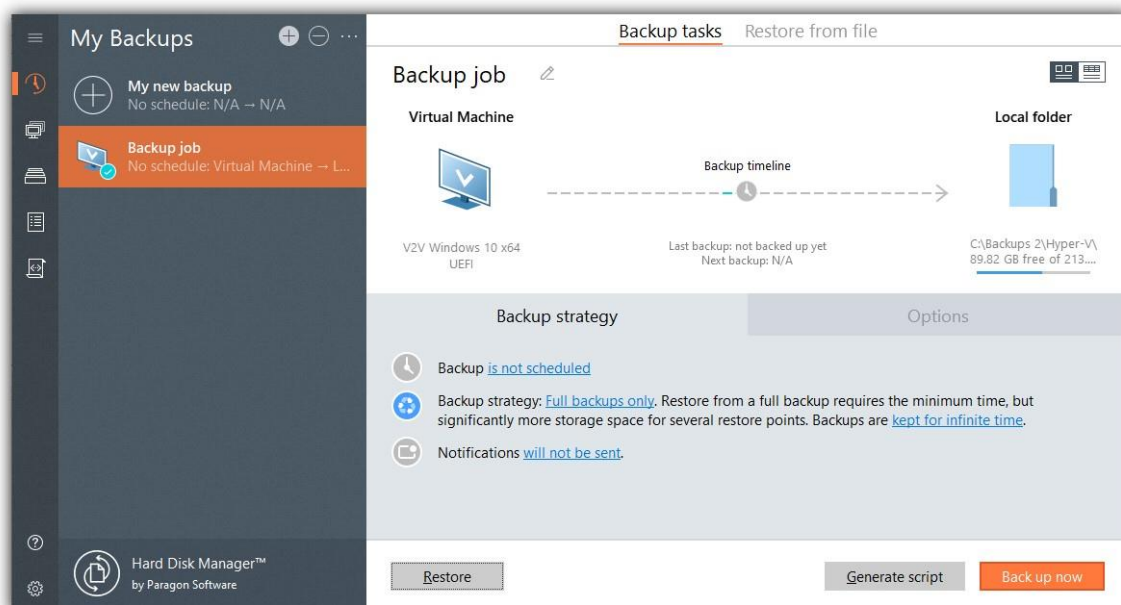
You cannot change Target for VM Backup task. Create new Backup task if you wish to choose another destination VM.

Restore Tasks

> ⓘ Legacy PBF-based backup images can be restored with the help of the corresponding wizard, you can find by clicking on the sidebar: **Backup & Recovery > the three-dot icon > Restore from PBF**.

Exporting Individual Files from Backup

1. Click **Backup & Recovery** on the sidebar.

2. Select an existing backup job (file- or volume-level), click the desired restore point on the backup timeline, then select **Explore**.
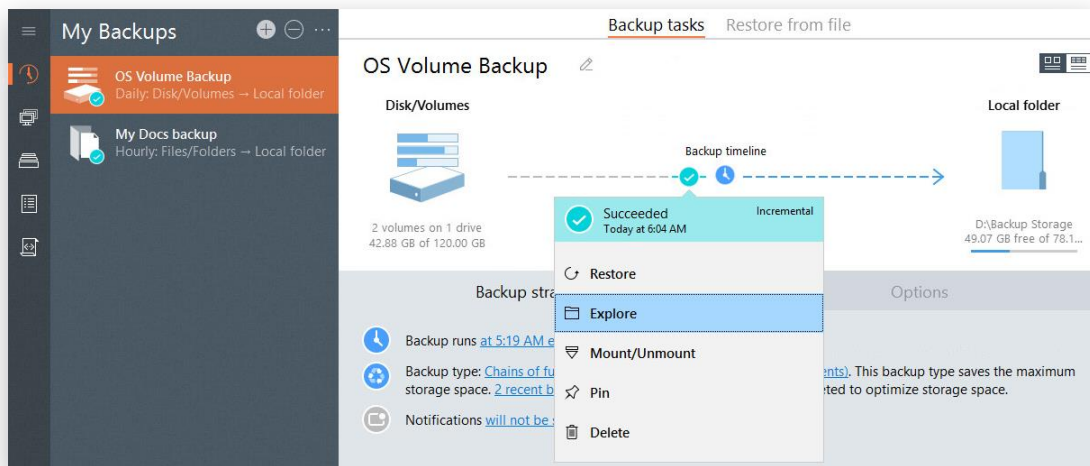
> ⓘ Be ready to provide a valid password to access contents of an encrypted backup image.

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.
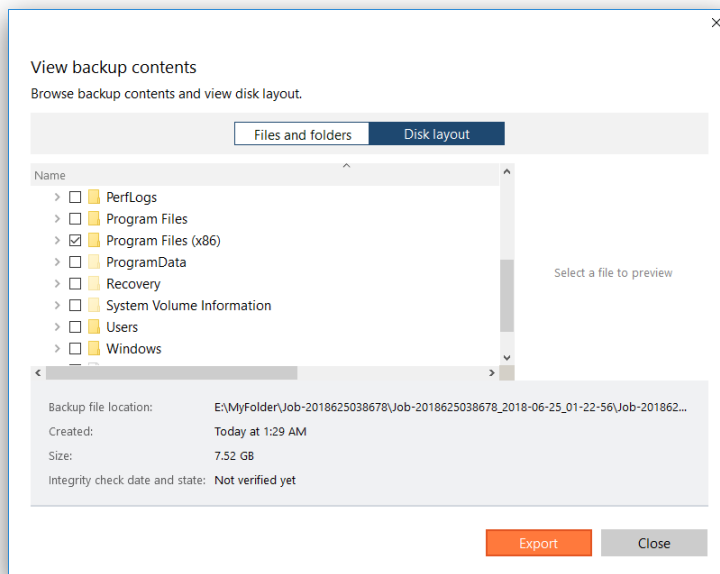
4. Specify where you'd like the selected files to be exported. Use the corresponding buttons to create new, rename, or delete folders.
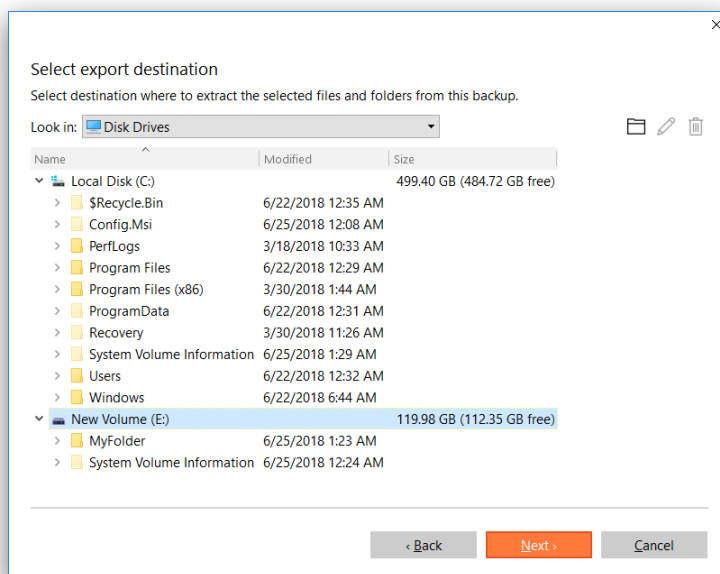
Export to the original location with overwriting existing files requires exclusive access rights to the entire target volume. By default, if the target volume cannot be locked, our program ends this type of operation with a corresponding error.

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

5. The operation starts immediately after confirmation.

Restore Hyper-V machines

1. Click **Backup & Recovery** on the sidebar.

2. Select an existing file-level backup job, click the desired restore point on the backup timeline, then select **Restore**. If you click **Restore** in the lower left corner of the working area, the latest restore point will be selected for you automatically.
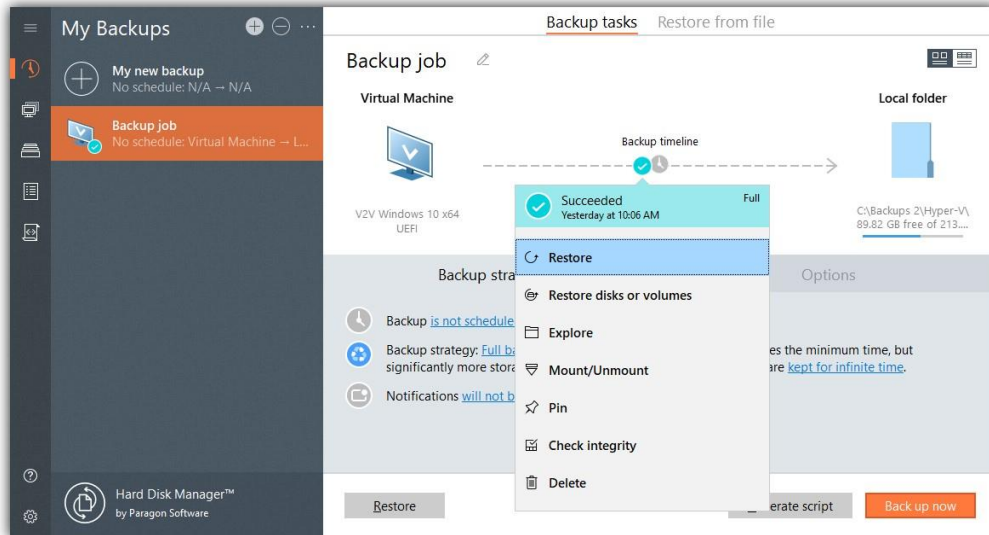
3. Choose new destination and name for the virtual machine to restore
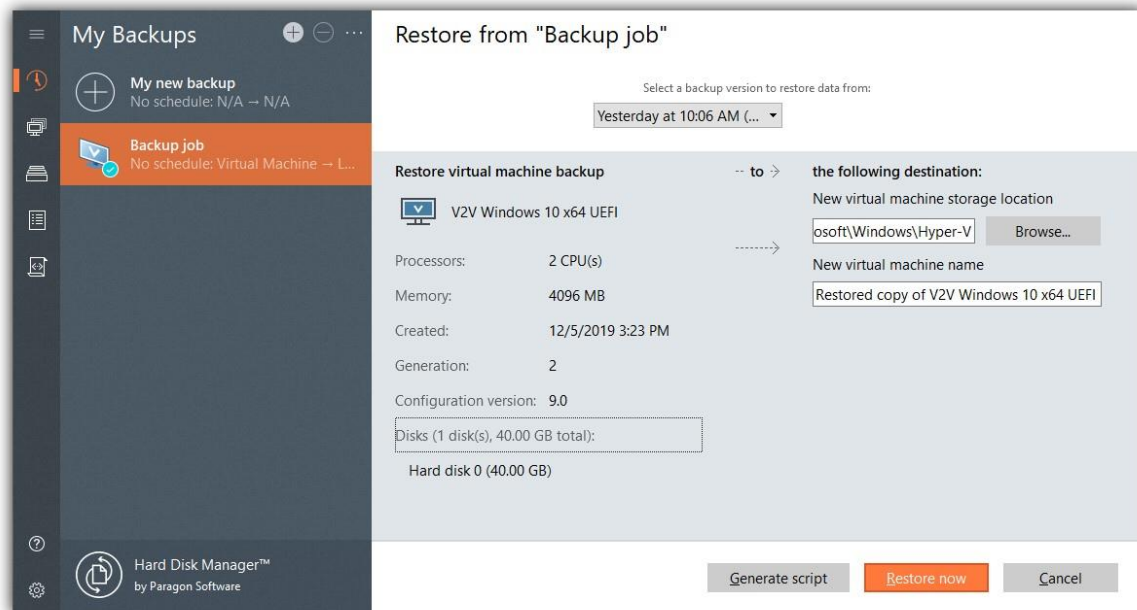
4. After restore is complete, new Virtual Machine is created, with new GUID and all settings from the original Virtual Machine.

> You can also **Restore Volumes** from Hyper-V machine backup. Volumes can be restored to physical machine, or any other virtualizer (XenServer, KVM, VirtualBox, etc.)
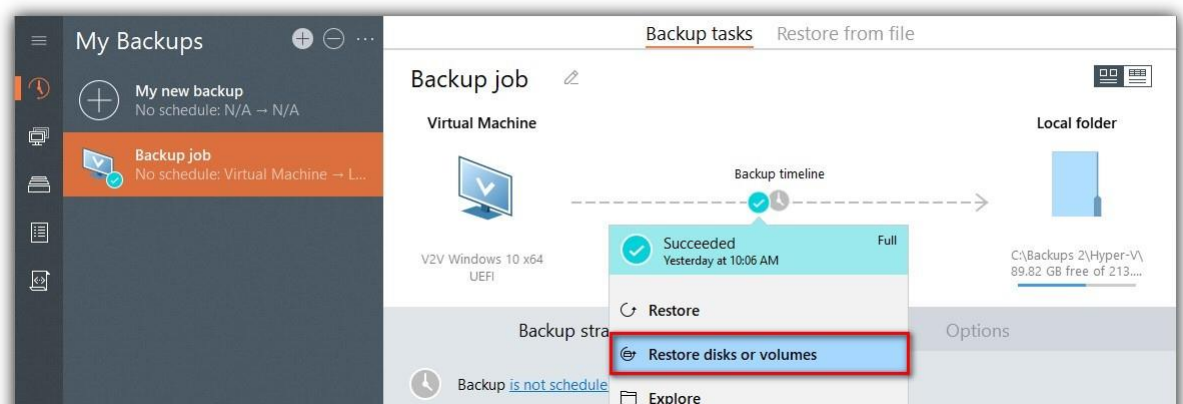
Restoring a File-level Backup

1. Click **Backup & Recovery** on the sidebar.

2. Select an existing file-level backup job, click the desired restore point on the backup timeline, then select **Restore**. If you click **Restore** in the lower left corner of the working area, the latest restore point will be selected for you automatically.
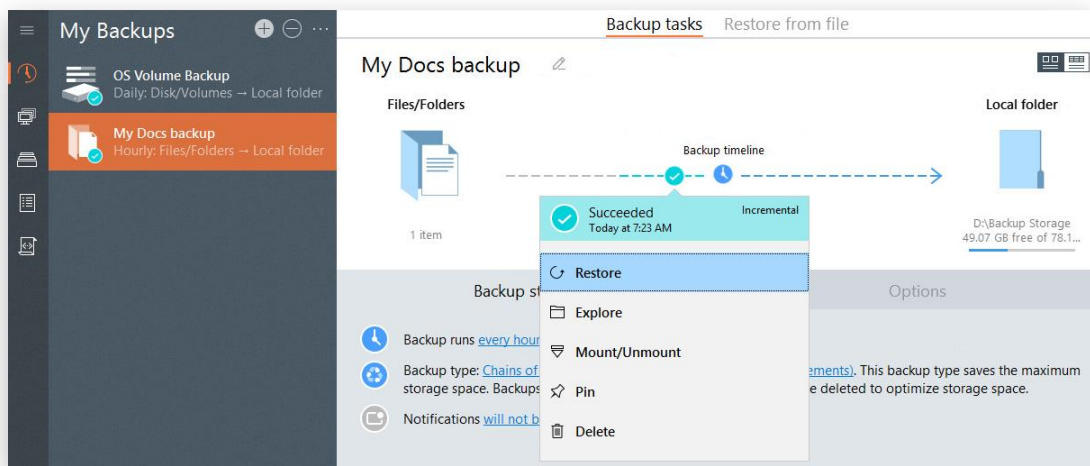
3. By default, the program prompts you to restore all backup objects inside the selected restore point exactly where they belong non-destructively, that is without overwriting files that have identical names. If you're sure that files stored in the destination are corrupted, select the **Replace existing files** option to replace all files in the destination with those from the backup. Just click **Restore now** to start the operation or change any of the defaults as described below.

    Here you can also find the **Generate script** option that helps to create a script out of the configured restore task to run it later from the command prompt. For more details, please consult First Start and Using the Command Prompt.
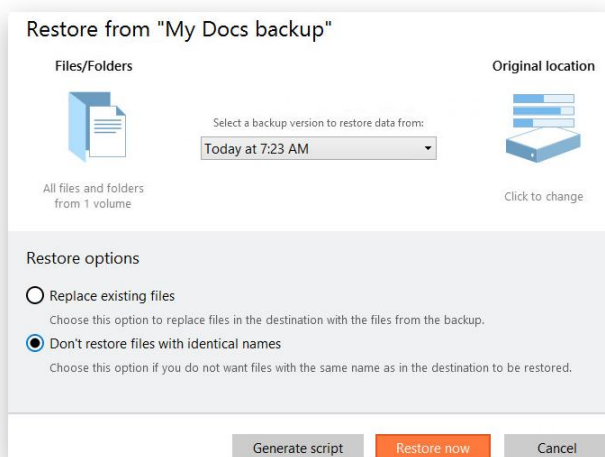
- Select another restore point from the drop down list, if necessary.
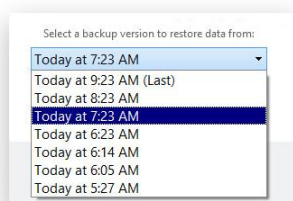
- Click the **File/Folders** icon to specify backup objects you'd like to restore by marking/unmarking checkboxes next to the required data items.
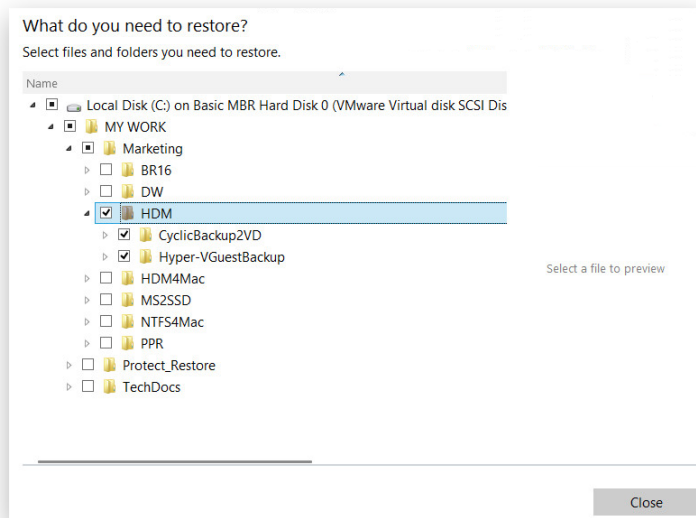
- Click the **Original location** icon to choose another place as restore target. In the opened dialog choose the **Different location** option from the drop down list, select an internal or external disk, then browse it for the desired location. Use the corresponding buttons to create new, rename, or delete folders, if necessary.
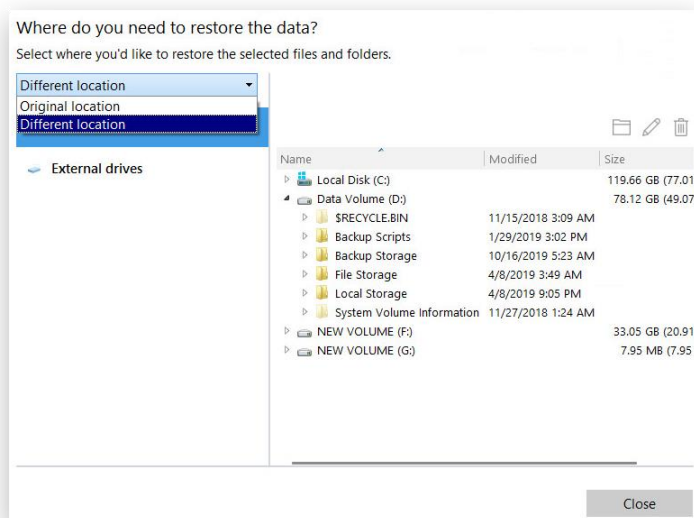
4. You will be prompted to check the selected backup for errors (recommended). Mark the corresponding option to skip this action if you're sure in its viability.
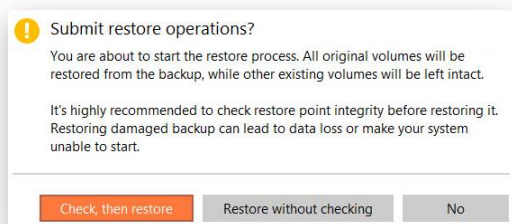
5. The operation starts immediately after confirmation.

