



Knowledgebase 8.0

Macrium Reflect v8.0 User Guide

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These pages introduce you to Macrium Reflect, its capabilities, and methods.

The first thing you should do is create rescue media. See [The Macrium Rescue Environment](#).

With your rescue media in hand, we recommend that you follow through some basic tutorials to learn the system and to gain some immediate security by backing up your Systems. We have a range of tutorials and videos covering many aspects of using Macrium Reflect.

To get you started the following are some useful tutorials and articles:

- [Introduction to Macrium Reflect](#)
- [Backup, imaging and cloning](#)
- [Restoring and browsing](#)
- [Scheduling and Retention rules](#)
- [The Macrium Rescue Environment](#)
- [Macrium Image Guardian](#)
- [Macrium Changed Block Tracker](#)
- [Macrium viBoot](#)
- [Re-deploying to new hardware](#)
- [Macrium Reflect Server Plus for Exchange and SQL](#)
- [Command line operations with Macrium Reflect](#)
- [Generating scripts and batch files](#)
- [Backup Folder Synchronization](#)
- [Defaults and Settings](#)
- [PXE Deployment](#)
- [Standalone backup set consolidation](#)
- [Converting a Physical machine to Virtual Machine](#)
- [Logging file changes for Incremental and Differential Images](#)
- [Backup to the cloud with Azure File Shares](#)
- [How to add an auto restore xml file to the rescue media](#)

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Introduction to Macrium Reflect

Using Macrium Reflect you can backup whole partitions or individual files and folders into a single compressed, mountable archive file. You can use this archive to restore exact images of the partitions on a hard disk so that you can easily upgrade your hard disk or recover your system if it breaks. You can also mount images as a virtual drive in Windows Explorer to easily recover Files and Folders using Copy and Paste.

Summary

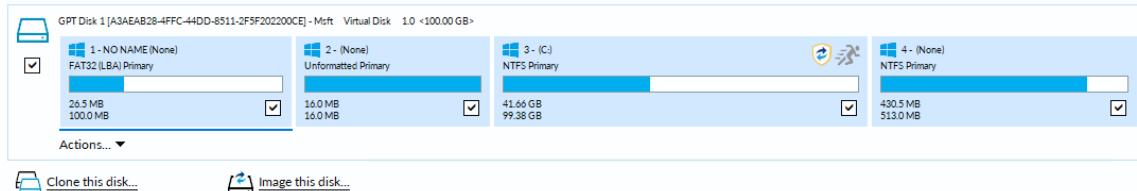
If you consider yourself non-technical this article should help you to start understanding the terminology, workings and concepts of imaging, backup and Macrium Reflect. More information on how to clone your disk is in our [KnowledgeBase](#) article.

The restore process is documented in the article

Inside a PC, the operating system, applications and all your files need to be kept somewhere when the power is off. This permanent storage is often a hard disk drive containing a spinning magnetic platter. The information on the platter is recorded and read by read-heads. So that the read-heads can store and find recorded data, the disk is split into blocks, usually of 512 bytes, which are numbered from the start to the end of the platter.

So that the operating system can use different file systems or provide multiple volumes (like the C: drive, D: drive and recovery area), it partitions these blocks into volumes (sometimes also called partitions). These volumes and their file systems are the first things you'll see when you start Macrium Reflect.

Figure: Macrium Reflect showing the volumes and file systems on a system disk



More recently, magnetic disk drives have been replaced or augmented by other technologies like Solid-State Drives (SSD). These devices have slightly different restore requirements which Macrium Reflect handles seamlessly using features like SSD Trim support.

Rescue media and Windows PE

If you lose your Windows operating system, you can start your PC using Macrium Reflect rescue media on CD, DVD, or USB stick. This makes creating rescue media the first thing you need to do with Macrium Reflect. It contains a bootable, lightweight version of Windows and a full version of Macrium Reflect.

This lightweight version of Windows is called the Windows Recovery Environment (also known as Windows RE or WinRE) and is supplied with Windows 7 and later operating systems. For Windows XP, Vista and systems without WinRE, Reflect will download the Windows Pre-installation Environment (also known as Windows PE or WinPE) directly from Microsoft.

Disk imaging

Macrium Reflect creates an accurate and reliable Image of a hard disk or the partitions on the disk. In the event of a partial or complete system loss, you can use this image to restore the entire disk, one or more partitions, or even individual files and folders.

During the imaging process, Macrium Reflect copies the contents of entire volumes including a reference to their physical location on the storage device to an image file (.mrimg). You would normally store the image file on local or network drives, or removable drives connected using USB or eSATA.

We strongly recommend that you create an image of your system at regular intervals.

You can read more about how to use Macrium Reflect to image your PC in our KnowledgeBase article [Creating a backup image of your computer, drive or partitions](#).

Macrium Reflect can help you create regular images by scheduling them for you. It can even tidy up after itself - see [Scheduling retention and disk space](#).

Differential and incremental images

Macrium Reflect can create **Full**, **Differential**, and **Incremental** images to optimize backup speed and disk space requirements.