Restoring a Volume-level Backup

> This scenario would be identical on the WinPE recovery media, except for the necessity to additionally import a backup image you're planning to use for restore. Find more details in **Importing a Backup Image**.
>
> Alternatively, you can use the **Restore from file** functionality. Find more details in **Restoring from an Isolated Backup Image**.

1. Click **Backup & Recovery** on the sidebar.

2. Select an existing volume-level backup job, click the desired restore point on the backup timeline, then select **Restore**. If you click **Restore** in the lower left corner of the working area, the latest restore point will be selected for you automatically.
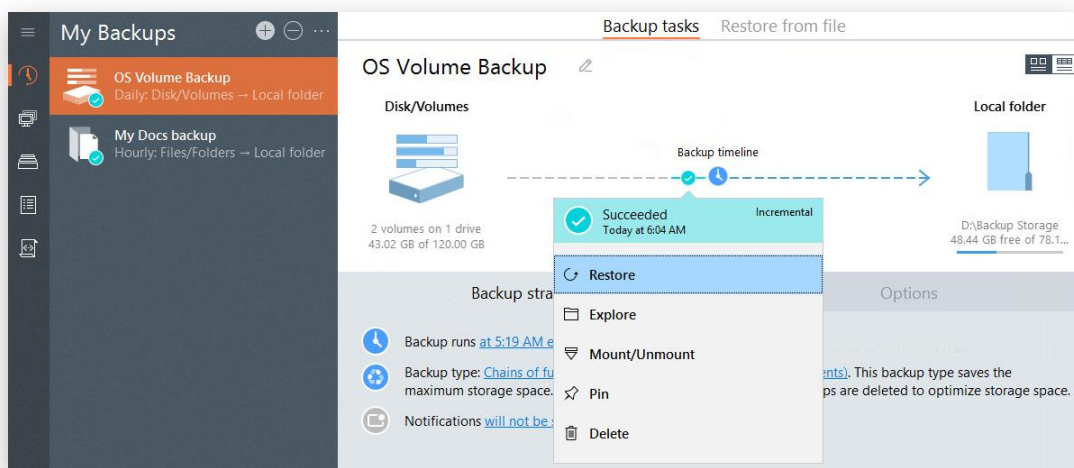

> Be ready to provide a valid password to access contents of an encrypted backup image.

3. By default, the program prompts you to restore all backup objects inside the selected restore point exactly where they belong. Just click **Restore now** to start the operation or change any of the defaults as described below.

   Here you can also find the **Generate script** option that helps to create a script out of the configured restore task to run it later from the command prompt. For more details, please consult First Start and Using the Command Prompt.

Restore from "OS Volume Backup"

Volumes   **Original location**

Select a backup version to restore data from:

Today at 6:04 AM ▼

2 volumes, 41.27 GB of   Click to change
120.00 GB

Restore the selected source volumes   -- to →   the following destination:

System Reserved 350 MB   System Reserved 350 MB
On Basic MBR Hard Disk 0 (VMware Virtual disk SCS...   -------→   On Basic MBR Hard Disk 0 (VMware Virtual disk SCSI...

Local Disk (C:) 119.66 GB   Local Disk (C:) 119.66 GB
On Basic MBR Hard Disk 0 (VMware Virtual disk SCS...   -------→   On Basic MBR Hard Disk 0 (VMware Virtual disk SCSI...

[Before changes] [After changes]

VMware Virtual disk SCSI Disk Device   120 GB Basic MBR

| Syst... | Local Disk (C:) |
Disk 0   350 M...   119.66 GB (41.00 GB used)
Online   NTFS   NTFS

[Generate script]   [Restore now]   [Cancel]

⊘ **If you choose to generate a script, the configured restore task will be canceled.**

- Select another restore point from the drop down list, if necessary.

  Select a backup version to restore data from:

  Today at 6:04 AM ▼
 Today at 6:14 AM (Last)
  Today at 6:04 AM
  Today at 5:44 AM
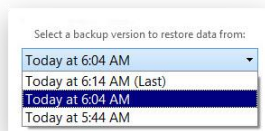
- Click the **Disk/Volumes** icon to specify backup objects you'd like to restore by marking/unmarking checkboxes next to the required data items.

  Select disks or volumes you need to restore

  Select volumes ▼

  Basic MBR Hard Disk 0 (VMware Virtual disk SCSI Disk Device) - Virtual Image
  120 GB, MBR, Basic

  ☑ **System Reserved**
  NTFS, 350 MB (285.03 MB used)

  ☑ **Local Disk (C:)**
  NTFS, 119.66 GB (41.00 GB used)
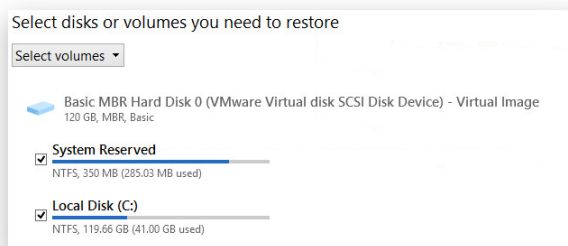
- Click the **Original location** icon to choose another place as restore target. In the opened dialog choose the **Different location** option from the drop down list, then specify a new location for each backup object involved in the operation.
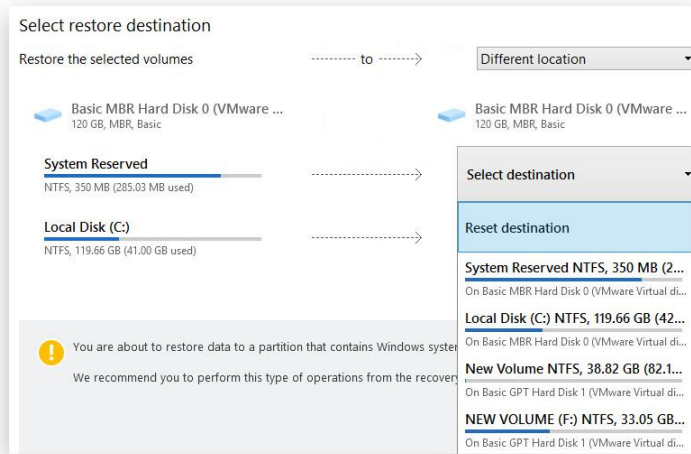
! **You will be warned when trying to rewrite a bootable partition.**

---

4. Use the corresponding buttons to check the original and resulting disk layouts.

5. 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.


6. The operation starts immediately after confirmation.

Restoring from an Isolated Backup Image

An isolated backup image is a supported backup container that is unavailable in the program interface for restore, because of removal from the "My Backups" list or creation with another program version. This function is available on the WinPE recovery media and in Windows.
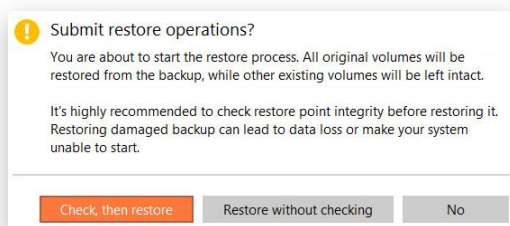
Supported backup data containers:

- Volume- and file-level virtual containers (pVHD, VHD(X), VMDK) created by the current version.

- Volume- and file-level virtual containers (pVHD, VHD(X), VMDK) created by any 15-16th version.

> You can also add an existing backup job and all restore points produced by that job to the "My Backups" list and this way make them available in the program interface through the **Import backup** function.
>
> Legacy PBF-based backup images can be restored with the help of the corresponding wizard, you can find by clicking on the sidebar: **Backup & Recovery > the three-dot icon > Restore from PBF**.

1. Click **Backup & Recovery** on the sidebar.

2. Click the **Restore from file** tab in the upper part of the working area, then select the most suitable option on the sidebar: **Restore volumes** or **Explore and export files**.
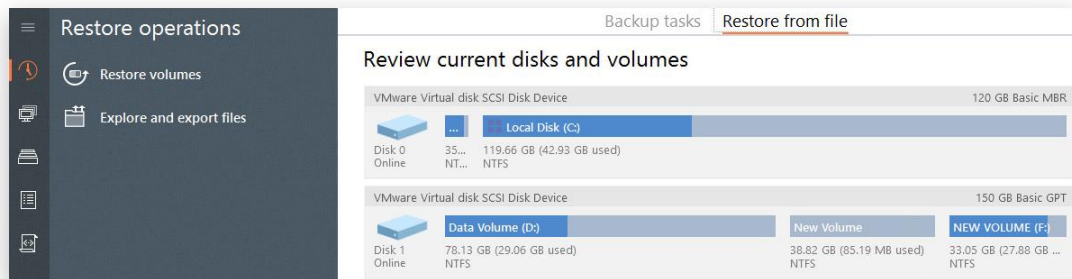
3. Both scenarios would be identical to the already described **Exporting Individual Files from Backup** and **Restoring a Volume-level Backup**, except for the necessity to additionally browse for a backup image.

4. 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 1.2 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.

1. Click **Backup & Recovery** on the sidebar.

2. Select an existing backup job, click the desired restore point on the backup timeline, then select **Mount/Unmount**.
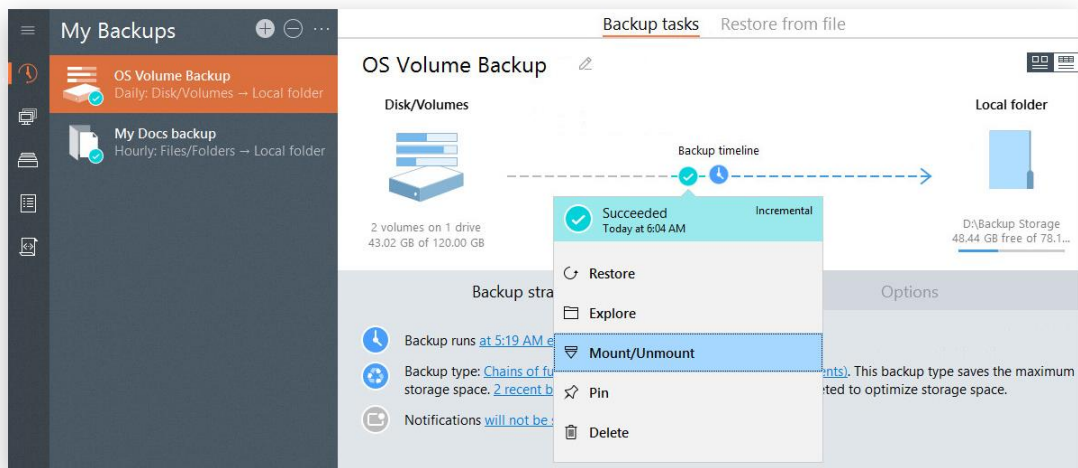
3. In the opened dialog you can see contents of the selected backup image. Select a partition you'd like to mount, then one of the vacant drive letters from the list to associate with the partition. Click **Next** to confirm.
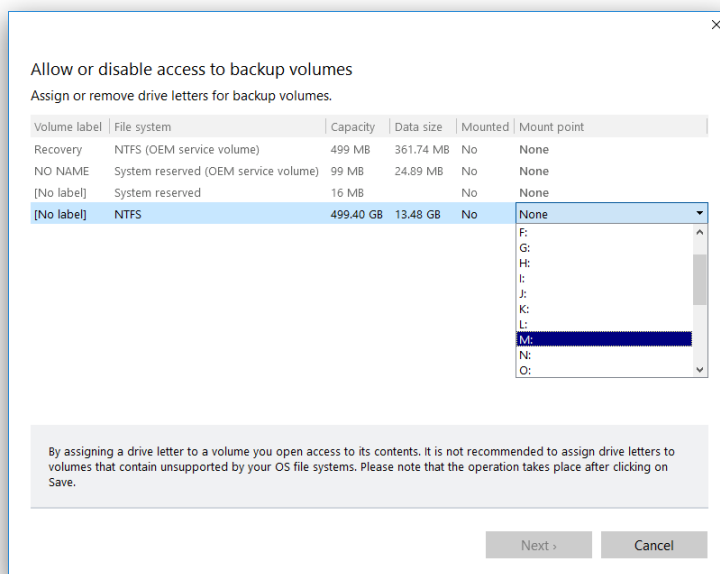
4. Once mounted, you can treat the backup partition as you would any other Windows volume (browse, retrieve files, modify files).

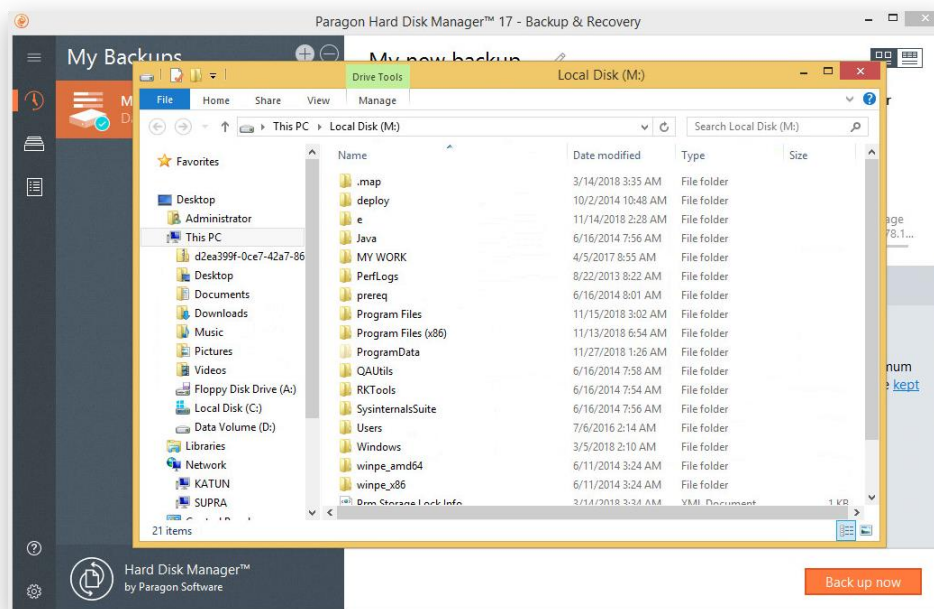5. Use the same algorithm to unmount the backup image when not required any more.

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.

> ⚠️ Volume-level restore scenarios are also available on the WinPE recovery media and in Windows.

1. Start up the computer from the Linux recovery media.

2. Select **Normal Mode** in the boot menu or wait 10 seconds and it will be loaded automatically.

3. Select **Restore from VD Wizard** in the Wizards pane.
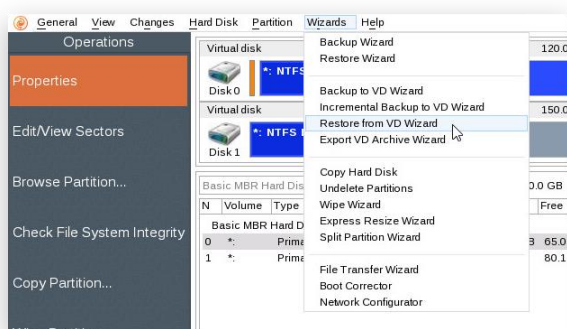
4. The welcome page introduces the wizard's functionality. Click **Next** to continue.

5. Click the standard browse button [...] to find the required backup image, then double click it to proceed. If your backup is located on a network share, you need to map it.
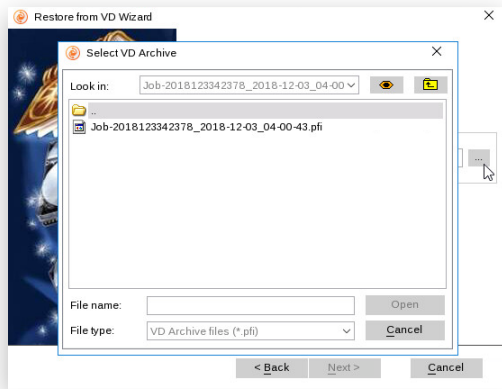
6. View the provided backup properties to make sure you have selected the correct image. At this step you can also set up how to process unknown volumes.
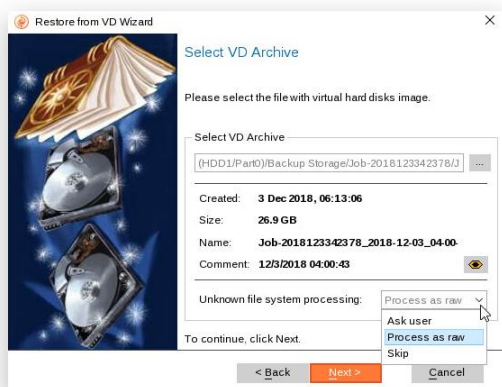
7. If the partition structure on the source disk hasn't been changed much, you can restore to the original location. If it has changed, e.g. you're attempting to restore to another computer, then you can use one of the two remained options.
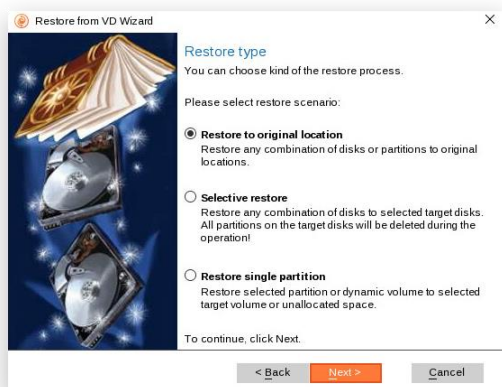
8. Our program displays contents of the selected backup image. If you have several partitions in the backup, select those you need to restore.
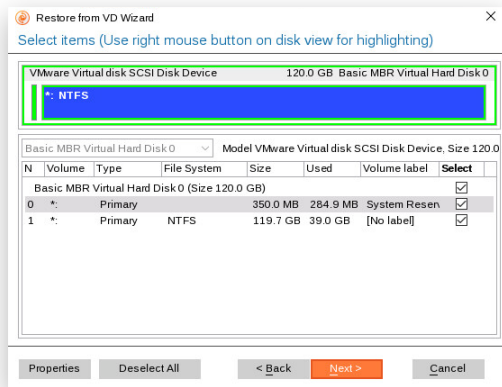
9. Depending on the specified restore mode and backup object(s), you may have the options to enlarge the restored volume to occupy the entire target disk, remove existing free blocks, or restore as is. Any change to the disk layout will be displayed on the disk map.

Restoring a single volume
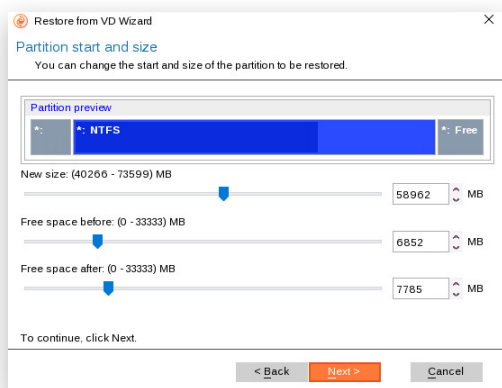
Restoring to another location
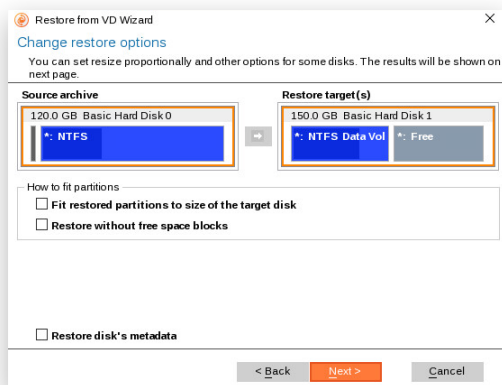
10. Check the resulting disk layout. Click **Next**, then confirm the operation to start.
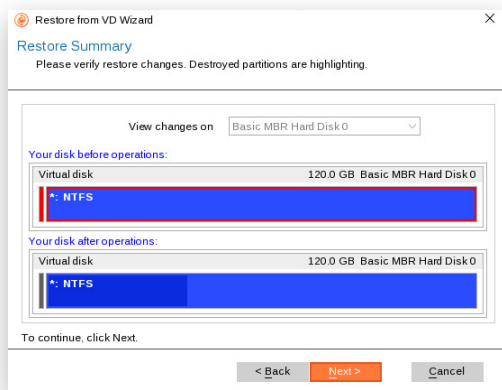
11. In the Progress window you can see in real-time a detailed report on all actions carried out by our program.

12. 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.

⚠️   Boot Corrector is also available on the Linux recovery media.

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1. Start up the computer from the WinPE recovery media.

2. Click **Disks & Volumes** on the sidebar.

3. Click the **Restore from file** tab in the upper part of the working area, then select **Correct boot** on the sidebar.

4. Select the required operation from the list.
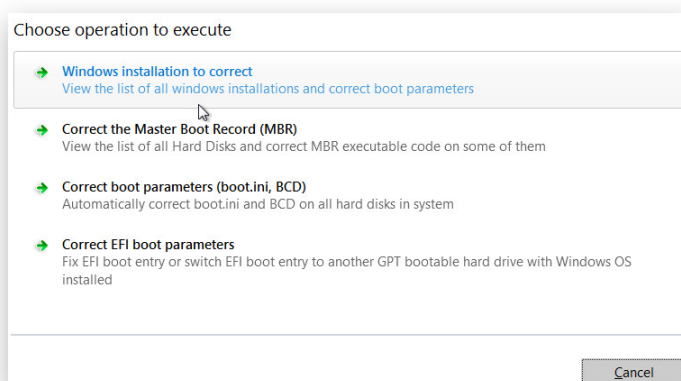
- **Windows installation to correct**. Use this option to fix your Windows startup ability if it fails to complete the startup procedure. You will need to choose a failed Windows installation from the list of found installations (if several) and then the required action.
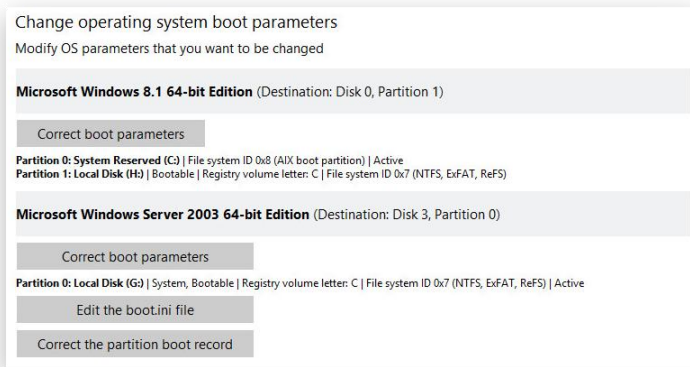
- Click **Correct boot parameters** to review and modify partition parameters that are critical for the boot process.
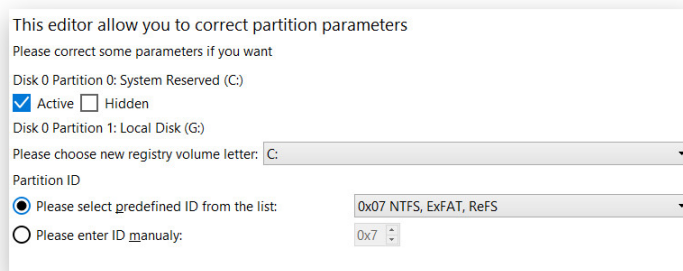
- Click **Edit the boot.ini file** to edit configuration options for a boot menu. Normally, when you're having a multi-boot system this menu appears upon boot up allowing you to choose OS you'd like to start up. Sometimes, when reinstalling Windows novice users do not overwrite the original instance, but install a second copy, which also leads to appearance of the boot menu. After deleting the first instance, the menu still appears, because the boot.ini file still contains information about both operating systems. This is when you need a bit of editing.

- Click **Correct the partition boot record** if you suspect that it is damaged. This operation is accomplished automatically after confirmation. No input from your part is required.

The number of available actions depends on the target operating system.

- **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.
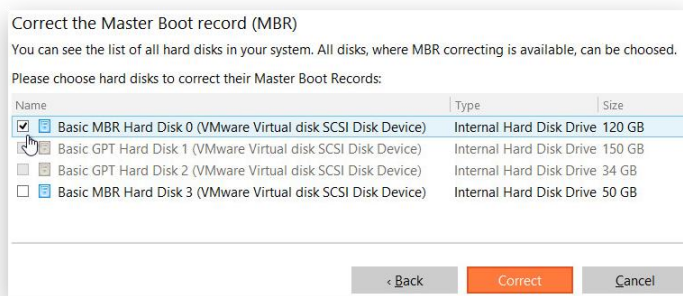
- **Correct boot parameters (boot.ini, BCD)**. If you have several operating systems on your disk (Windows Vista and later) after copying a system partition for instance, update their BCD (Boot Configuration Data) files to be able to choose an OS to start up. This operation is accomplished automatically after confirmation. No input from your part is required.

- **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.
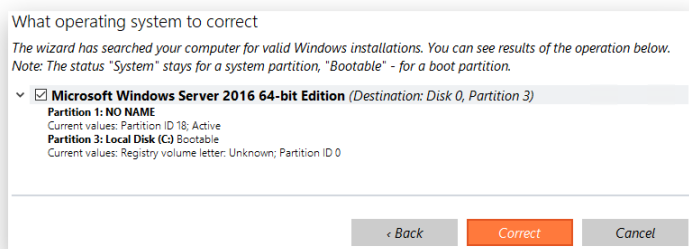
5. When done with all parameters, please confirm the operation to proceed.

6. After completing the operation, please reboot the computer.

Transferring Files between Storages

> File Transfer Wizard is also available on the WinPE recovery media.

1. Start up the computer from the Linux recovery media.

2. Select **Normal Mode** in the boot menu or wait 10 seconds and it will be loaded automatically.

3. Select **File Transfer Wizard** in the Wizards pane.

4. 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.

5. Select a disk where the files you need are stored from the pull-down list in the right pane of the dialog window, then select files you want to copy and place them to the Clipboard by pressing the left arrow-button.
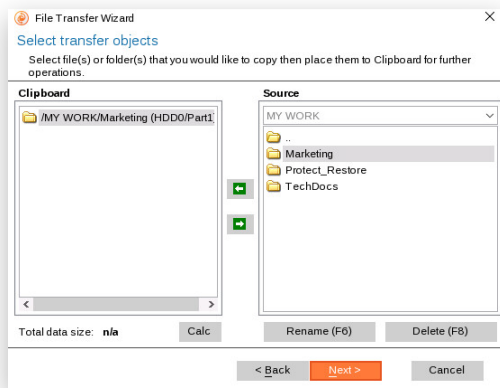
File Transfer Wizard allows browsing both mounted and unmounted (without a drive letter) partitions. It is also possible to map a network drive.

Use the **Calc** button to estimate the resulted data amount.

6. You can 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. Use the standard browse button [...] to specify the required location. If you'd like to copy the selected data to a network share, you need to map it.

7. Complete the wizard to initiate the operation. In the Progress window you can see in real-time a detailed report on all actions carried out by our program.
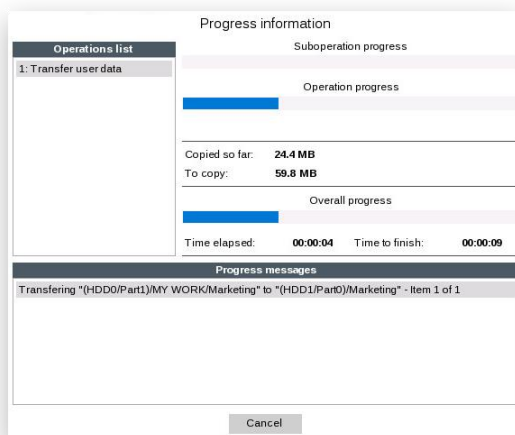
Managing Partitions and Disks

Partitioning lets you divide a single physical drive into a number of logical drives, each of which serves as a container with its own drive letter and volume label, thus enabling the operating system to process data more efficiently. Partitioning also makes it possible to organize data so that it is easy to find and manage. By detaching the OS from the rest of the data you can tackle one more crucial issue – in case of a system malfunction, you can get the system back on track in minutes by recovering it from a backup image located on the other partition of the hard drive. Finally partitioning is a necessity if you're planning to run several OSs on a single hard drive to effectively delineate the boundaries of each OS.

Basic Partitioning Tasks
Creating a Partition

1. Click **Disks & Volumes** on the sidebar.

2. Left click a block of free space on a disk you'd like to partition in the working area, then select **Create volume** on the sidebar.

3. By default, you will be prompted to create a primary NTFS partition named "New Volume" that will be the size of the selected free block. This partition will also acquire the first vacant drive letter.

    If necessary, change the partition size by using the "Volume size" slider or setting an accurate value in the corresponding field. You can also change the default volume label to easily identify the partition later.
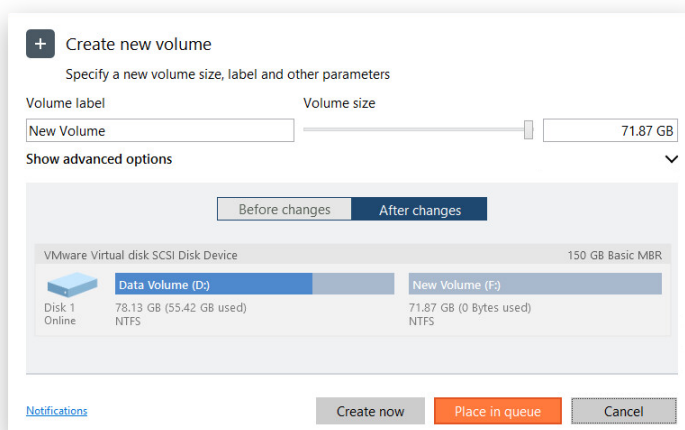
4. Click **Show advanced options** if you want to modify other properties.
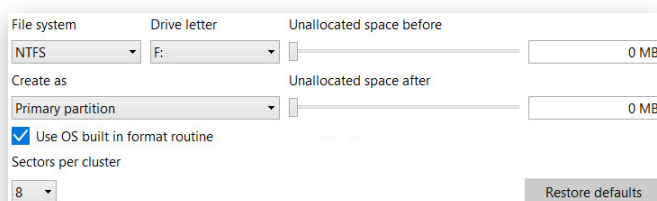
    - Select the desired partition type (Primary or Extended). The available alternatives depend on the selected block of free space – within a Logical block, only Logical partitions can be created; Within a Primary block, both Primary partitions or the Extended Partition are allowed to create.

    - Select the desired file system from the list, otherwise you won't be able to store data on the created partition.

        Supported file systems:

- FAT16 – MS DOS file system, now is used for small sticks

- FAT32 – use for data disks that are 32GB or less

- NTFS – the primary file system for Windows OS

- Ext 2/3/4 – the primary file system for Linux OS

- Apple HFS – the primary file system for Mac OS X

- Resilient FS 3.1/3.4 – a potential successor to NTFS

- Choose one of the vacant drive letters from the list to associate with the partition. The drive letter plays an important role in telling Windows where to look data. Select "None" if you do not want this partition to be available in the system.

- If the partition does not occupy the entire free block, define its position by using the corresponding sliders or setting accurate values of unallocated space before and after the partition.

- By default, the amount of sectors per cluster will be specified according to the used OS and the chosen file system. If you'd like to set another value, unmark the **Use OS built in format routine** and define the desired value in the corresponding field. The cluster size is one of the crucial parameters of any file system. Its value implicitly affects the performance of the files input-output activity since it defines the size of the file system metadata. Besides, the so-called waste space factor also depends on it.

> You won't be able to work with a partition formatted to a Windows unsupported file system, unless you have a third-party driver installed, for instance Apple HFS for Windows.

5. Use the corresponding buttons to check the original and resulting disk layouts.

6. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

7. Use the corresponding buttons to check the original and resulting disk layouts. Click **Create now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Formatting a Partition

When you create a new partition you will be prompted to choose the desired file system format as described above. This section explains how to format an existing partition.

1. Click **Disks & Volumes** on the sidebar.

2. Left click an existing partition in the working area, then select **Format volume** on the sidebar.

3. By default, you will be prompted to format the partition to one of the Windows-native file systems (depends on partition size) with the volume label "New Volume".

   If necessary, select another file system from the list and change the default volume label to easily identify the partition later.

   Supported file systems:

   - FAT16 – MS DOS file system, now is used for small sticks

- FAT32 – use for data disks that are 32GB or less

- NTFS – the primary file system for Windows OS

- Ext 2/3/4 – the primary file system for Linux OS

- Apple HFS – the primary file system for Mac OS X

- Resilient FS 3.1/3.4 – a potential successor to NTFS
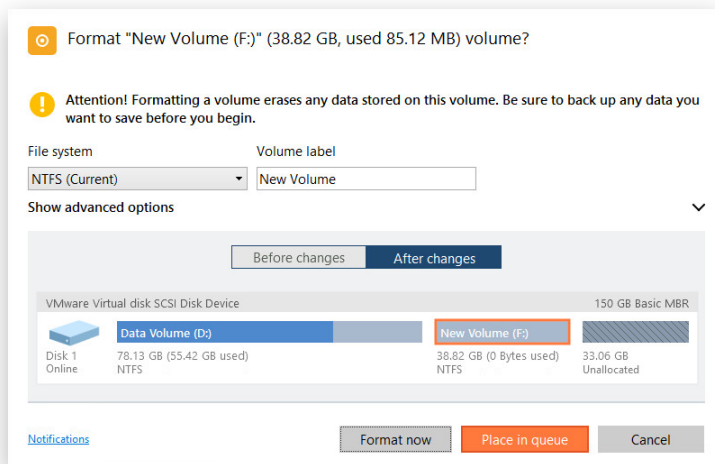
4. Click **Show advanced options** if you want to change the default amount of sectors per cluster. The cluster size is one of the crucial parameters of any file system. Its value implicitly affects the performance of the files input-output activity since it defines the size of the file system metadata. Besides, the so-called waste space factor also depends on it.

All data on the selected partition will be lost after formatting.

You won't be able to work with a partition formatted to a Windows unsupported file system, unless you have a third-party driver installed, for instance Apple HFS for Windows.

5. Use the corresponding buttons to check the original and resulting disk layouts.

6. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

7. Use the corresponding buttons to check the original and resulting disk layouts. Click **Format now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Deleting a Partition

1. Click **Disks & Volumes** on the sidebar.

2. Left click an existing partition in the working area, then select **Delete partition** on the sidebar.

3. By default, our program only suggests removing references to the selected partition from the Partition Table.

4. If you'd like to additionally destroy the on-partition data, mark the **Make the deleted data unrecoverable** option to specify data erasure algorithm and other parameters. Find more details in **Erasing Data**.
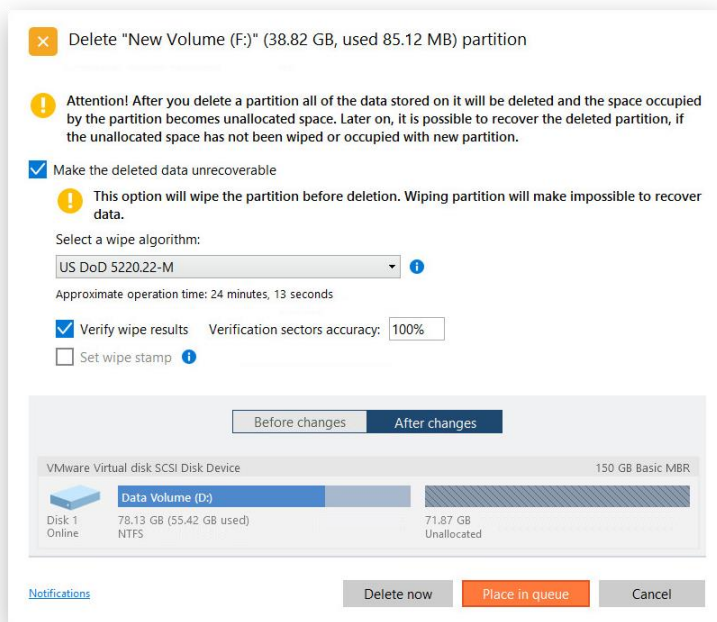
5. Use the corresponding buttons to check the original and resulting disk layouts.

6. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

7. Use the corresponding buttons to check the original and resulting disk layouts. Click **Delete now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Moving/Resizing a Partition

1. Click **Disks & Volumes** on the sidebar.

2. Left click an existing partition in the working area, then select **Move or Resize** on the sidebar. Alternatively, you can drag-and-drop borders of a partition directly on the Disk Map to define its size and position.
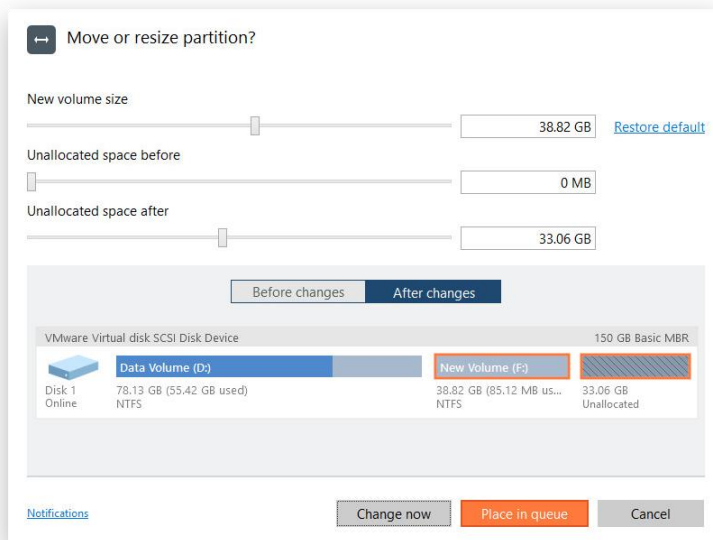
3. Use the corresponding sliders or set accurate values to define new size and the amount of unallocated space before and after the partition.

4. Use the corresponding buttons to check the original and resulting disk layouts.

5. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

6. Click **Change now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.


⚠ **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.**

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.

Hard Disk Manager 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 our program offers this function only for blocks of free space.

1. Click **Disks & Volumes** on the sidebar.

2. Left click a block of free space that used to be a partition in the working area, then select **Undelete volumes** on the sidebar.