When you image a volume for the first time it is referred to as a **Full** image. A **Full** image file contains all of the data stored in the volume. Macrium Reflect provides two alternative methods of backing up your data after the initial full image has been completed:

1. A **Differential** image that backs up all the data that has changed on the volumes since the last Full image was taken.
2. An **Incremental** image that backs up all the data that has changed on the volumes since the *last* image was taken whether that is a **Full**, an **Incremental**, or a **Differential** image.

These methods significantly reduce the amount of disk space and time required to create image files and make it possible to restore your system from intermediate points within the backup chain.



Note: In order to restore a Differential image, you must have the original Full and the Differential image you wish to restore. To restore an Incremental image, you must have the original Full and all subsequent incremental images in the backup set.

If you want to learn how to create differential or incremental backups using Macrium Reflect, please see [Differential and incremental disk images](#).

To learn more about backup sets, please see [Backup, imaging and cloning](#).

File and folder backups

To create a **File and Folder** backup, select the files and folders you want to backup, apply File and Folder filtering criteria to include and exclude files and/or folders, and Macrium Reflect creates a compressed backup file (.mrbak) that can be restored directly or browsed using Windows Explorer. Storing backups in a single file is beneficial because it can be compressed, encrypted and stored elsewhere with ease.

As you can for images, you can also create **Differential**, and **Incremental** file and folder backups to optimize backup speed and disk space requirements.

File and folder backups are ideal if you only wish to backup specific documents, photos or music, rather than your whole system.

More information on how to backup files and folders is in our KnowledgeBase article [Creating a backup image of your computer, drive or partitions](#).

Disk cloning

With Macrium Reflect, you can clone your system disks to enable you to swap failed disks out of your system and get things back up and running again in minutes.

Cloning is often confused with imaging. The process is identical but instead of storing data to a file, it replicates volume contents and disk structures to an alternative device. When the cloning process is complete, the target disk is identical to the original and contains a duplicate of all volumes, files, operating systems and applications.



Note: Any data on the target disk prior to the cloning process will be erased.

Cloning a disk is particularly useful to upgrade an existing hard disk and in the event of a hard drive failure, you can simply replace the failed disk with a clone and have your system up and running again in minutes. However, cloning a disk is not an efficient way of backing up your data if it changes frequently because the clone will only contain one point in time as there is no 'Backup Chain' history that is available with Disk Images. Also, Disk Images can be compressed and saved to any location.

More information on how to clone your disk is in our KnowledgeBase article [Cloning a disk](#).

Backup Plans and Retention Rules

Macrium Reflect provides multiple **Backup Plan** options to create backup cycles in days, weeks, or months that allow you to pick when you want your backup definitions to run and whether they should be Full, Differential or Incremental backups. Scheduled backups can run independently of whether anyone is logged into the computer.

Macrium Reflect provides an easy 3 step approach to editing backup plans for a backup definition:

1. First, optionally select a **Template** from a set that includes implementations of industry best practice like Grandfather, Father, Son (GFS), or Incremental Forever
2. Add, remove or change the schedules as needed for Full, Differential, and Incremental backups

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- Finally, define **Retention Rules** for each type of backup. Using the **Retention Rules**, you can retain a specific number of each type of backup or keep them for a number of days or weeks before cleaning up.

Options define whether to apply the retention rules to all the backups in the folder, whether to run the purge before backing up, and let you define a minimum amount of disk space to retain in gigabytes (GB) before automatically deleting the oldest *backup sets* in the destination folder to make space available for new backups.



Note: A backup set consists of a full backup and any Incrementals or Differentials with the same image ID. The image ID is the part underlined in the following example backup file name: 69B5FC3F39E0F9F5-00-00.mrimg

Restoring files and folders

Macrium Reflect restores selected files and their folder structures from File and Folder backup .mrbak files. There are a number of ways to restore backups:

- You can restore individual files, for example, accidentally deleted spreadsheets or lost photos by browsing an Image or File and Folder Backup. This process mounts the image file in Windows Explorer as if it were an extra disk drive. After it is mounted, you can browse and open files and copy the files back onto your active file system whenever you like.
- You can directly restore the contents of a file and folder backup using the Macrium Reflect file and folder restore feature.

You can find more information in [Restoring a file and folder backup](#) and [Browsing Macrium Reflect images and backups in Windows Explorer](#).

Restoring images

Macrium Reflect restores disks or their partitions exactly as they were when the backup was taken. The restore process also enables you to expand or shrink partitions if the restore target is a new disk and a different size to the original.

If your whole system becomes corrupt, you can load Macrium Reflect and restore your image despite being unable to boot Windows. You can boot from the Macrium Reflect Windows PE rescue media and use Macrium Reflect to find and restore your images

The restore process is documented in the article [Restoring a backup system image from Windows](#).

ReDeploy

From the rescue environment you can launch Macrium **ReDeploy** to adapt the recovered Windows system to its new environment whether that is a virtual machine or a different computer. With Macrium Reflect **ReDeploy**, you can restore an image to a replacement computer or even create virtual hard drives to virtualize the machine, a technique sometimes called Physical to Virtual or P2V.