3. 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 "Full search" option to scan every single sector in the specified search area to get the most accurate results.
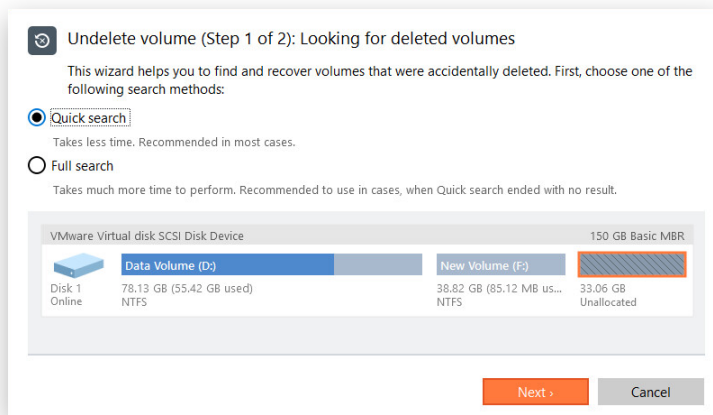
4. By default, our program searches records of any deleted partition ever existed on the selected block of free space. So you can get several partitions to choose from. Most likely the required partition will be found first.
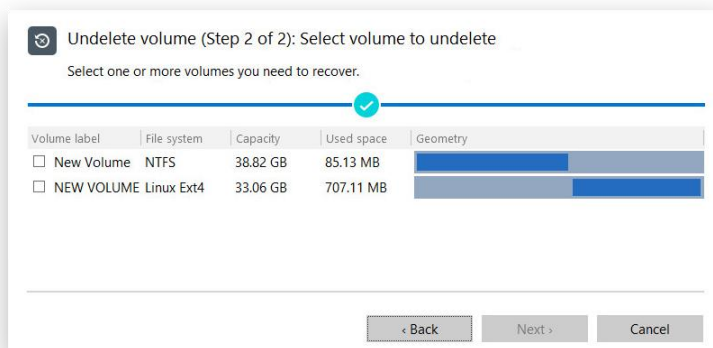
5. Use the corresponding buttons to check the original and resulting disk layouts.
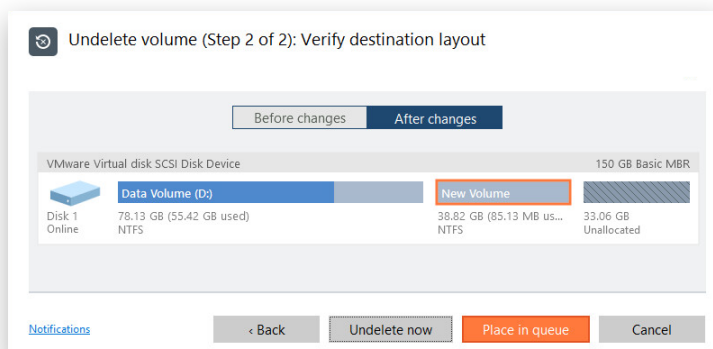
6. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

7. Click **Undelete now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Converting File System

You can change type of an existing file system without formatting and completely safe for your data. First the original file system will be checked for consistency, then the partition data will be verified whether it meets the requirements of the target file system or not. And only after having passed this testing, our program will re-organize the file system metadata and user files.

Our program supports the following scenarios:

- FAT16/32 <> NTFS conversion

- NTFS <> HFS conversion

- NTFS <>Resilient FS 3.1/3.4

1. Click **Disks & Volumes** on the sidebar.

2. Left click an existing partition in the working area, then select **Convert file system** on the sidebar.

3. Choose a file system you would like to convert to from the list. Our program only displays variants available for the operation, taking into account parameters of the selected partition and limitations of the used file system.

   If necessary, you can change the suggested cluster size. This parameter can have a profound effect on the overall performance. In a nutshell, larger clusters waste more space, but generally provide for slightly better performance, because of less fragmentation. So be particularly careful with it.

> ⚠ **The cluster size value is expressed in sectors per cluster. To get it in Kbytes, please divide it into half.**

4. Use the corresponding buttons to check the original and resulting disk layouts.

5. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

6. Click **Convert now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Changing Volume Label

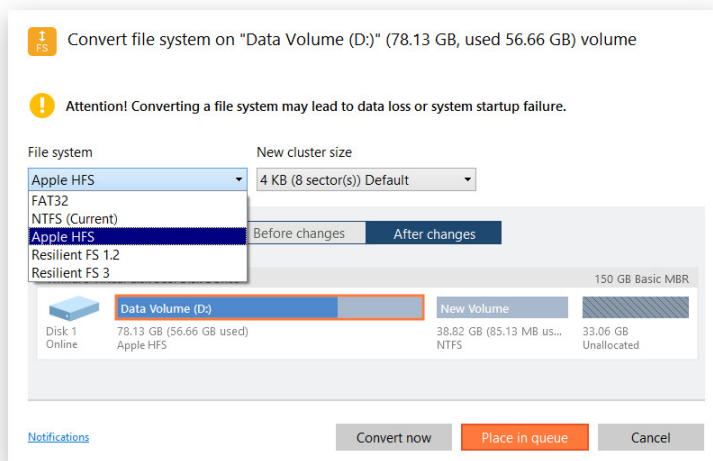1. Click **Disks & Volumes** on the sidebar.

2. Left click an existing partition in the working area, then select **Change volume label** on the sidebar.

3. Change the default volume label to easily identify the partition later.
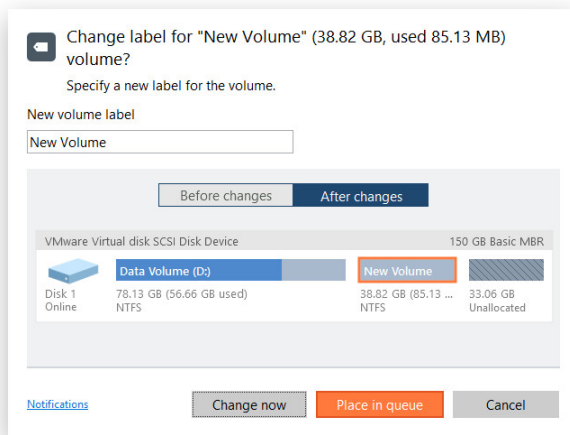
4. Use the corresponding buttons to check the original and resulting disk layouts.

5. Click **Change now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.
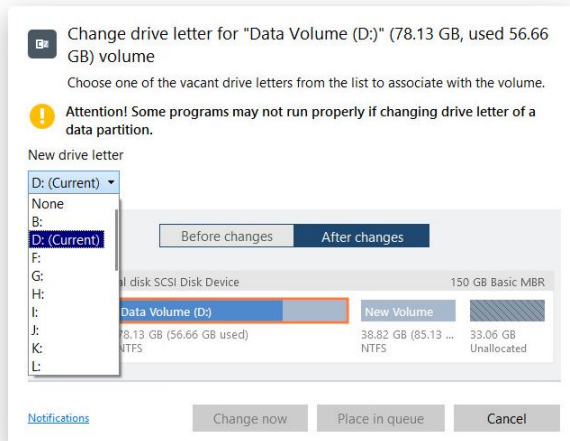
Changing Drive Letter

1. Click **Disks & Volumes** on the sidebar.

2. Left click an existing partition in the working area, then select **Change drive letter** on the sidebar.

3. Choose one of the vacant drive letters from the list to associate with the partition. The drive letter plays an important role in telling Windows where to look data.

> ⚠ **After changing drive letter of the system partition, your Windows OS won't start up.**
>
> **Some programs may not run properly either if changing drive letter of a data partition.**

4. Use the corresponding buttons to check the original and resulting disk layouts.

5. Click **Change now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Hiding/Unhiding Partition

This option can help you hide a partition from OS, applications, and users, thus preventing access to its contents and vice versa. To prevent the situation when the operating system becomes unbootable, our program doesn't allow you to hide OS partitions.
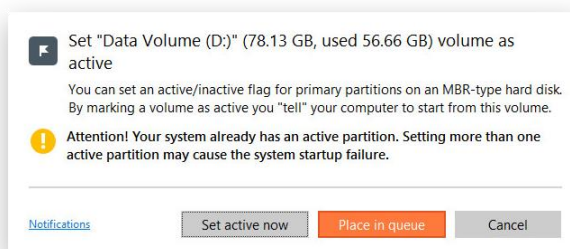
1. Click **Disks & Volumes** on the sidebar.

2. Left click an existing partition in the working area, then select **Hide/Unhide partition** on the sidebar.

3. Click **Hide/Unhide now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.
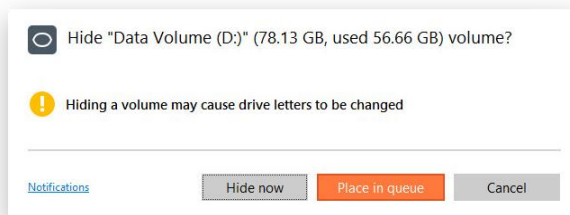
Making Partition Active/Inactive

You can set an active/inactive flag for primary partitions on an MBR-type hard disk. Please note that OS starts up only if the partition where its bootable files are resided is active or bootable.

1. Click **Disks & Volumes** on the sidebar.

2. Left click an existing partition in the working area, then select **Set partition as active/inactive** on the sidebar.

3. Click **Set active/inactive now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Updating MBR

Our program enables you to overwrite the current bootable code in the MBR (Master Boot Record) by the standard bootstrap code. This can help to repair a corrupted bootable code of a hard disk after a boot virus attack or a malfunction of boot management software.

1. Click **Disks & Volumes** on the sidebar.

2. Left click an existing MBR disk in the working area, then select **Update MBR** on the sidebar.

3. Click **Update now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Update MBR?
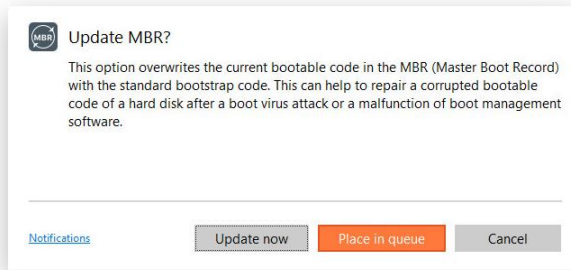
This option overwrites the current bootable code in the MBR (Master Boot Record) with the standard bootstrap code. This can help to repair a corrupted bootable code of a hard disk after a boot virus attack or a malfunction of boot management software.

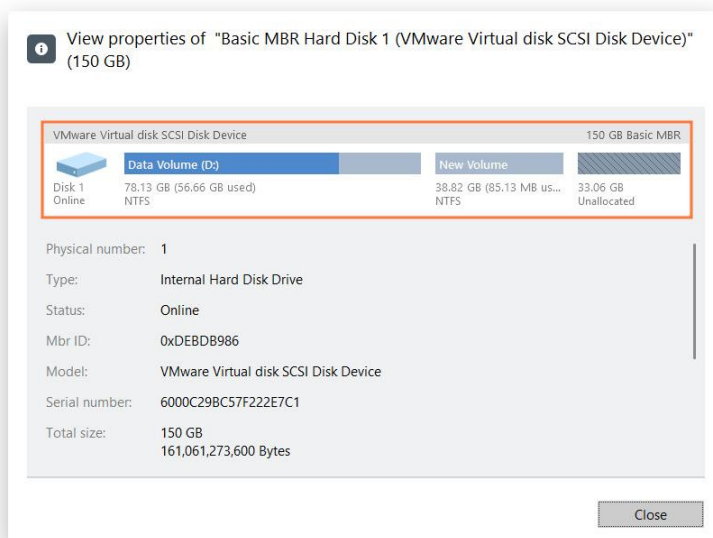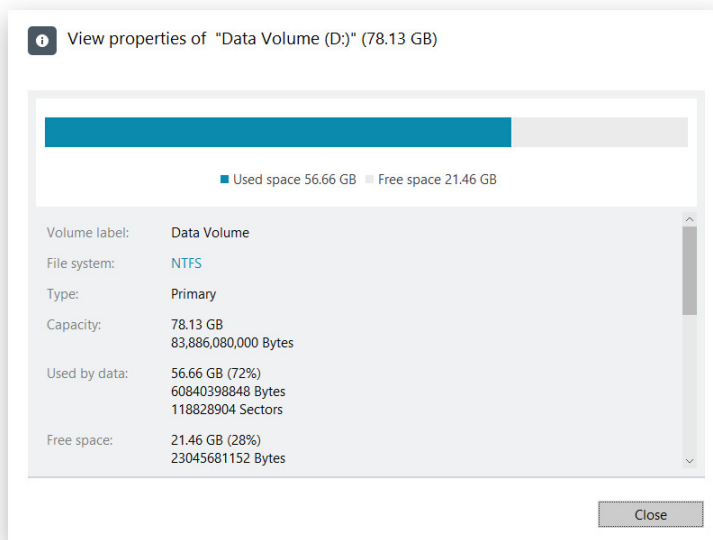Notifications   Update now   Place in queue   Cancel

Getting Disk/Partition Properties

1. Click **Disks & Volumes** on the sidebar.

2. Left click an existing partition or disk in the working area, then select **Properties** on the sidebar.

3. Our program provides detailed information on the properties of an entire storage device or individual partition. Besides the general information, such as capacity, used space or file system type it provides the possibility to get info on hard disk geometry, cluster size, exact partition location, etc.

Disk Properties:

View properties of "Basic MBR Hard Disk 1 (VMware Virtual disk SCSI Disk Device)" (150 GB)

VMware Virtual disk SCSI Disk Device		150 GB Basic MBR
Data Volume (D:)	New Volume	
Disk 1 Online 78.13 GB (56.66 GB used) NTFS	38.82 GB (85.13 MB us… NTFS	33.06 GB Unallocated

Physical number:	1
Type:	Internal Hard Disk Drive
Status:	Online
Mbr ID:	0xDEBDB986
Model:	VMware Virtual disk SCSI Disk Device
Serial number:	6000C29BC57F222E7C1
Total size:	150 GB 161,061,273,600 Bytes

Close

Partition Properties:

Complex Partitioning Tasks
Splitting a Partition

Let's assume you have one partition across the entire hard disk, like most other people who purchase a computer with a preinstalled operating system. So besides OS, it holds all your documents, favorite music, movies and family photos. This type of configuration is not optimal for effective data organization and safety. First, it negatively affects the system: huge amount of data aggravated by its inevitable excessive fragmentation causes poor performance in file search/access and read/write operations. Second, it's inconvenient for the user: system files and folders piled up with media and documents besides obvious difficulties in transparent organization become a naughty problem in case of a system malfunction.

Hard Disk Manager can help you detach the operating system and data or different types of data by splitting one partition to two different partitions of the same type and file system – you just select a partition, then files and folders you'd like to move to the new partition and finally redistribute free space between the two partitions, if necessary.

Before you start, please take into account the cases when the split operation is impossible to perform:

- Partition's type is not supported (you have selected a non-standard primary or logical partition);

- The selected partition is located on a dynamic disk;

- You've already got 4 primary partitions on a Basic MBR disk;

- You've already got 3 primary partitions on a Hybrid (Retained) GPT+MBR disk;

- There's not enough free space on the selected partition (free up to 50 MB);

- The selected partition has an unsupported file system.

1. Click **Disks & Volumes** on the sidebar.

2. Left click a partition you'd like to split in the working area, then select **Split partition** on the sidebar.

3. By default, our program suggests you to allocate some free space to the new partition (depends on the disk layout), label it "SPLITVOL", and assign no drive letter.

   If necessary, change the partition size by using the "New volume size" slider or setting an accurate value in the corresponding field. You can also change the default volume label and associate one of the vacant drive letters with the partition to make it available for OS and applications after the operation.
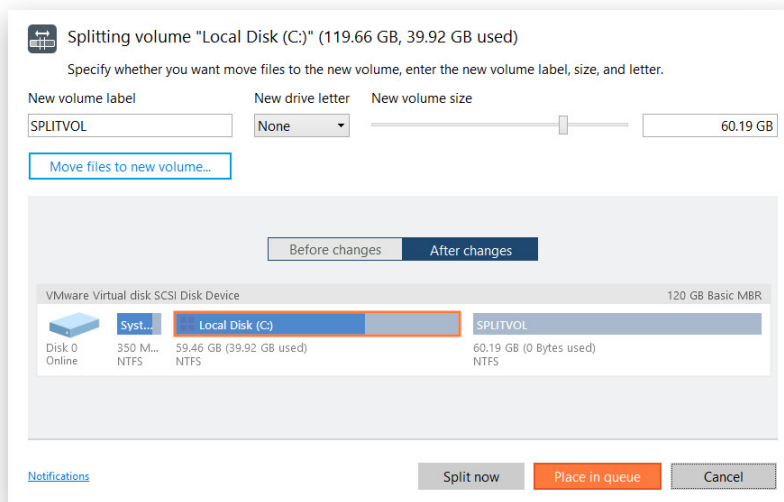
> You should decide for yourself how much free space of the original partition should be given to the new partition. Anyway, we strongly recommend you to allocate enough free space to both partitions.

---

4. Click **Move files to new volume...**, then mark checkboxes next to files or folders you're planning to move from the original partition to the new one. Click **OK** when ready to let our program calculate the amount of selected data and go back to the main dialog window. Please note that the calculation may take some time, so please be patient.
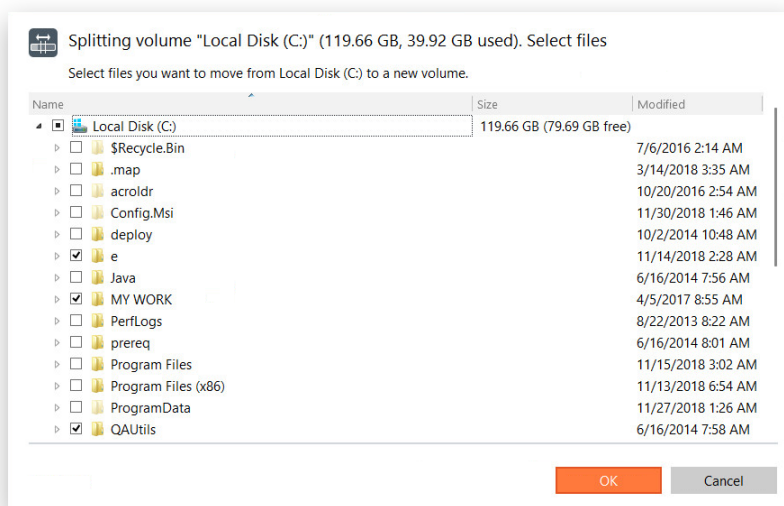
> **Please do not move system files or folders like "Windows", "Users", "Program Files", config.sys, etc. for it may cause inability of the operating system to start up.**

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5. Use the corresponding buttons to check the original and resulting disk layouts.

6. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

7. Click **Split now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Expanding a Partition

Hard Disk Manager can help you increase free space on one partition by up-taking the on-disk unallocated space and the unused space of other partitions. According to introduced changes, our program will automatically recalculate positions of the involved partitions and move their contents to new locations.

> ⚠️ If you need to redistribute free space between two adjacent partitions, drag-and-drop the border between them directly on the Disk Map.

1. Click **Disks & Volumes** on the sidebar.

2. Left click a partition you'd like to expand in the working area, then select **Expand** on the sidebar.

3. By default, our program suggests adding all blocks of the free space to the target partition. You can also specify other on-disk partitions of the supported file system type to act as space donor.
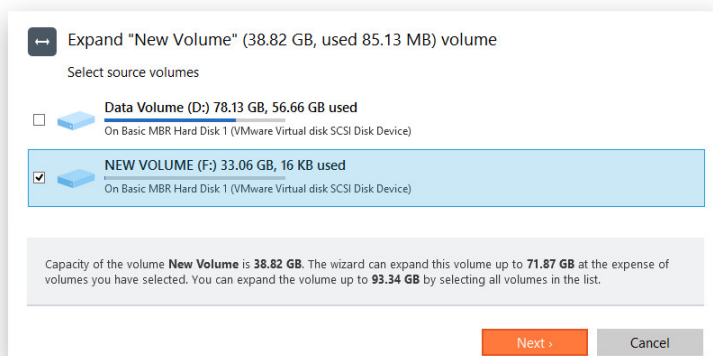
4. Set the partition size by using the "New volume size" slider or setting an accurate value in the corresponding field. If capacity of the available unallocated space is not enough, lacking free space will be taken proportionally from specified donor partitions.
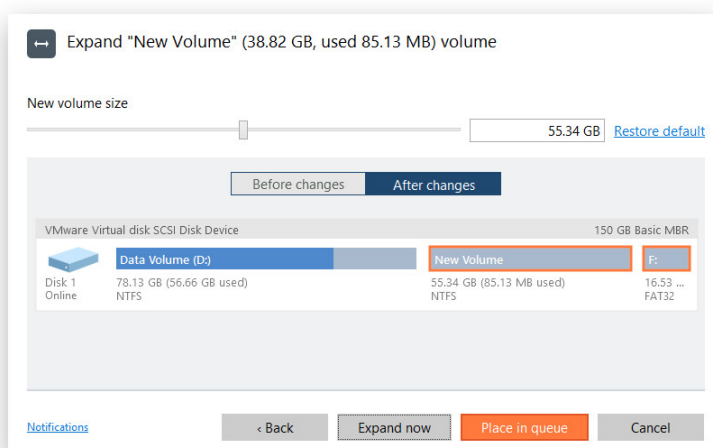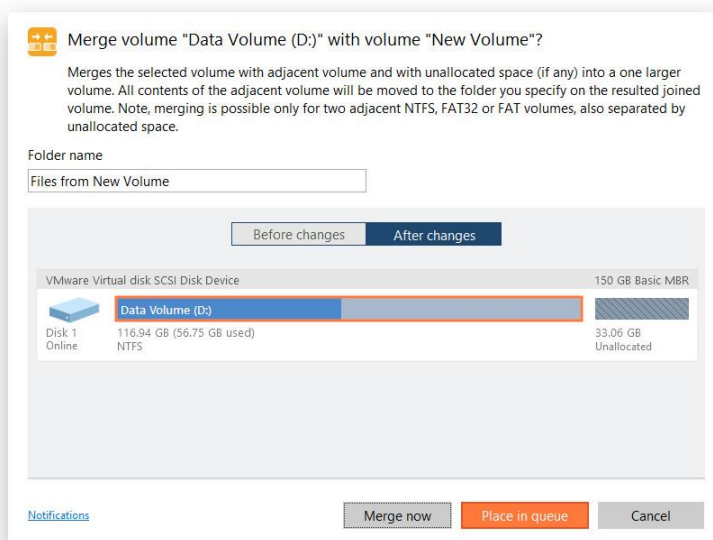
5. Use the corresponding buttons to check the original and resulting disk layouts.

6. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

7. Click **Expand now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Merging Partitions

Hard Disk Manager enables you to consolidate the disk space, which originally belongs to two adjacent partitions (or additionally separated by free blocks), into a single, larger partition.

Please note that our program can only merge two adjacent NTFS, FAT32 or FAT partitions, also separated by unallocated space.

1. Click **Disks & Volumes** on the sidebar.

2. Left click the left partition of the pair of partitions you need to merge in the working area, then select **Merge with the right volume** on the sidebar.

3. By default, our program suggests moving all contents of the right partition to a folder named "Files from <volume label>"on the resulted joined partition. If necessary, change the default volume label in the corresponding field.

> ! **If a system partition is the right one of the selected pair, Windows OS will become unbootable after the merge operation is over.**
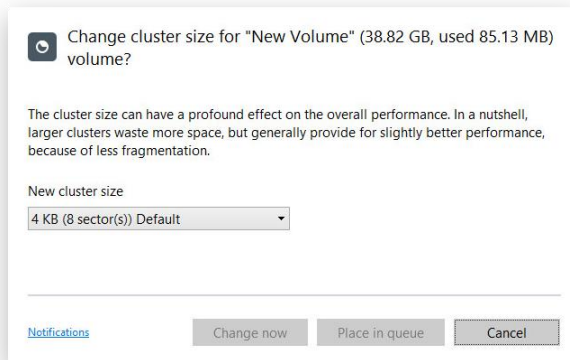
4. Use the corresponding buttons to check the original and resulting disk layouts.

5. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

6. Click **Merge now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Advanced Partitioning Tasks
Changing Cluster Size

The cluster size can have a profound effect on the overall performance. In a nutshell, larger clusters waste more space, but generally provide for slightly better performance, because of less fragmentation. So be particularly careful with it.

1. Click **Disks & Volumes** on the sidebar.

2. Left click an existing partition in the working area, then select **Change cluster size** on the sidebar.

3. Change the default cluster size according to your needs.

7. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

8. Click **Change now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.


⚠️ The cluster size value is expressed in sectors per cluster. To get it in Kbytes, please divide it into half.

Converting to Logical/Primary

You can include a primary partition into the extended partition or exclude a logical partition from the extended partition without partition duplication.

1. Click **Disks & Volumes** on the sidebar.

2. Left click an existing primary or logical partition in the working area, then select **Convert to logical/primary** on the sidebar.
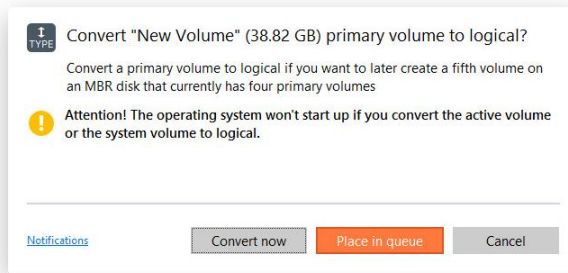
3. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

4. Click **Convert now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.


⚠ **The operating system won't start up if you make the system partition logical.**

Changing Serial Number

FAT16, FAT32, and NTFS file systems include the serial number parameter. It is generated automatically while formatting a partition and is saved in the boot sector.

You can modify this parameter for FAT16, FAT32, or NTFS partitions without re-formatting, and this way tackle software activation problems that may occur after Windows OS reinstallation or formatting partitions. It can also help when you get banned from a game server.

1. Click **Disks & Volumes** on the sidebar.

2. Left click an existing partition in the working area, then select **Change serial number** on the sidebar.

3. Enter a new serial number for the selected partition. It should contain 8 hexadecimal figures (0..9 or A..F). The operation cannot proceed until you enter all 8 symbols.
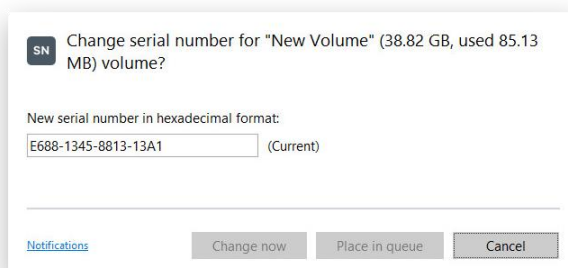
4. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

5. Click **Change now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Change Primary Slots

Different operating systems apply different approaches to enumeration of the primary partitions on MBR disks.

In Linux:

In Linux, every partition has a special symbolic name that encodes a hard disk containing a partition, and a partition itself. Partitions are addressed and accessed by using their symbolic names. Symbolic names are automatically generated by Linux in accordance with the order of hard disks in BIOS and the order of partition records in the Partition Table. Thus changing enumeration of the primary partitions can lead to changing of paths to some important resources.

In DOS:

MS-DOS uses a rather sophisticated algorithm for a drive letter assignment. A drive letter, which is assigned to a partition, depends on the order of records in the Partition Table. Thus changing enumeration of the primary partitions affects the drive letters assignment. In early versions of MS-DOS, it could even lead to the unavailability of a partition.

Hard Disk Manager enables you to change enumeration of the primary partitions on a basic MBR disk, and this way fix boot problems that may occur after a boot manager failure or incorrect work of a disaster recovery utility.

1. Click **Disks & Volumes** on the sidebar.

2. Left click an MBR disk in the working area, then select **Change primary slots** on the sidebar.

3. Use the corresponding buttons to move the selected partition up and down within the primary part of the partition table.
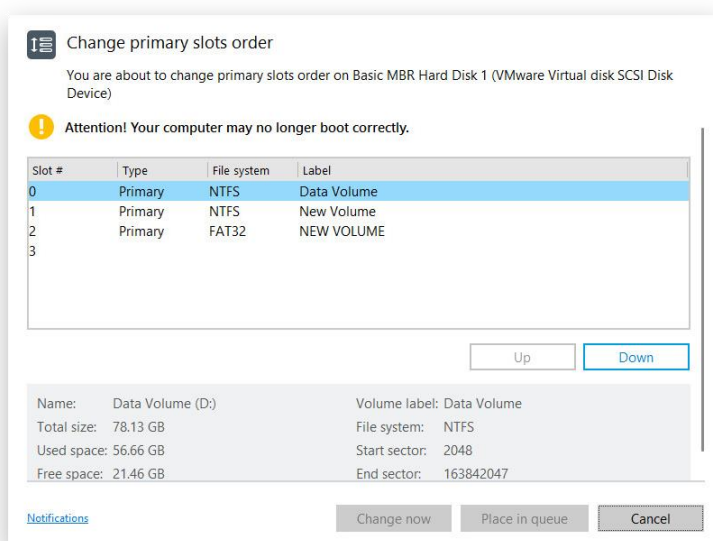
OS may no longer start up after changing enumeration of system partitions.

4. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

5. Click **Change now** to start the operation immediately or **Place in queue** to add this task to <u>the list of pending changes for later execution</u>.

Converting a Partition Table

Your storage device may have GPT (GUID Partition Table), MBR (Master Boot Record), including dynamic disk configurations, or a hybrid GPT+MBR partition table.

GPT is now used on Windows and Mac computers as the primary partition scheme, while MBR used to be the main and only partition scheme for Windows computers up to Vista. A hybrid GPT+MBR partition scheme is a necessity for Apple BootCamp users. Dynamic disk configurations are mostly employed by business.

Our program allows easy non-destructive conversion between various partition schemes:

- Basic GPT <> Basic MBR disk conversion. Please note that only 64-bit Windows OSes since Vista are able to boot from a GPT disk. So if you've got a 32-bit Windows OS accommodated on an MBR disk, it won't start up after converting to GPT.

- Dynamic GPT/MBR > Basic MBR disk conversion. Please note that our program can only process dynamic disks containing solid simple volumes (without extension).

1. Click **Disks & Volumes** on the sidebar.

2. Left click a disk in the working area, then select **Convert MBR disk to GPT/Convert GPT disk to MBR/Convert dynamic to basic** on the sidebar (available operation depends on the chosen storage device).

3. Conversion from MBR to GPT doesn't require any configuration.
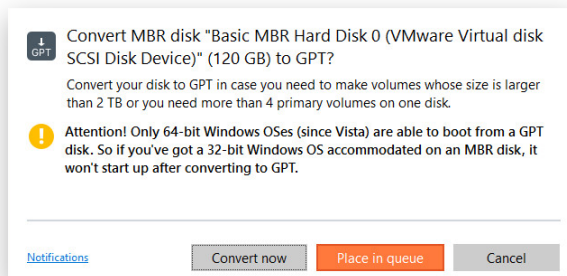
But when attempting to convert a basic GPT disk or a dynamic disk containing several volumes, our program will ask you to choose the preferred number of primary partitions, and the rest (if there are more than four volumes on the disk) will be converted to logical disks within the extended partition. It has to do with the limitations of the MBR partitioning scheme, that does not allow more than four primary partitions on one disk or one extended and three primary partitions.
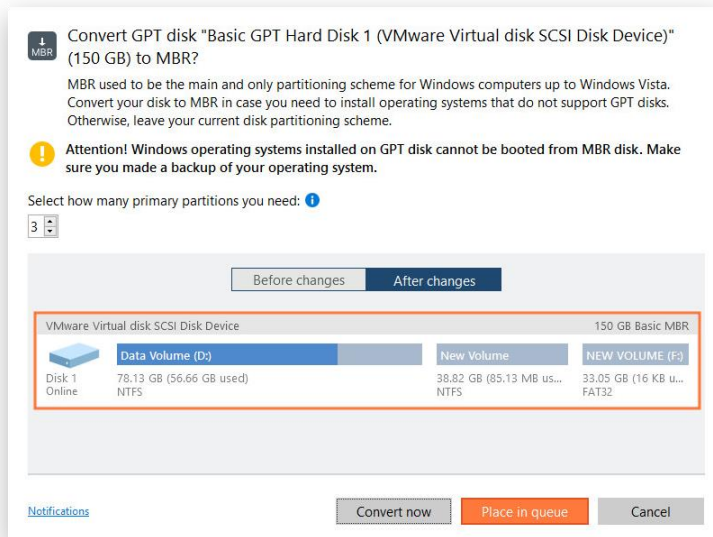
4. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

5. Click **Convert now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Editing Disk Sectors

With the help of this function advanced users can fix various boot problems or verify results of accomplished data erasure operations. It can also be great for studying purposes as it provides visual representation of the disk structure and information it contains.

⚠️ **Careless use of this function may lead to boot problems or even data loss.**

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1. Click **Disks & Volumes** on the sidebar.

2. Left click a disk or individual partition in the working area, then select **View / edit sectors** on the sidebar.

3. You can directly access and modify sectors, save and restore sectors from specified files as well as navigate through the system metadata.

NTFS Optimization

As you know NTFS partitions get more and more redundant records about deleted files over time, which slows down performance. On database servers that host MS SQL or Exchange it may cause severe performance degradation. We include tools that help you organize valid and delete redundant records inside NTFS MFT (Master File Table) in a couple of minutes, so you don't need to rebuild the system or defragment the entire disk when that is the only problem.

Compacting MFT

1. Click **Disks & Volumes** on the sidebar.

2. Left click an NTFS partition in the working area, then select **Compact MFT** on the sidebar.

3. By default, our program prompts you to shift MFT records to the head of the table ("Compact records") and then remove emptied table rows ("Truncate MFT"). Though it's not recommended, you can disable any of these actions.

4. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

5. Click **Compact now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.
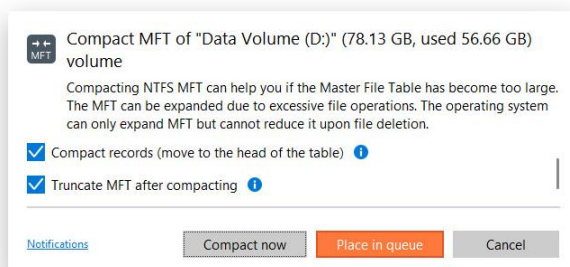
Defragmenting MFT

1. Click **Disks & Volumes** on the sidebar.

2. Left click an NTFS partition in the working area, then select **Defragment MFT** on the sidebar.

3. Since a hardware or software failure, or power outage during this operation may lead to data loss, please make a backup of the selected NTFS partition. Find more details in **Configuring Backup Job**.
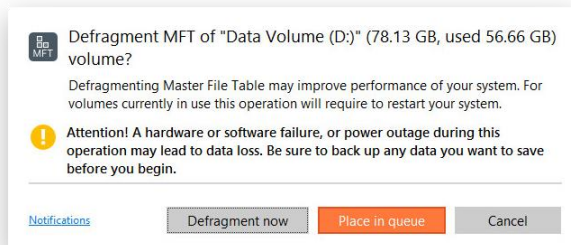
4. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

5. Click **Defragment now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Partitioning Virtual Disks

Guess you didn't know that partitioning of virtual disks could be done from outside without login into a guest virtual machine? Just connect a virtual disk you'd like to manage as if it was an ordinary physical disk and here you go. And if you feel uneasy about spoiling anything, just enable the non-destructive mode and all changes on the connected disk will be saved to a snapshot. This snapshot can later be merged with its parental disk by using standard tools included with the virtualization software. Find more details in **Connecting Virtual Disks**.

Connecting Virtual Disks

Our program helps you to connect virtual disks of all popular virtualization vendors (VHD(X), VMDK, and VDI) as if they were ordinary physical disks, and this way accomplish various operations, including:

- Clone partitions or entire disks, which opens V2P and V2V migration scenarios;

- Data exchange between physical and virtual environments;

- Drive partitioning (create, format, delete, move, resize, etc.);

- Modification of partition attributes (Active flag, Hidden flag, Volume Label, etc.);

- Optimization of virtual disks formatted to Microsoft NTFS;

- Data import from a parent virtual disk to one of its snapshots;

- Edit/View sectors, and many more.

Limitations:

- A virtual disk opened for writing with a 3rd party tool (e.g. being used by a virtual machine) won't be connected, as asynchronous parallel writing to the disk file will most likely result in data corruption.

- A virtual disk opened for reading with a 3rd party tool (e.g. it's a parent VMware disk, which snapshot is being used by a virtual machine) will be opened for reading only with the corresponding notification.

- The non-destructive connection is unavailable for .vdi disks, as our program doesn't support Oracle VirtualBox snapshots.

- Virtual disks connected from compact discs will be available for reading only.

- A double disk connection is prohibited.

1. Click **Disks & Volumes** on the sidebar.

2. Left click the three-dot icon on the sidebar opposite "Operations", then select **Connect virtual disk**.

3. Choose the required connection mode. Select the first option if a virtual disk you'd like to connect can be reached directly (resides on a local disk, removable media, or network share). The second option is for virtual disks hosted by VMware vSphere.

What would you like to connect?

→ Connect a local virtual disk
Connect local VHD, VMDK, PVHD and other virtual disks.

→ Connect VMware vSphere virtual disks
Connect virtual disks from virtual machines managed by vCenter or standalone ESXi host.
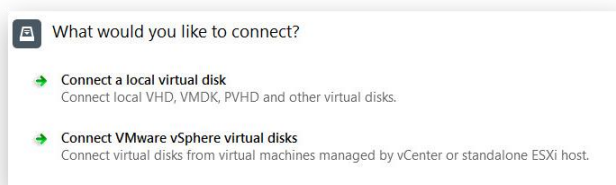
Direct connection

4. Type in a full path to the desired virtual container in the corresponding field or browse for it wherever it is stored (a local disk, a flash stick, a mapped network share, or a compact disc).
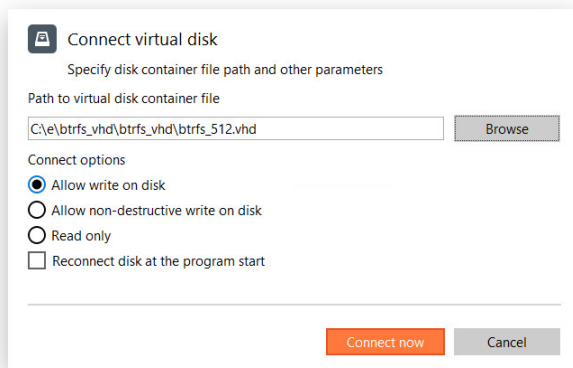
- **Allow write on disk**. By default, the selected disk will be connected in read/write mode until you disconnect it or exit our program.

- **Allow non-destructive write on disk**. It is a special read/write mode, when all changes on the connected disk are being saved to a snapshot, thus providing complete safety for the original disk's contents. If needed, this snapshot can later be merged with its parental disk by using standard tools of virtualization software vendor.

- **Read only**. Use this mode to avoid modification of data on the virtual disk.

- **Connect disk at the program start**. Use this option to have the virtual disk connected automatically at every program start.