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Macrium **ReDeploy** is included in all paid editions of Macrium Reflect. This excludes the Free Edition and 30-day trials.

VBScript, PowerShell and MS-DOS batch file support

Macrium Reflect stores backup definitions as XML files that are loaded using the Reflect command line. This enables powerful batch and scheduling processing using VBScript, PowerShell or MS DOS batch files.

Macrium Reflect includes a VBScript and PowerShell generator that creates template script files for programmable control over your backup cycles and Pre/Post backup events.

Further Reading

- [Macrium Reflect Minimum System Requirements](#)
- [Deprecation of SHA-1 code signing](#)
- [Macrium Reflect Feature Comparison Chart](#)
- [Licensing Policy](#)
- [New in Version 8.0](#)
- [Download and install your purchase](#)
- [Macrium Reflect Quick Start](#)
- [Windows Explorer shell integration](#)
- [Reviewing your backup history](#)
- [Removing your License key when Upgrading your PC](#)
- [What is VSS, how does it work and why do we use it?](#)
- [Rapid Delta Clone - RDC](#)
- [Rapid Delta Restore - RDR](#)

Macrium Reflect Minimum System Requirements

PC and Windows

In order to run Macrium Reflect, you must have a system that has the following minimum system requirements:

- At least 512MB RAM (1GB min recommended)
- Windows XP Service Pack 3 or Windows Server 2003 Service Pack 2 or later
- A keyboard and mouse

To use the rescue media, you will need either a CD/DVD writing drive or a USB drive.

Supported File Systems

Imaging clusters in use and changed clusters (intelligent copy) is supported by FAT16, FAT32, NTFS, exFAT, ReFS (on server editions), and Ext 2,3,4 file systems. All other file systems and unformatted partitions will be imaged on a sector by sector basis, i.e. every sector in the partition will be copied.



Incremental and Differential images have no file system dependencies. You can even create Incremental and Differential images of unformatted partitions.

Rapid Delta Restore (RDR) and Rapid Delta Clone (RDC) are supported by NTFS file systems only. All other file systems will cause a Full restore or clone.

Deprecation of SHA-1 code signing

We are committed to continuing support of many of our customers' older operating systems. There are many scenarios, particularly in an industrial or medical environment where updating to the latest Windows version is impossible or prohibitively expensive. To this end, alongside our SHA-2 signature, until Reflect v7.3, we have included a SHA-1 counter signature.

Due to the withdrawal of all SHA-1 timestamp services, we can no longer add a SHA-1 counter signature. This has two consequences for operating systems that haven't been updated to include SHA-2 support.

You will not be able to verify our binaries provenance or integrity. When launching Reflect, the publisher will be shown as "Unknown" in the Windows Vista and later UAC prompt. A user mode SHA-2 update is available for all Reflect supported platforms.

Where driver signature checks are enforced, drivers will not load without kernel SHA-2 support. Patches and updates for kernel SHA-2 support are only available for Windows 7 / Server 2008 R2.

Core Reflect features can only be implemented in kernel mode and therefore we are forced to block Reflect installs and updates in some instances, as detailed below.

Windows OS	Status
Windows 8, 10, Server 2016, 2019 and later	SHA-2 is supported by default, no impact or action required.
Windows XP, Server 2003 (32 /64bit) and Vista 32bit / Win7 32bit	These OSs do not support SHA-2 by default, however due to lack of driver signature checks, Reflect will continue to work but you will receive an unknown publisher warning in the UAC prompt for Windows Vista and later. This can be resolved by applying a patch or updating to the latest release to gain user mode SHA-2 support.
	Reflect updates and installs will continue to be supported on this platform if the OS has been patched to include SHA-2 support .

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Windows OS	Status
Windows 7 64bit / Windows 2008 R2 Server 64 bit	
Vista 64bit / Windows 2008 Server 64 bit	Macrium Reflect v7.3 is the last version available for these platforms, v8.0 and later cannot be installed . This is due to a combination of enforced kernel driver signature checking without the availability of a kernel mode SHA-2 update from Microsoft.

Further References

<https://redmondmag.com/articles/2019/02/19/windows-deadlines-sha-2.aspx>

<https://support.microsoft.com/en-gb/help/4472027/2019-sha-2-code-signing-support-requirement-for-windows-and-wsus>

Macrium Reflect Feature Comparison Chart

Feature \ Edition	Free	Home	Workstation	Server	Server Plus
Disk Imaging	✓	✓	✓	✓	✓
Disk Cloning	✓	✓	✓	✓	✓
Access Images and File and Folder backups in Windows Explorer	✓	✓	✓	✓	✓
Schedule backups	✓	✓	✓	✓	✓
Windows PE 3.0, 4.0, 5.0, 10 and Windows RE	✓	✓	✓	✓	✓

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Feature \ Edition	Free	Home	Workstation	Server	Server Plus
XP SP3/ Vista / 7 / 8 / 8.1 /10 / WHS compatibility	✓	✓	✓	✓	✓
Retention rules	✓	✓	✓	✓	✓
Recovery from Windows boot menu	✓	✓	✓	✓	✓
Differential backups	✓	✓	✓	✓	✓
Macrium viBoot for instant virtualization of system image files.	✓	✓	✓	✓	✓
Incremental backups		✓	✓	✓	✓
File and Folder backup		✓	✓	✓	✓
Email notification of backup status		✓	✓	✓	✓
Backup scripting		✓	✓	✓	✓
		✓	✓	✓	✓

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Feature \ Edition	Free	Home	Workstation	Server	Server Plus
Password protection and encryption					
Restore to dissimilar hardware with ReDeploy		✓	✓	✓	✓
Backup file Ransomware Protection with Image Guardian		✓	✓	✓	✓
Rapid Delta Restore (RDR) Rapid Delta Clone (RDC)		✓	✓	✓	✓
Changed Block Tracker (CBT)		✓	✓	✓	✓
Integrated Windows Event Logging			✓	✓	✓
Windows Server cross-hardware restore				✓	✓
				✓	✓

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Feature \ Edition	Free	Home	Workstation	Server	Server Plus
Integrated Windows event logging					
Resilient File System (ReFS) support				✓	✓
Microsoft SQL & Exchange database backup & recovery					✓
Microsoft SQL database continuous backup					✓
Microsoft Exchange Mailbox restore (Granular Recovery)					✓
	Download 				

Licensing Policy

Macrium Reflect Licensing Policy Overview

Macrium Reflect licenses are perpetual: they do not have an expiry date or require an annual renewal.

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Macrium Reflect v8 Home Edition, Workstation, Server, and Server Plus for Exchange and SQL are licensed per machine - each PC must have its own licensed copy of Macrium Reflect installed.

You may only transfer a Macrium license to another PC if it is a replacement for the original machine (due to hardware failure, for example). See [Removing your License key when Upgrading your PC](#)

Support & Maintenance

Macrium Reflect v8 Home Edition includes 12 months of free Technical Support. This will ensure that not only do you get a great backup tool for your home PCs, but you know that there is help if you need it. You also have full and permanent access to our active and helpful support forum.

Macrium Reflect v7 Workstation, Server and Server Plus for Exchange and SQL, all include 12 months free Support & Maintenance in the purchase of each license which is renewable for subsequent years. Support is provided via email and, if needed, remote access. This annual subscription includes Upgrade Protection - so Minor updates (i.e. v8.1 to v8.2) and Major updates (i.e. v7 to v8) are free. We also offer a Premium support option which includes priority response and telephone support.

If the Support & Maintenance subscription is not renewed the software will continue to function, Minor updates (i.e. v8.1 to v8.2) will remain free, and access to the [Macrium Support Forum](#) and Knowledgebase will still be available for all customers.

You can read more about [Macrium Support & Maintenance](#) here:

The Macrium Reflect End User License Agreement can be found [here](#):

Service Providers, please see [here](#): Macrium Services Provider License Agreement explained

Macrium Services Provider License Agreement explained

The Macrium Services Provider License Agreement (SPLA) license provides an alternative usage based charging model, available to high volume service providers where the normal perpetual license model does not make sense. It is currently being piloted with a selected customers. If it is of interest to you, please [contact us](#) for more information.

How it works

You are provided with a single key per edition. This can be installed on an unlimited number of machines hosted by you. You will pay a monthly charge based on the number of unique machines with the software installed that are active within the billing period.

The billing is automatically generated using data from a daily callback to our license server. You will need to ensure that the software has a network route to our server and provide us with an IP range (or ranges) that your machines

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will use to connect to our server.

Your monthly bill will include a report of usage broken down by machine. This will include the associated IP and MAC address of the interface used to contact the license server and also a user machine reference, if specified.

How to specify the user machine reference

This is configured during the install process and is purely for your convenience in interpreting your bill.

You can install in the usual way, just specifying your SPLA key. However, currently, you can only specify the user machine reference using the command line install method. Use the following, replacing the angle brackets with parameters relevant to you.

```
<installer>.exe /passive /l <log filename> LICKEY=<your spla key> LICOWNREF=<your  
machine reference>
```

Please read more about command line installs: [Installing Macrium Reflect from the command line](#)

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"Image" is defined as an exact copy of the data stored on a Computer's built-in media.

"media" means optical disks of any kind, hard or flash drives, and any other media in or on which software and/or data can be loaded or stored on a temporary, volatile or permanent basis.

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Macrium Reflect® must be installed onto a Computer owned, leased or hired by you. Once you have installed Macrium Reflect® and entered your license key, you may not transfer your license key to any other Computer.

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Contacting Macrium Support

Self Help Resources

Reflect Knowledgebase	https://knowledgebase.macrium.com
Site Manager Knowledgebase	https://knowledgebase.macrium.com/display/MSM
Forum	https://forum.macrium.com
Order Information	https://www.macrium.com/myorders/index

How to raise a ticket

- 1) Visit our [knowledgebase](#) to see if the issue has been documented.
- 2) If you need to raise a ticket visit <https://helpme.macrium.com>
- 3) [Log in or Sign up](#).