> Although you're allowed to connect virtual disks from network shares, we do not recommend it due to modest performance.

vSphere connection

4. Enter an IP address (DNS name) of your vCenter or standalone ESX host and access credentials in the corresponding fields. All information except for the password will be saved for later use. Just click the arrow icon during the next launch and select on the previous connections.
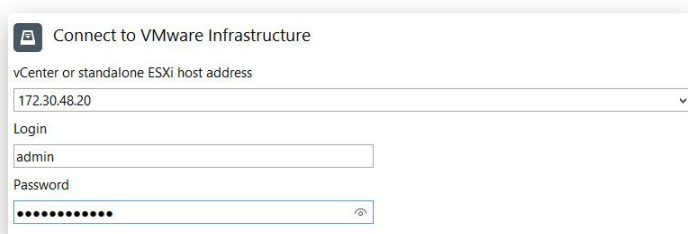
> Initial scanning of the ESX infrastructure requires time, please be patient.

5. Upon success, you will see the inventory of the connected host or vCenter. Browse for a guest virtual machine, which disks you'd like to manage, or enter its name in a text field for the fast search. Once found, mark a checkbox opposite the VM name to connect all virtual disks or double click it to select individual disks.

    If your local network is not secured and can be accessed by intruders, we highly recommend you to encrypt VD connections by enabling the **Securely connect virtual disks** option. Connections in this mode are also advised, if you establish multiple connections of more than 30 machines from one host managed by vCenter and 8+ machines from a standalone host, while a 3d party application simultaneously works with the same virtual disks via NFC.
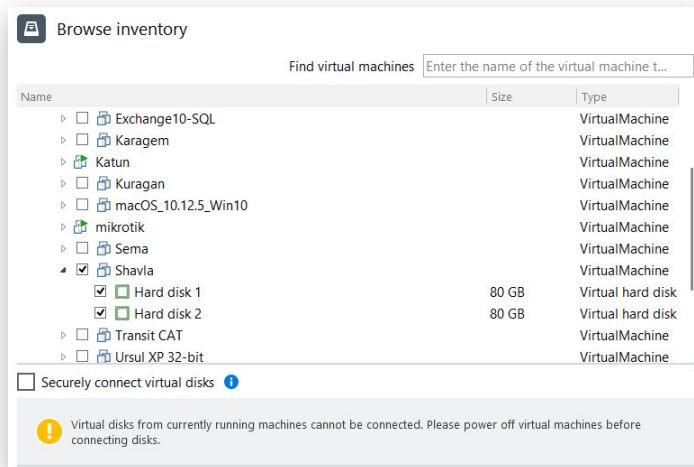
6. Click **Connect** when ready. The operation will be performed immediately.

7. As a result a new disk(s) will appear on the Disk Map. Now you can change its layout, copy data from/to, check surface and file system integrity, optimize NTFS, and accomplish other operations.

Checking Partitions for Problems

Testing Partition Surface

You can test surface of existing partitions and blocks of free space for bad or unstable sectors. During the operation all found questionable and damaged sectors will be marked unusable in the file system metadata, thus minimizing the risk of data loss.

1. Click **Disks & Volumes** on the sidebar.

2. Left click an existing partition or block of free space in the working area, then select **Test surface** on the sidebar.
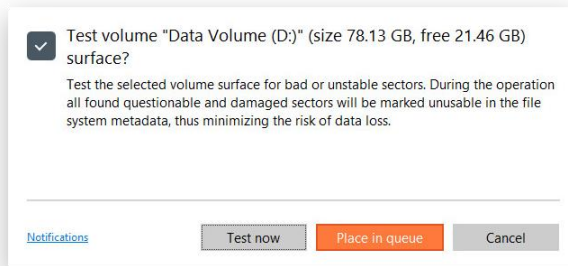
3. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

4. Click **Test now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Checking File System Integrity

You can check the integrity of a file system to detect and repair errors before copying data or performing drive partitioning.

1. Click **Disks & Volumes** on the sidebar.

2. Left click an existing partition or block of free space in the working area, then select **Check file system** on the sidebar.

3. If you'd like our program to automatically fix file system errors and/or find and attempt to repair bad sectors, just enable the corresponding options.
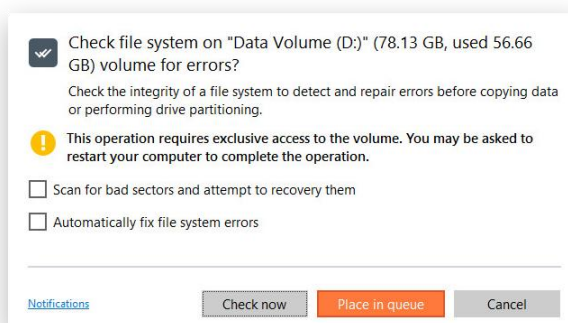
4. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

5. Click **Check now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

⚠️   This operation requires exclusive access to the volume, so please be ready to restart the system.

Erasing Data

You probably don't have an idea that deleted data can be easily recovered by novice, while pros can retrieve data even from a disk destroyed by mechanical means. Your private data is yours alone and should not be exposed to third party in any way. This can be achieved by erasing your storage device.

1. Click **Disks & Volumes** on the sidebar.

2. Left click a volume or disk you'd like to erase completely in the working area, then select **Wipe data** on the sidebar. If you need to wipe remnants of deleted files and folders only, select **Wipe free space**.

3. Change the default wipe options, if necessary.
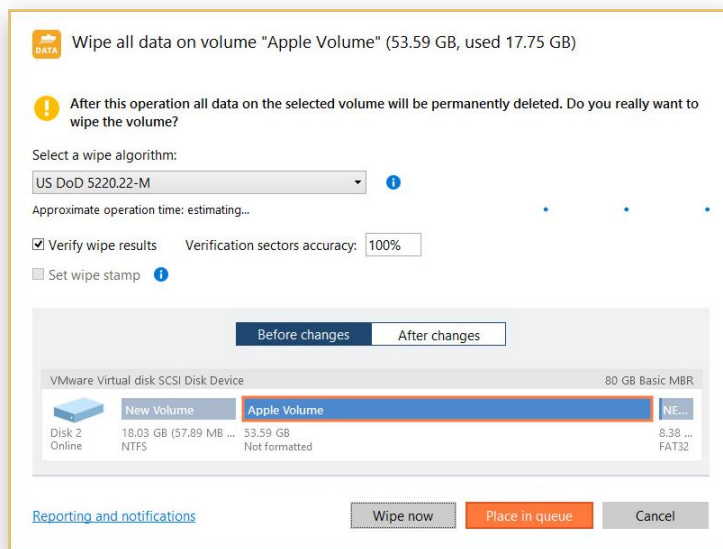
- Select a specific data erasure algorithm or create your own method.
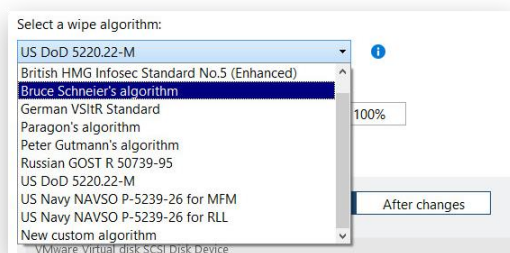
Please note that the SSD Trim option becomes available in the wizard, if our program detects one or several SSD (NVME SSD) drives in your system. We highly recommend you not to apply traditional HDD-based wiping algorithms for your solid state drives. First, the data wiping eats up write cycles, which are limited for SSD. Second, none of traditional erasure software is able to control the specific region the data is written to, as this is controlled by SSD controllers. Thus the data wiping doesn't guarantee complete data destruction on SSD.
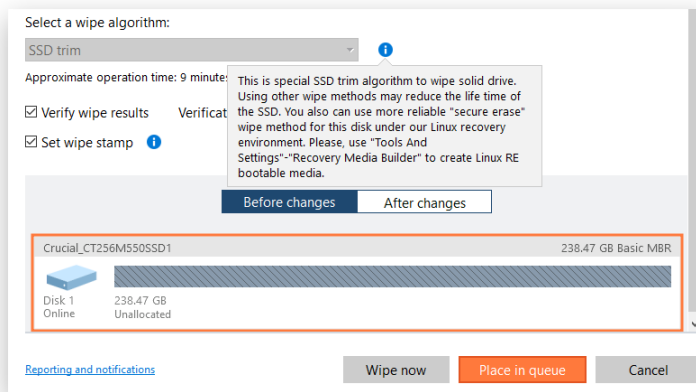
However, even SSD Trim doesn't securely delete data. Because the SSD hardware controller does the job independently, you cannot say for sure when it actually trims all blocks. Furthermore, SSD drives use some unallocated space as a buffer during the wear leveling to keep data records there.

Only the so called "Secure Erase" function can help you to irreversible and completely delete data from SSD. Many SSD manufacturers include it into their hardware management tools. Our Linux-based recovery environment also contains this capability. So if you need a guaranteed permanent deletion of data from your SSD or NVME SSD drive, please use the secure erase.
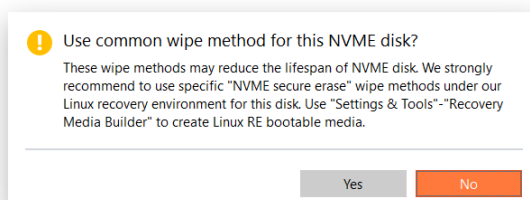
The list of supported wiping algorithms may vary for your product.

The "trim" command works for individual volumes, entire drives, and remnants of deleted files.

To create a new wiping algorithm, define up to four wiping patterns, number of passes for each wiping pattern and for the group of patterns. The Mask spinner control allows you to set a hexadecimal character value ("0" by default). The available range is from "0" to "FF". You can also choose whether to carry out residual data verification or not specifying the percentage of sectors to check.
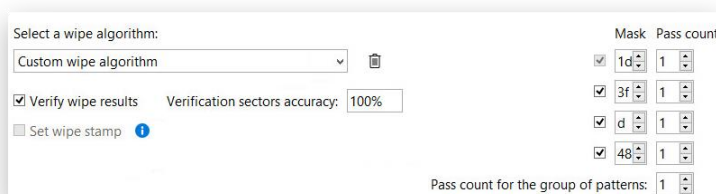
- Mark the **Set wipe stamp** option to add information on the used wipe program, algorithm, device serial number, and other properties to the MBR (Master Boot Record) of the wiped storage device to get notified during the boot phase how and when the storage has been wiped. Please note this option is available when wiping entire disks only.

4. Click **Reporting and notifications** to set up e-mail notification about successful completion and/or failure of the wipe operation and/or to let our program generate a wipe report.

Find more details in:

- **E-mail Settings**

- **Notifications Settings**

- **Reporting Settings**

5. Use the corresponding buttons to check the original and resulting disk layouts.

6. Click **Wipe now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

Copying Data

Sooner or later each of us faces the problem of having not enough space on the internal disk to install a new game or application, or to store a favorite music album or family pictures. Worse still, is a situation when a system HDD or a trendy SSD starts to deteriorate, threatening to die any moment. When this is happening to us, the only thought we've got is how to transfer Windows OS, applications and all data to a newer and larger storage device with minimal time and effort.

Fortunately, there are technologies that help to straightforward the process of moving all contents of your disk, including standard bootstrap code and other system service structures, to another storage device without having to re-install the operating system and applications. Our program can help you to perform fast and safe migrations of Windows OS, single partitions and entire disks to new storage devices and even downsizes to smaller capacity drives.

Copy operating system

Below you can find a step-by-step guide how to transfer Windows OS to a fast but relatively small SSD drive.

1. Connect a new disk to the computer.

2. Launch Hard Disk Manager.

3. Click **Disks & Volumes** on the sidebar.

4. Left click the three-dot icon opposite "Operations", then select **Find and copy OS**. Alternatively, you can left click a Windows OS volume in the working area, then select **Copy operating system** on the sidebar.

5. Our program will search your system for supported operating systems. If several OSes have been found, you will need to choose the one you'd like to migrate.
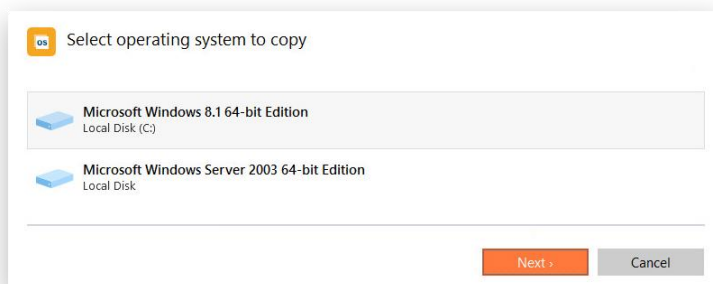
6. Depending on your choice, it will then automatically pick one or two on-disk partitions (Windows may have System Reserved, a special hidden partition that contains boot critical files, while in the uEFI+GPT mode there will be another hidden partition, called EFI System Partition).

    If there are more than two storage devices besides the source, you can select a destination disk from the drop-down list.

    If the selected disk is not enough in capacity to hold your OS, you will be suggested to exclude files from the main system partition.
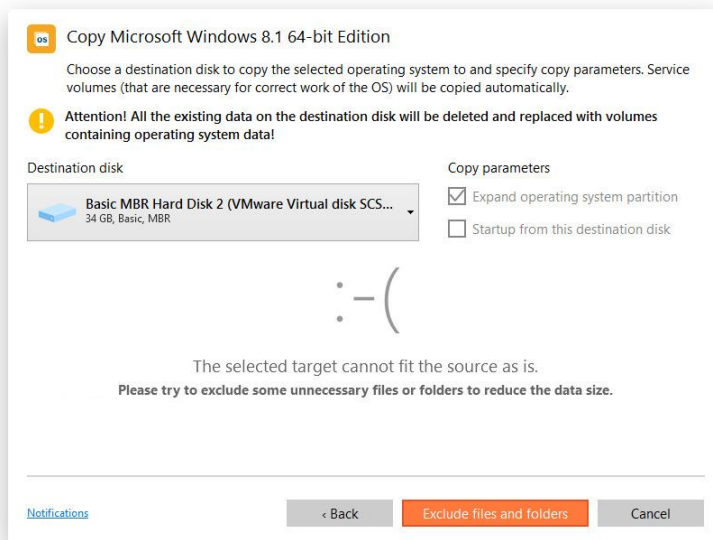
If the selected disk is the same size or larger than the source, but you're still willing to remove redundant data from the migration process, just click **Exclude files and folders**.
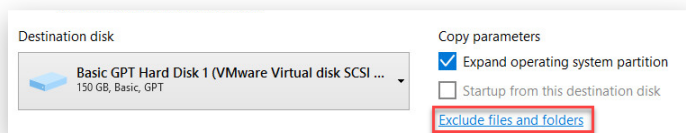

- By default, our program is configured to expand the resulted OS partition across all on-disk space. Unmark the corresponding option if you don't need that.

- If the destination disk becomes Bootable GPT as a result of the migration process, you'll see one more option available for selection. Please note that you can specify a bootable device at any time through Boot Corrector.

All data stored on the specified destination disk will be lost during the migration, so please use Windows Explorer or any file manager to check and save important data to another location.

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7. Double click the system partition to see its contents, then unmark checkboxes opposite unnecessary files and folders to try to fit in to the destination disk. We highly recommend you not to exclude system files, but those that could take plenty of disk space, like video, music, photos, etc.

Click **OK** when ready to let our program calculate the amount of selected data and go back to the main dialog window. Please note that the calculation may take some time, so please be patient.
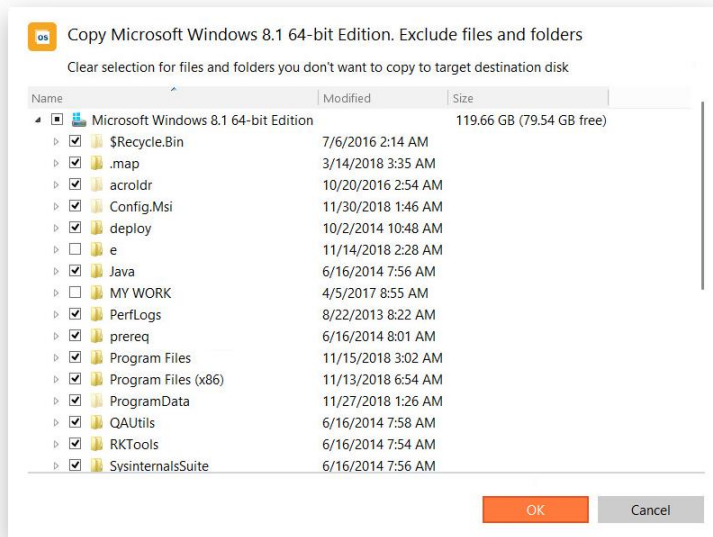
8. Use the corresponding buttons to check the original and resulting disk layouts.
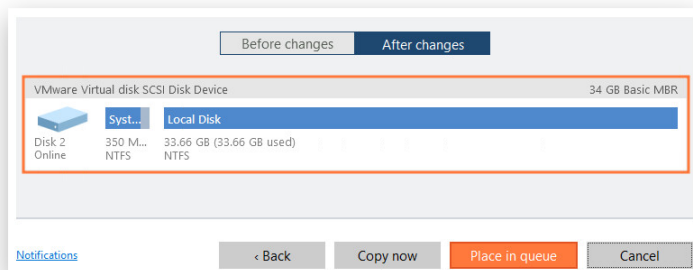
9. If necessary, click **Notifications** to set up e-mail notification about successful completion and/or failure of the operation. Find more details in **Notifications Settings**.

10. Click **Copy now** to start the operation immediately or **Place in queue** to add this task to the list of pending changes for later execution.

11. When the migration is over, first check up Windows OS starts up from the destination disk. If yes, delete the Windows OS partition from the source disk, then re-partition the disk according to your needs.

Copy disk

1. Launch Hard Disk Manager from Windows, or use Recovery Media (see Building Recovery Media).
2. Click **Disks & Volumes** on the sidebar.