The screenshot shows the Macrium Helpdesk login interface. At the top, there's a logo for Macrium Software with the tagline "Your Image is everything". Below the logo, the word "Helpdesk" is displayed. A navigation bar includes links for "Home", "My Area", and "Submit a Ticket". The main area contains input fields for "Email Address" and "Password", along with a "Remember me" checkbox and a "Sign In" button. To the right of these fields, there are two informational boxes: one for "New user Sign Up" which explains it allows users to raise & track Tickets, find Articles and contribute to the Community; and another for "Forgot Password Reset" which says users will receive an e-mail with a link to reset their password. At the bottom right, there's a link for "Are you an Agent? - [Login here](#)".

- 4) Select '**Add Ticket**'

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Add ticket
Submit a ticket to seek help from our support specialists

Submit a Ticket

Additional Contact Information

Phone

Country

Ticket Information

Department

Subject

Description

« Plain Text

5) Fill in as much information as you can on the form.

6) After submitting the form, you will receive an email with a link to the ticket and any other communication from Macrium Support/Sales.

New in Version 8.0



Macrium Reflect v8.0 has been comprehensively overhauled to provide a better user experience, and we've added some great new functionality as well...

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	<p>Resilient File System (ReFS) and exFAT support for Server and Server Plus Editions</p> <p>We've added support for Windows Resilient File System (ReFS) and Extensible File Allocation Table (ExFAT) file systems for Intelligent sector copy, MIG and, in the case of ReFS, for CBT as well.</p> <p>For more information see here</p>
	<p>Dark Theme</p> <p>Macrium Reflect v8 includes optimized Light and Dark theme user interface options to enhance the user experience.</p> <p>For more information see here</p>
	<p>Intra-Daily scheduled backups</p> <p>Macrium Reflect v8.0 now includes Intra-Daily scheduling of backups for a minimum of 15 minute intervals between start times, providing near continuous backup protection.</p> <p>For more information see here</p>
	<p>Removable media Imaging and Cloning support</p> <p>v8.0 includes support for imaging and cloning USB Flash drives. Flash drives can be imaged and cloned using the same functionality, and UI, as regular internal disk drives. USB Flash drives can be cloned to other USB flash drives or internal disks. Flash drives show in the Reflect main window alongside internal disks:</p> <p>For more information see here</p>
	<p>Automatic partition resizing when restoring or cloning to different sized disks</p> <p>We've improved the Restore and Clone functionality by adding automatic fill/shrink where the target disk is a different size to the source. The most common disk copy tasks are now automated and we've also added the ability to set free space before and after a copied partition to precisely locate and resize partitions on the target disk.</p> <p>For more information see here</p>
	<p>New 'Existing Backups' view</p> <p>We've renamed the 'Restore' tab in v7 to 'Existing Backups' and added extra functionality, including the ability to view backup files in their backup chain hierarchy, navigate to individual folders where backups are stored and edit the comment field in existing backups.</p> <p>For more information see here</p>
	<p>Improved File and Folder backup wizard</p> <p>We've improved the user interface for adding folders to your File and Folder backups by adding a tree selection for 'root' folders</p>

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	For more information see here
	Improved backup file name functionality New run time parameters enable dynamic information to be included in backup file names at run time. For more information see here
	New tbFAT driver for mounting File and Folder backups In v8.0, F&F backups containing files larger than 4GB in size can now be mounted in Windows Explorer showing the original file size and contents. In earlier versions of Macrium Reflect, backed up files would be split into multiple 4GB chunks, and the only way to restore large files was by using the File Restore functionality in the main application. We've added a new driver to mount all F&F backup files. The maximum size of a contained file is now 3.9 TB rather than 4 GB.
	Redesigned and Improved 'Log' view The Log view page has been extensively redesigned in v8 to make locating logs much easier. We've also improved the performance when accessing and searching large quantities of logs, as may be necessary when running Intra-Daily backups. For more information see here
	OAuth 2.0 email authentication for Gmail and Outlook 365 Macrium Reflect v8.0 includes OAuth 2.0 to authenticate Macrium Reflect to send emails using your Microsoft or Gmail account. It's easy to setup and uses your account sign in, including two factor if enabled, to securely authenticate.
	viBoot now includes Oracle VirtualBox support v8.0 adds Oracle VirtualBox support for instant virtualization of Macrium Reflect Images. For customers without Windows operating systems capable of running Hyper-V, or those that require USB drive virtualization, VirtualBox provides a great solution to reduce Time To recover (TTR), or to test Image restore capability, For more information see here

ReFS and ExFAT Support

We've added support for **Windows Resilient File System (ReFS)** and **Extensible File Allocation Table (ExFAT)** file systems for **Intelligent sector copy**, **MIG** and, in the case of ReFS, for **CBT** as well.

In Macrium Reflect v7 and earlier, both ReFS and ExFAT file systems would appear as unformatted volumes. Creating images of unformatted volumes causes every sector in the volume to be copied. Although such images are perfectly good, they take a long time to complete and the image file sizes are much larger than necessary. In v8, we've introduced **Intelligent sector copy** for both file systems. This means that only used clusters are copied,

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significantly reducing the time to image and also reducing the size of the resultant image files. Additionally, **MIG now protects Macrium backup files saved to either file system** and CBT can be used to further increase the speed of Incremental ReFS images.

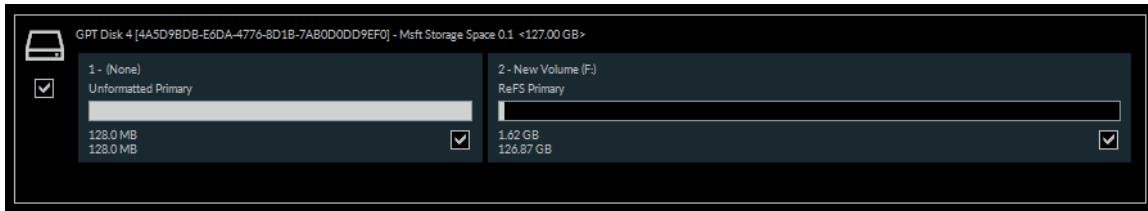
ExFAT Volume:



Macrium Reflect is one of only a very few imaging product that support Windows Storage Spaces. **ReFS** is the default and recommended file system to use with Storage Spaces.

<https://docs.microsoft.com/en-us/windows-server/storage/storage-spaces/overview>

ReFS Volume:



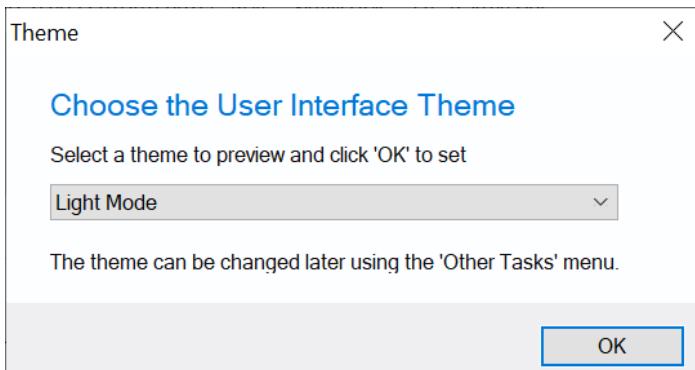
Dark Theme



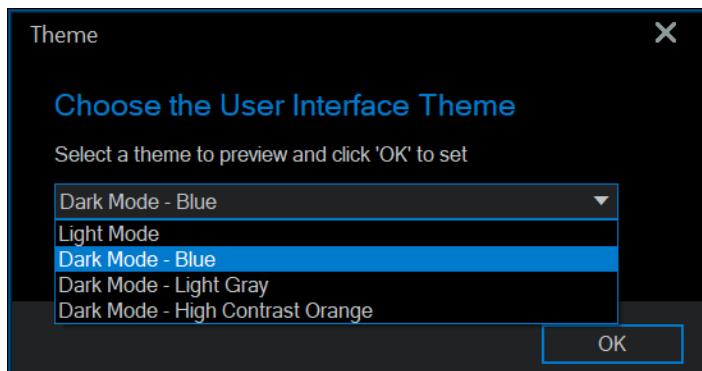
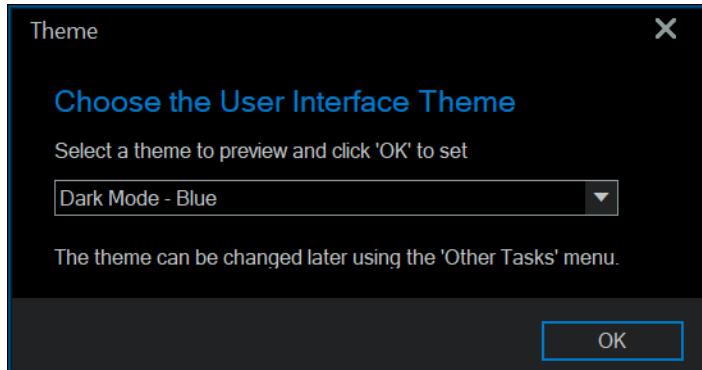
Note: Macrium Reflect Free Edition and all Windows operating systems earlier than Windows 8.0 only support 'Light Mode'

Macrium Reflect v8 now includes Light and Dark theme options available by taking the '**Other Tasks**' > '**Change UI Theme...**' menu option.