3. You can left click a Disk in the working area, then select **Copy disk** on the sidebar.

4. On the Disk map, click on disk you wish to copy and choose "Copy Disk" in the left panel

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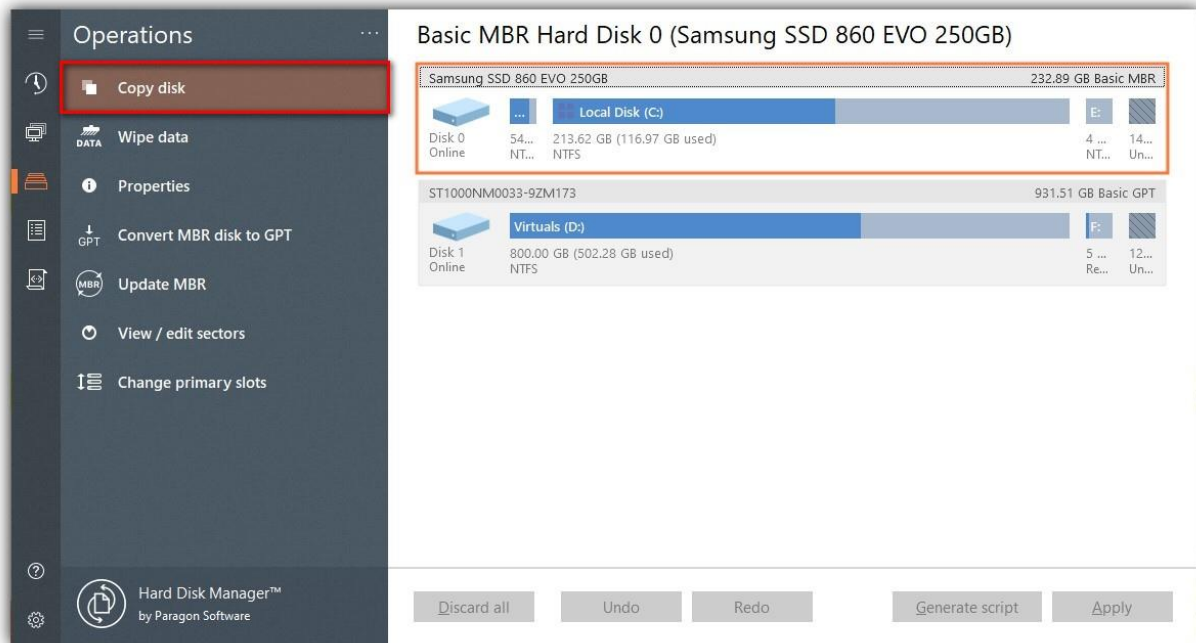
! **If the selected disk is larger than the source disk, or it has the same size, you still can exclude unnecessary data from the migration by clicking on "Exclude files and folders".**

---

5. By default, the product is set to resize selected volumes proportionally in accordance to the size of the target drive (this is toggled by "Copy with proportional auto-resize" box in "Copy parameters" menu). Use the **Keep disk layout** option if you want to copy the hard disk as is.
    Select **Copy with proportional resize** to enlarge or shrink copied volumes proportionally to the target disk capacity. Please note that the maximum volume size is limited by the used file system. For example, a FAT32 volume cannot be larger than 32 GB.
    The **Copy disk raw structure** option provides sector-to-sector copying of data, unallocated and unused volume space (requires more time to complete).
    If it's required to make computer boot from the target drive on next start, just check "Startup from destination", and the product will perform all necessary adjustments.
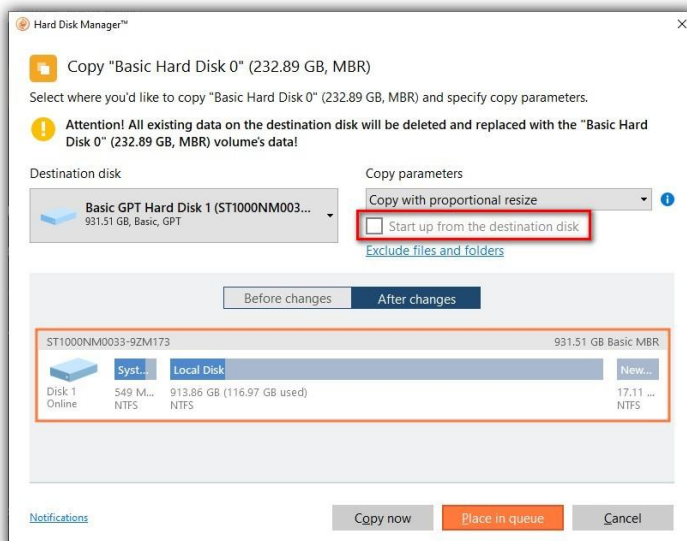
6. On the Disk Map, you can examine target disk layout before and after migration. If needed, use the corresponding option to create report with operation results.

7. Press "Copy now" to start the operation, or press "Place in queue" to perform it later, together with other queued operations. (see Simulation mode).
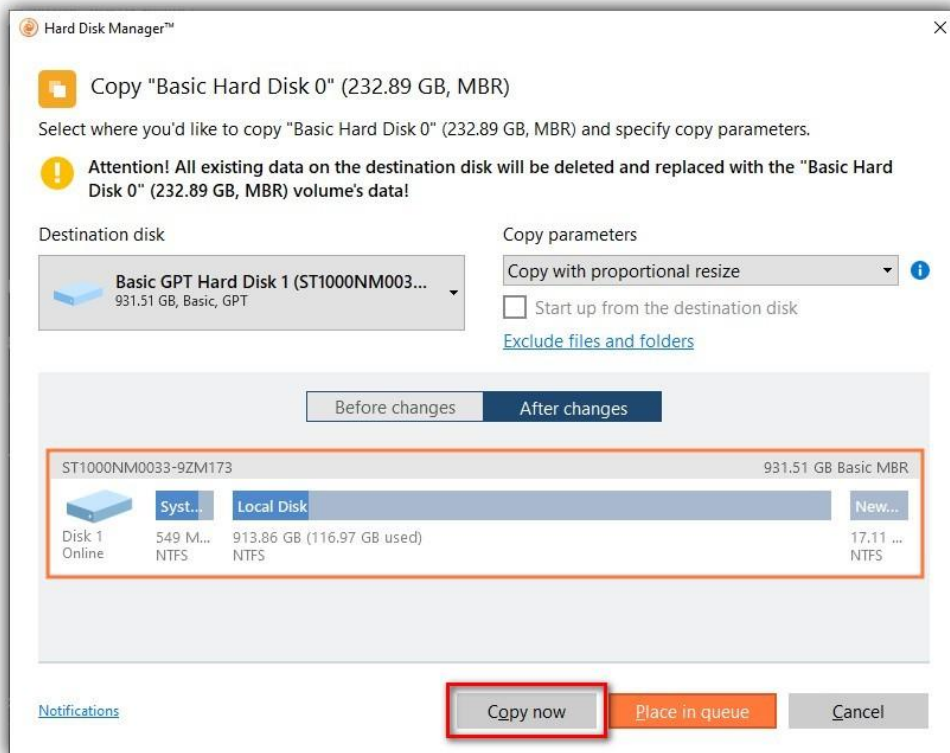
Migrating VM

To be agile and competitive a contemporary IT environment needs a clear migration path across different hypervisors. There are two major virtualization software vendors on the market right now, i.e. VMware and Microsoft. Compared to hypervisors from VMware, Microsoft Hyper-V has the great advantage of being included with Windows Server at no extra cost and providing tight integration with Microsoft Azure, which really makes sense for a switch.

With Hard Disk Manager you can easily migrate your virtual machines from VMware vCenter, ESX or ESXi servers directly to Microsoft Hyper-V environment.

> ⚠️ **This is an offline migration scenario, so your VMs won't be available until it is over. The total amount of downtime depends on the size of VMDKs to be processed.**

Recommended actions before you start the migration:

- Remove ISO-images, attached to the target virtual machines to avoid any disruptions.

- Check for the presence and remove unnecessary hardware inside the target virtual machines.

- Clean up the target virtual disks (empty the trash, delete unused apps, defrag the source volumes).

- Delete snapshots for the target virtual machines to convert "proper" VMDKs only, but not all differencing disks created by snapshots.

1. Click **VM Migrate** on the sidebar, then click the plus icon.

2. The Task steps list will appear to the right of the bar. First, you need to set up general migration options.
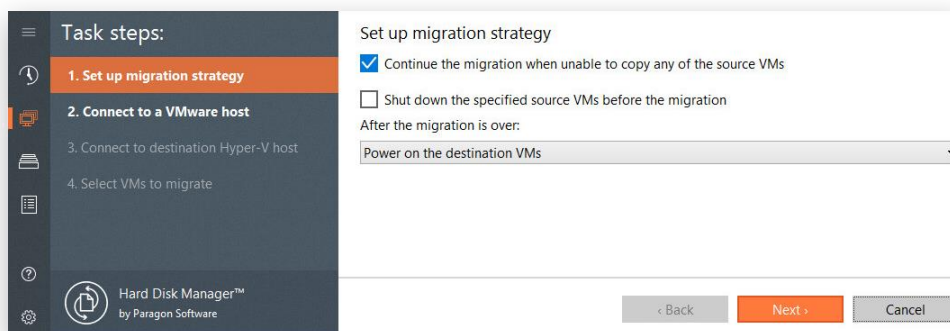
- **Continue the migration when unable to copy any of the source VMs**. Unmark this option, if you'd like our program to stop after failing to transfer any of the target virtual machines, otherwise the migration task will continue processing all specified VMs.

- **Shut down the specified source VMs before the migration**. Our program can only transfer powered off virtual machines. Use this option to let our program automatically power off a running VM(s) involved in the migration process.

- **Target VMs power status after the migration**. By default, the target virtual machines will be powered on automatically on the destination host after the migration is over. Change this behavior if necessary by selecting the corresponding option from the drop-down menu.

3. Then provide an IP-address or DNS name as well as access credentials to the VMware server that hosts virtual machines you'd like to transfer.

Mark the "Ignore Invalid SSL Certificate" checkbox, if the server's certificate is recognized as invalid, otherwise you won't be able to proceed to the next step.
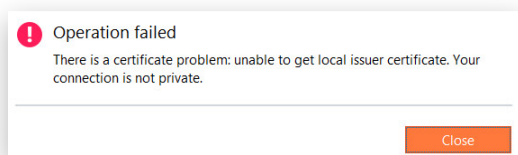
4. After establishing a test connection, provide an IP-address or DNS name as well as access credentials to the destination Hyper-V server.

5. If the details you entered at the previous step are also correct, you will be prompted to find and select one or several target VMs for the migration.

6. During the next step you need to specify the name and destination for each migrated VM, the preferred format of virtual disks (VHD or VHDx) and their type (Fixed size or dynamically expanded), as well as choose the required number of virtual processors and memory.

Mapping a network share for storing Hyper-V machines:

7. Once done, you will see the resulting migration task, which you can rename according to your needs. By clicking on any of the target VMs, you can review and change the specified migration options. Click **Run migration now** to start the process.
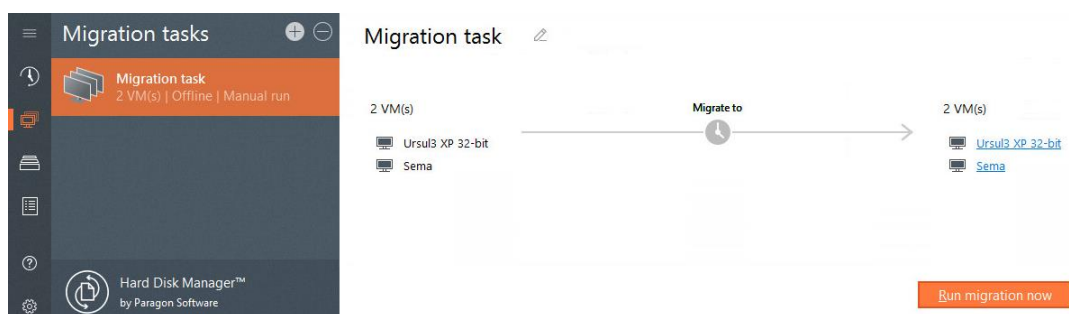
8. The following window will appear, containing all necessary information pertaining to the migration task in progress.
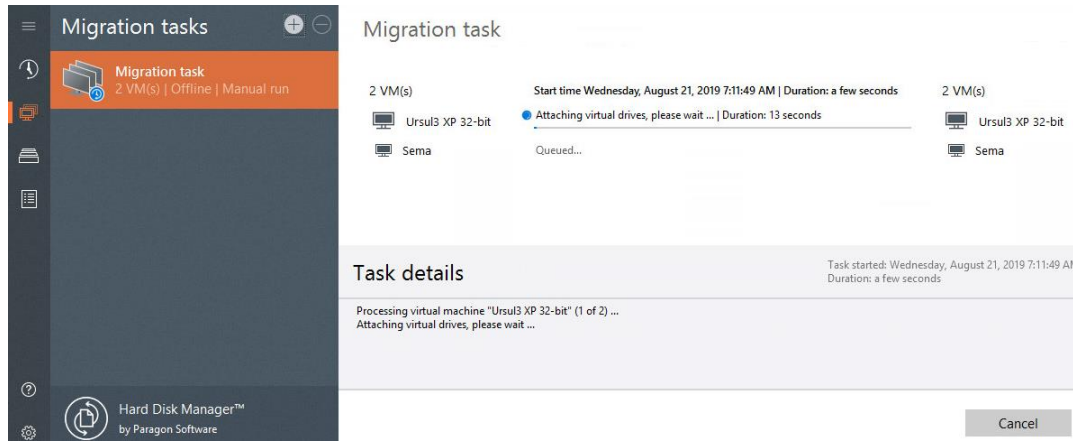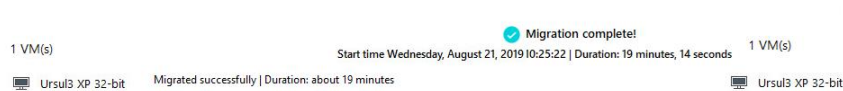
> ⚠ While copying a disk or volume that hosts Windows OS, our program also does a boot fixup to make your OS bootable on a different virtualization platform.

9. After a while, you will see a notification that the migration process is complete.

Successful migration:

10. After checking the target virtual machines for viability on the destination Hyper-V host, you can delete the original VMs on the VMware server.

Extra WinPE Scenarios
Importing a Backup Image

⚠️   This function is also available in Windows.

You can add an existing backup job and all restore points produced by that job to the "My Backups" list and this way make them available in the program interface.

Supported backup data containers:

- Volume- and file-level virtual containers (pVHD, VHD(X), VMDK) created by the current version.

- Volume- and file-level virtual containers (pVHD, VHD(X), VMDK) created by any 15-16th version.


⚠️   Backups imported in the WinPE recovery environment are only available for the current session, so you won't be able to use them in Windows after system restart.

Although legacy PBF-based backup images cannot be imported, you're allowed to specify an old image as restore point in the Restore Wizard of the Linux recovery media.
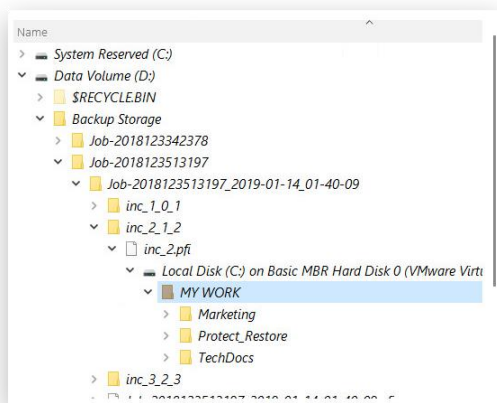
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1. .

2. Click **Backup & Recovery** on the sidebar.

3. Left click the three-dot icon on the sidebar opposite "My Backups", then select **Import backup**.
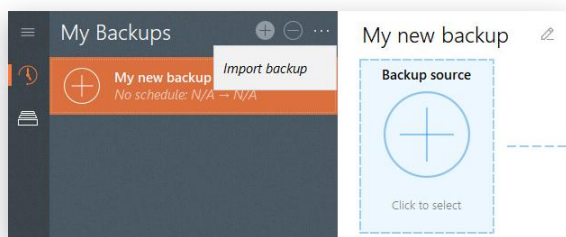
4. Browse for the required backup index file (PFI), then click **Next**.
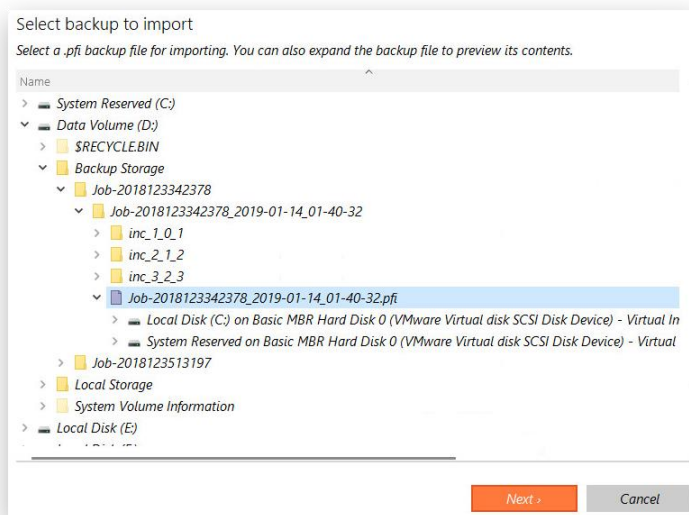
Please note that Paragon's backup index files are browsable. Just click on a PFI file to see backup items stored in corresponding backup containers.

5. Upon success, you will see a new preconfigured backup job on the list with available restore points on the backup timeline.
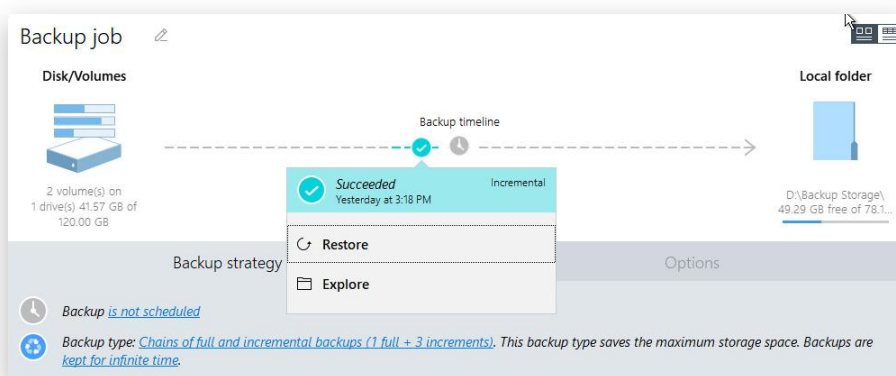
Adjusting OS for the New Hardware

Windows family operating systems are notorious for their excessive sensibility to hardware, especially when it turns to replacement of such a crucial device as HDD controller or motherboard that will most likely lead to a boot failure. In Windows 8.1 this problem has become less acute and almost disappeared in Windows 10. However, many people are still using Windows 7 and earlier versions, where built-in driver repositories are relatively modest. Additionally, these operating systems require adjustment of the Windows kernel settings according to the new configuration.

Our program can help you make Windows OS bootable on dissimilar hardware by allowing automatic injection of the required drivers and other actions crucial for this type of migration.

When you may need it

- After moving your OS to a different hardware platform

- After replacing failed hardware devices

- After upgrading hardware

Known issues

- After transferring Windows to a different hardware platform, you will need to re-activate your license. It's normal behavior as Windows keeps tracking any change of hardware. Re-activation is legally justified in this case, as you transfer OS to another PC.

- If you've installed several operating systems on one partition, we can only add drivers to the latest OS version. Microsoft highly recommends you to install an operating system on a separate partition.

- Drivers are not cached during the selection. So if you select a driver to inject, but it's become unavailable during the operation, the program will end with an error.

Operation prerequisites

- You should have drivers for the new hardware ready to use, not zipped or in .exe files (crucial for Windows 7 and earlier versions).

- Your OS should be unrolled on the new computer, not in a backup image.

- The WinPE environment offers excellent hardware support. However, in case it doesn't have a driver for your disk controller, your disks will be unavailable, until you inject the required driver. Find more details in **Adding Specific Drivers**.

1. Start up the computer from the WinPE recovery media.

2. Click **Disks & Volumes** on the sidebar.

3. Click the **Restore from file** tab in the upper part of the working area, then select **Find and adjust OS** on the sidebar.

4. Our program will search your system for supported operating systems. If several OSes have been found, you will need to choose the one you'd like to adjust to the new hardware. If you're willing to adjust them all, just re-launch this wizard for each.
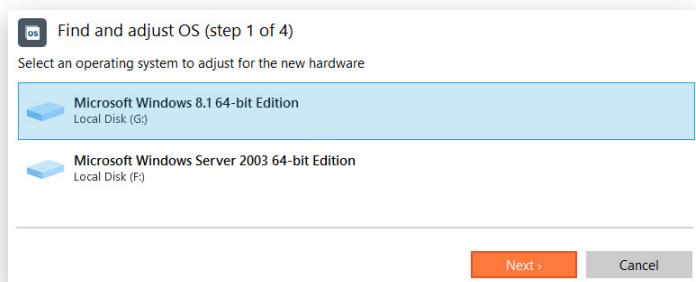

5. All necessary adjustments are accomplished automatically. You may only need to provide a path to an additional driver repository in case the wizard has failed to find drivers in the built-in repository. Generally, together with new hardware you get its drivers for different operating systems on removable media. By
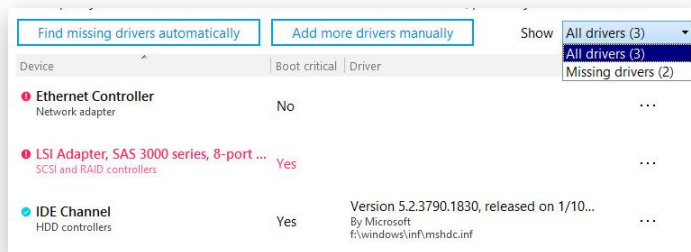
collecting all these drivers in one folder, you can let the wizard automatically pick and install those required for your OS.

After the search, the wizard lists devices without drivers in the built-in repository, highlighting those that are critical for the boot process.
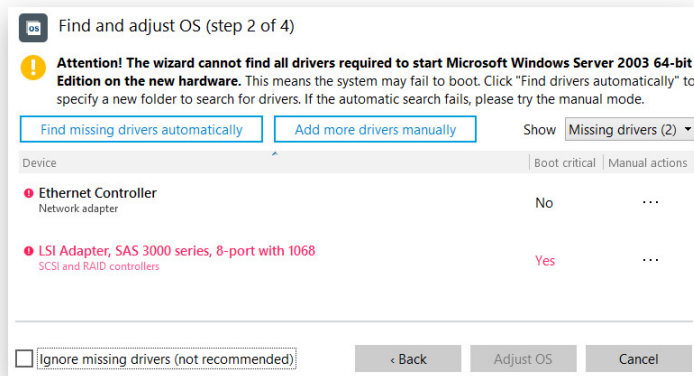

If you'd like to see all drivers to inject, change to "All drivers" in the drop-down menu.

Though providing drivers for boot critical devices is highly recommended, you can proceed as is by marking the corresponding option at the bottom of the dialog window.

Select **Find missing drivers automatically** to navigate to an additional driver repository. If you'd like to add drivers for undetected devices, use the **Add more drivers manually** option.
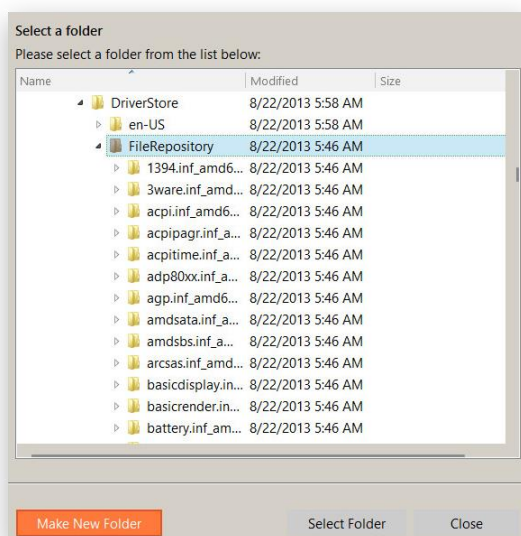
6. After the operation your system will become bootable on the new hardware. Just after the startup, Windows may initiate reconfiguration of all Plug'n'Play devices. It's a standard procedure, so please don't worry.

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](#).**

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1. [Start up the computer from the WinPE recovery media](#).

2. Click **Settings & Tools** on the sidebar.

3. Left click the three-dot icon opposite "Setting & Tools", then select **Load Drivers**.

4. Click **Add drivers to load**, then 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](#)**.
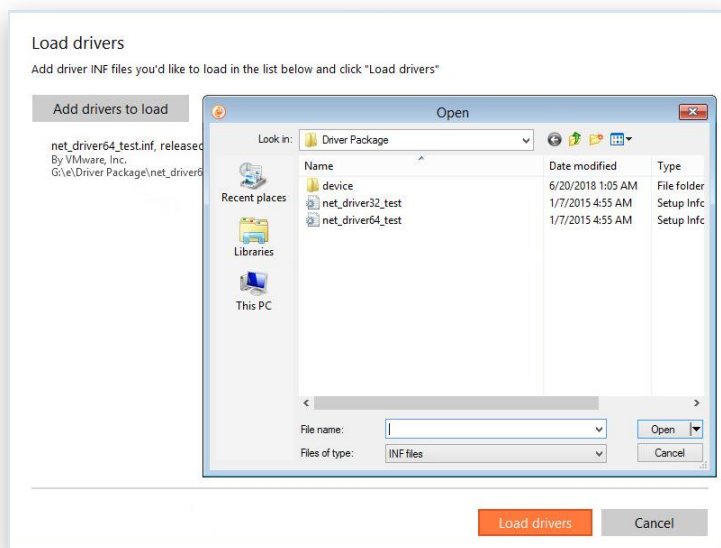
The chosen package gets on the list. Repeat this action to inject more drivers. Click **Load drivers** to accomplish the operation.

⚠️ **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. Click **Settings & Tools** on the sidebar, then select **Network Configurator**.

3. Use the **Network properties** tab to change the computer identification on the network.
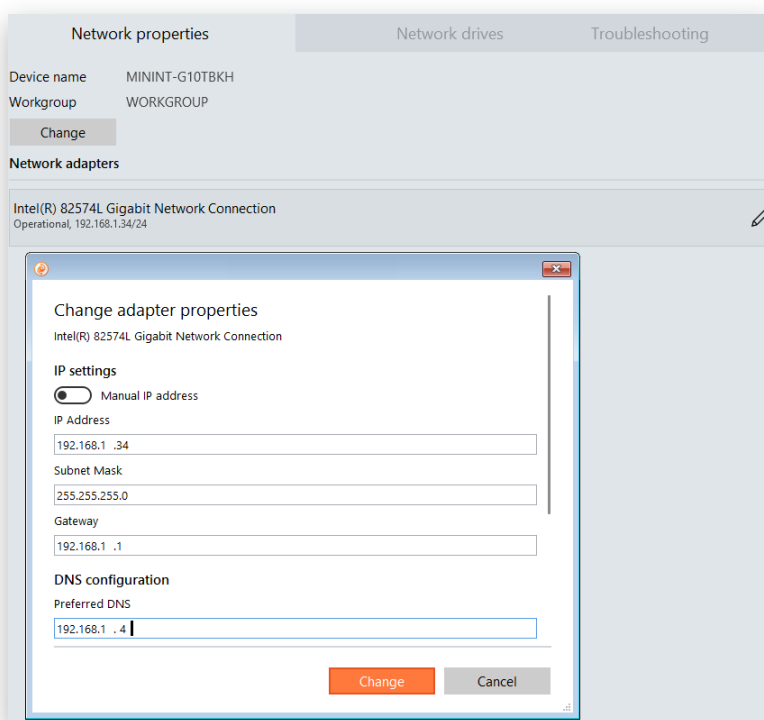
- **Device name and Workgroup**. Click **Change** if you'd like to join a specific workgroup or edit an automatically generated computer name.

- **Adapter properties**. By default, the recovery environment is configured to get an IP address from a local DHCP server. If there's no DHCP server on the network, please set up IP settings manually, providing a static IP address, network mask, default gateway, etc.

4. Use the **Network drives** tab to manage network shares.
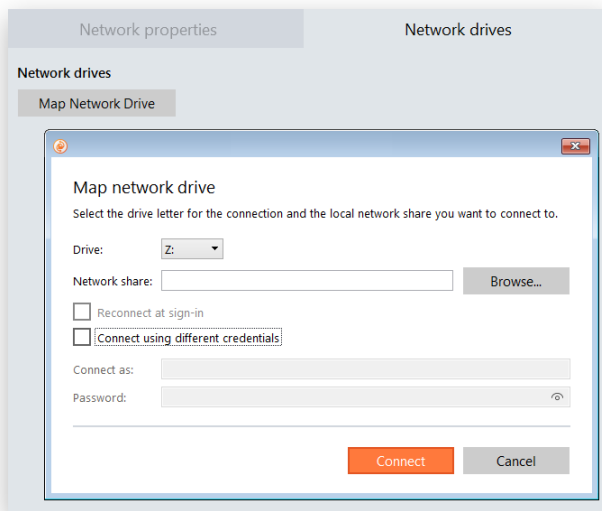
Click **Map Network Drive** to map a network share.

- Define a letter from the pull-down list of available drive letters;

- Click **Browse** to navigate to the required network share or manually enter a path to it, using back slashes, like in \\server\share;

- Mark the **Reconnect at sign-in** checkbox if you'd like to make this connection permanent. Otherwise it will only be available for the current session;

- Mark the **Connect using different credentials** checkbox to specify access credentials if the selected network share is not open for everyone. By default, the Guest account is used to map network shares.

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. Click **Settings & Tools** on the sidebar, then select **Network Configurator** > **Troubleshooting**.

3. By default, you will be prompted to verify the connection to *google.com*.
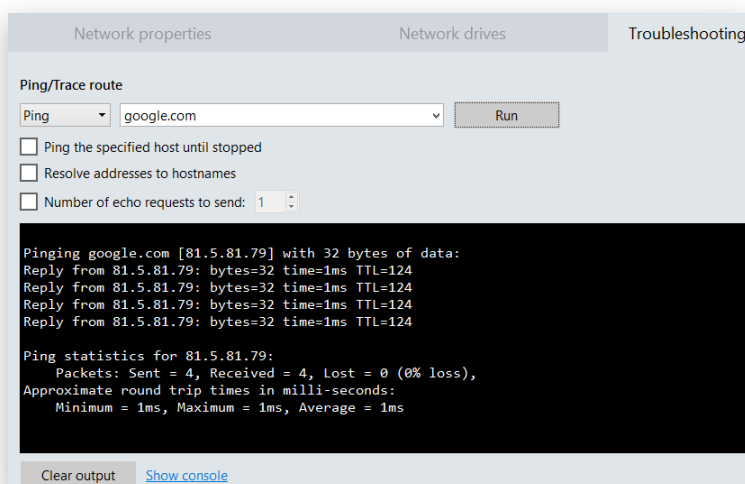
- **Remote host**. Type in the required IP address or its DNS name in the corresponding field.

- **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.

Click **Run** when you're ready with all parameters.

4. Select **Trace route** in the drop-down menu to see the path Internet packets traverse to reach a specified destination.
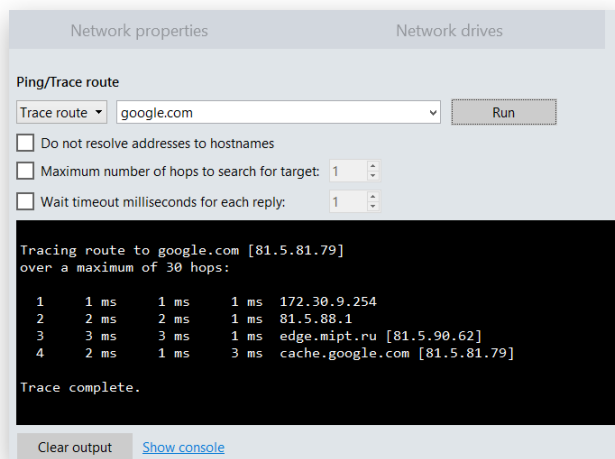
- **Do not resolve addresses to hostnames**. Mark the option to display IP addresses instead of hostnames.

- **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.

Click **Run** when you're ready with all parameters.

Using the Command Prompt

The primarily 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. Click **Settings & Tools** on the sidebar, then select **Command line**.

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.
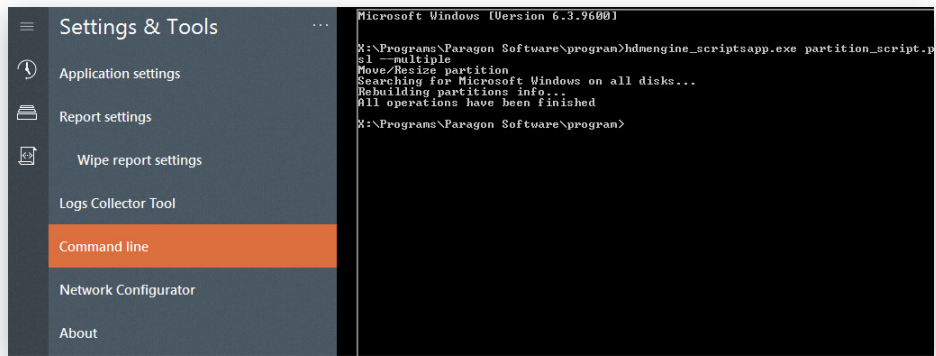

Please note that the 'multiple' parameter is obligatory to use in WindowsPE. To learn more about scripts, please consult the Paragon Scripting Language manual.

Operation Results and Reports

1. Click **Reports** on the sidebar to see when and with what result (success or failure) each operation completed. If the list contains too many items, use the built-in filter to narrow it down.
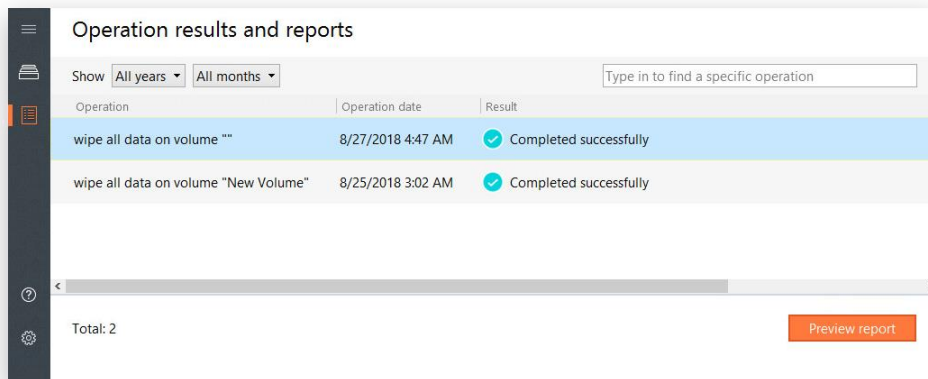
2. Click **Preview report** to get a detailed report on the selected at the moment operation. Use the corresponding buttons and fields to modify report properties according to your needs. You can print out the report, sent it by e-mail or save locally.
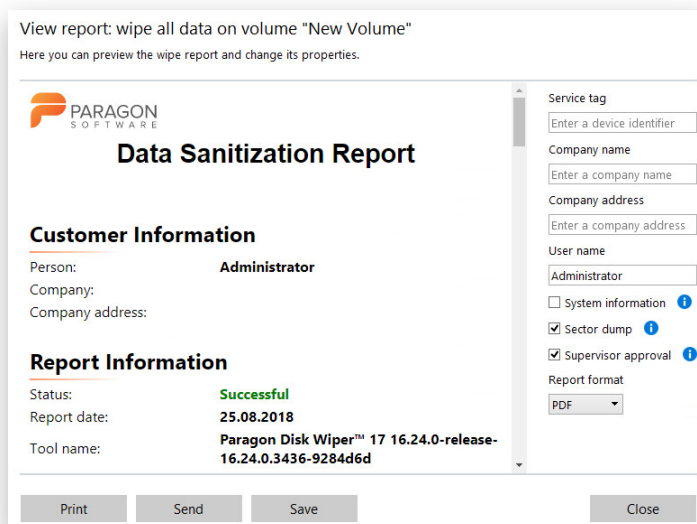

Find more details in:

- **E-mail Settings**

- **Reporting Settings**

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.
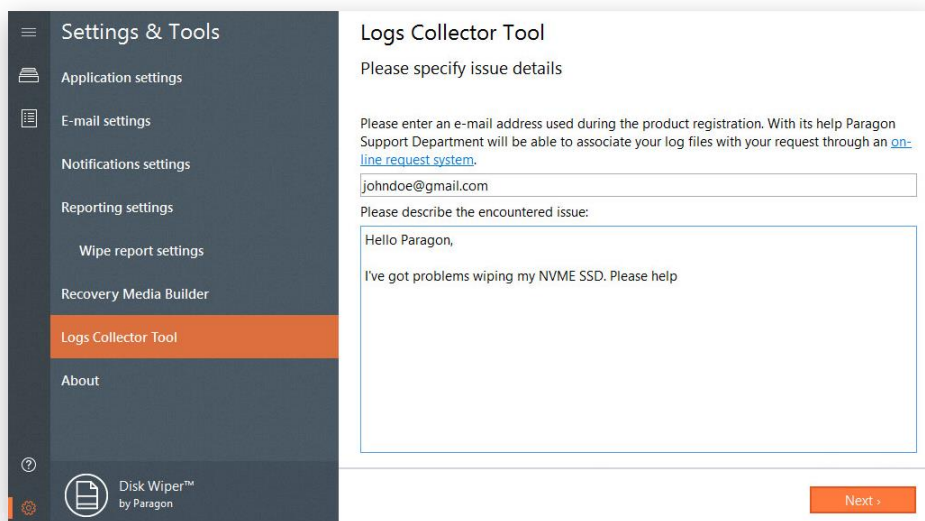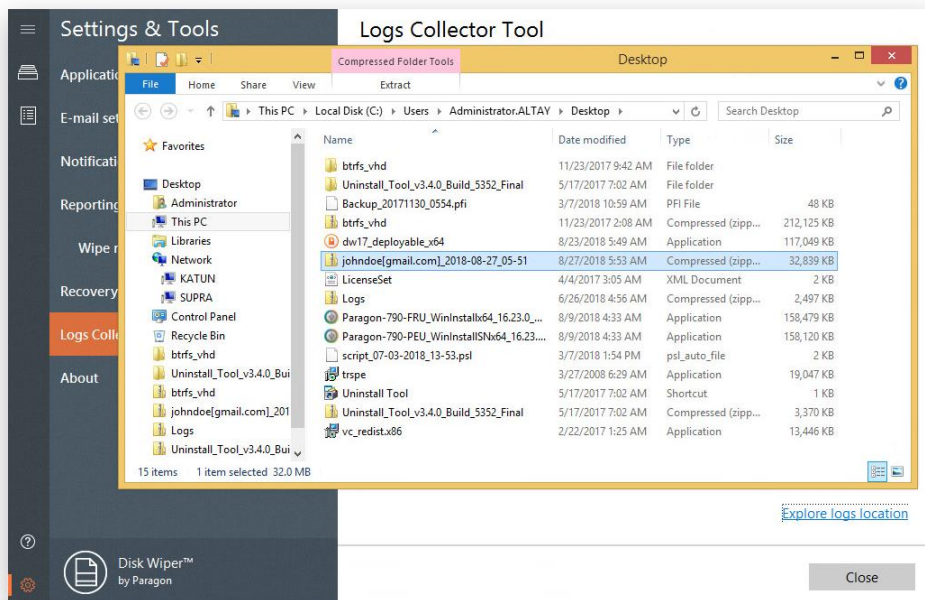

3. Browse for the required location of the log files package and edit the default file name, if necessary. Click **Save** when ready.
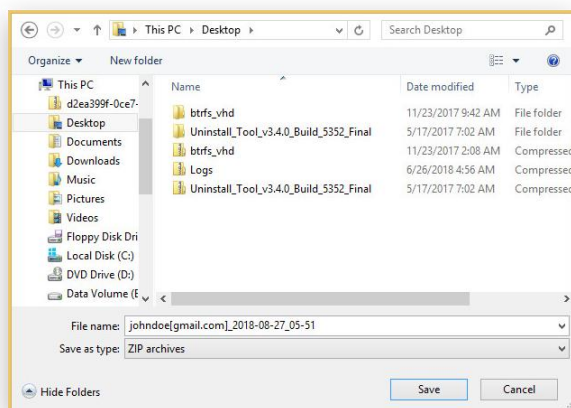
4. Once the operation is over, click **Explore logs location** to check the prepared package doesn't contain anything confidential, but layouts of your disks, performed operations, etc.

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.