When first started, a one-time **dialog is shown** to choose the initial application theme:



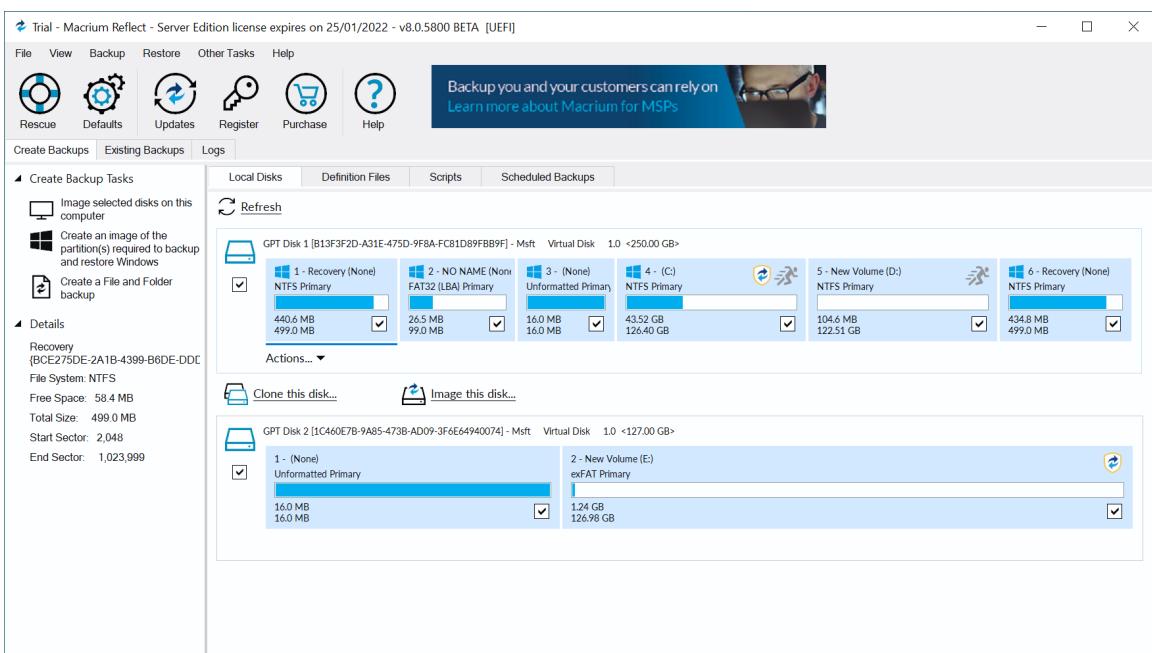
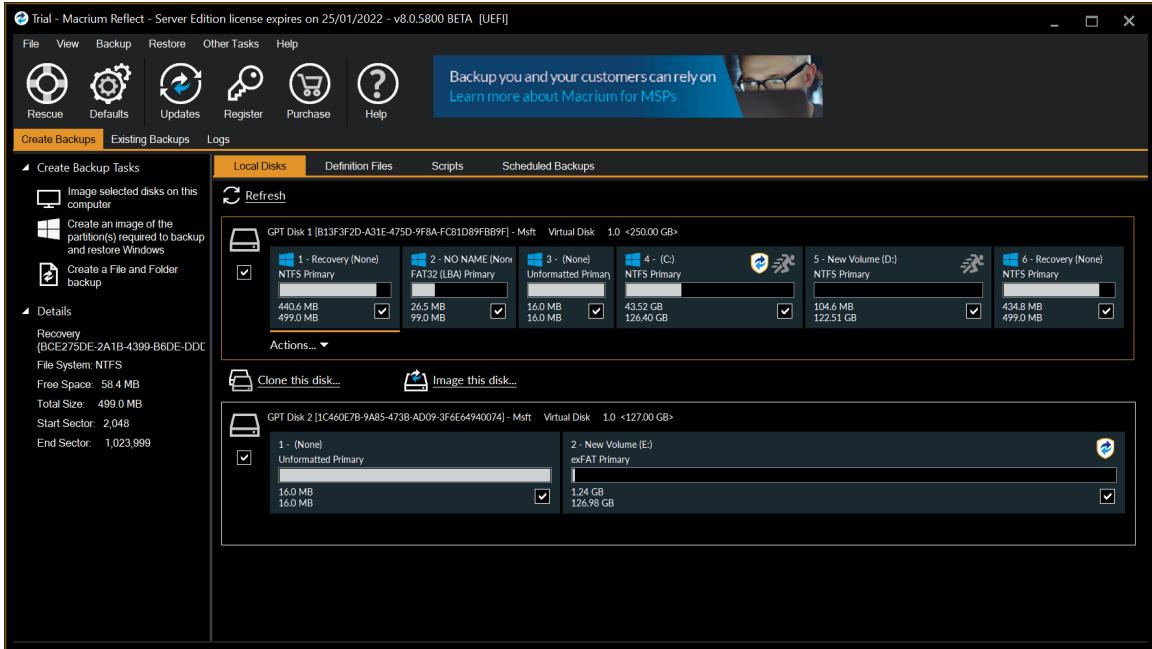
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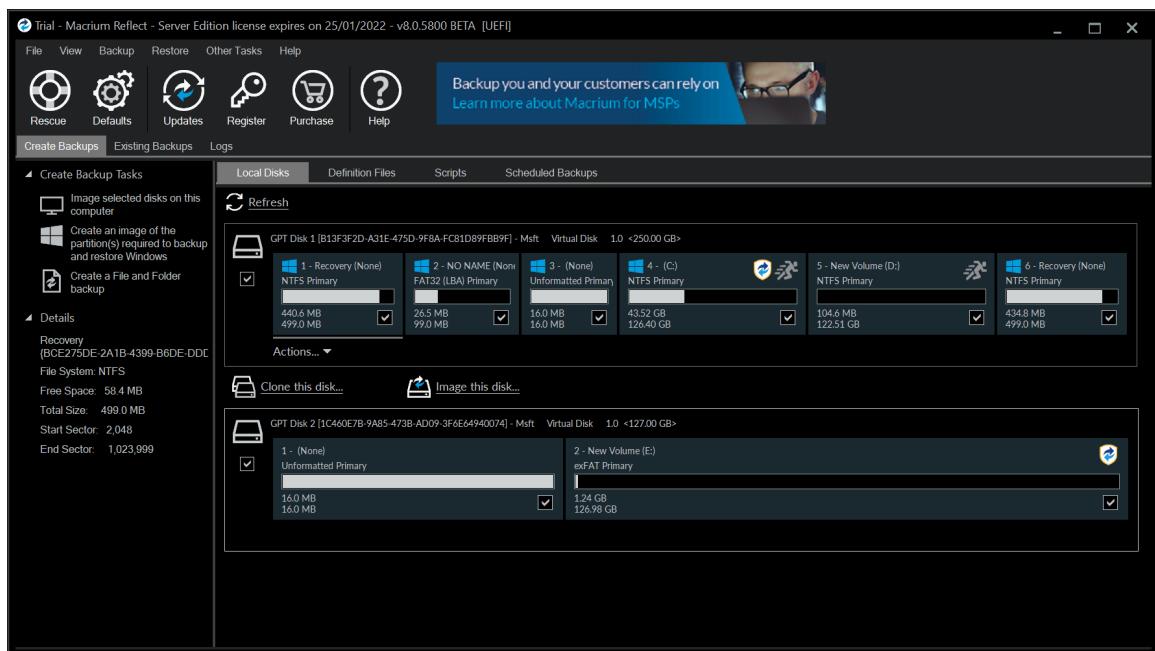
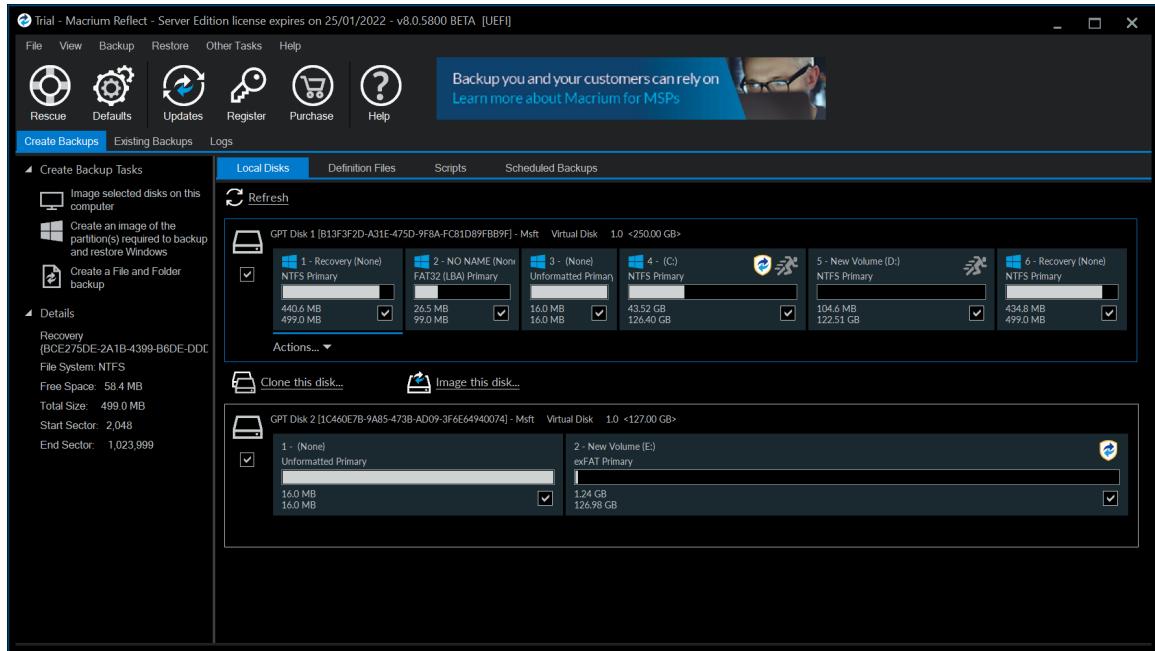
Note: When a theme is selected in the dropdown list, the entire application will dynamically change to the chosen theme, enabling a preview before selecting OK.

We've optimized the toolbar buttons, background colors and fonts to enhance the user experience in any theme.

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Restore and Clone Partition Layout

We've improved the Restore and Clone functionality by adding automatic fill/shrink where the target disk is a different size to the source. The most common disk copy tasks are automated by using the toolbar 'Copy' functionality but we've also added the ability to set free space before and after a copied partition to precisely locate and resize partitions on the target disk.

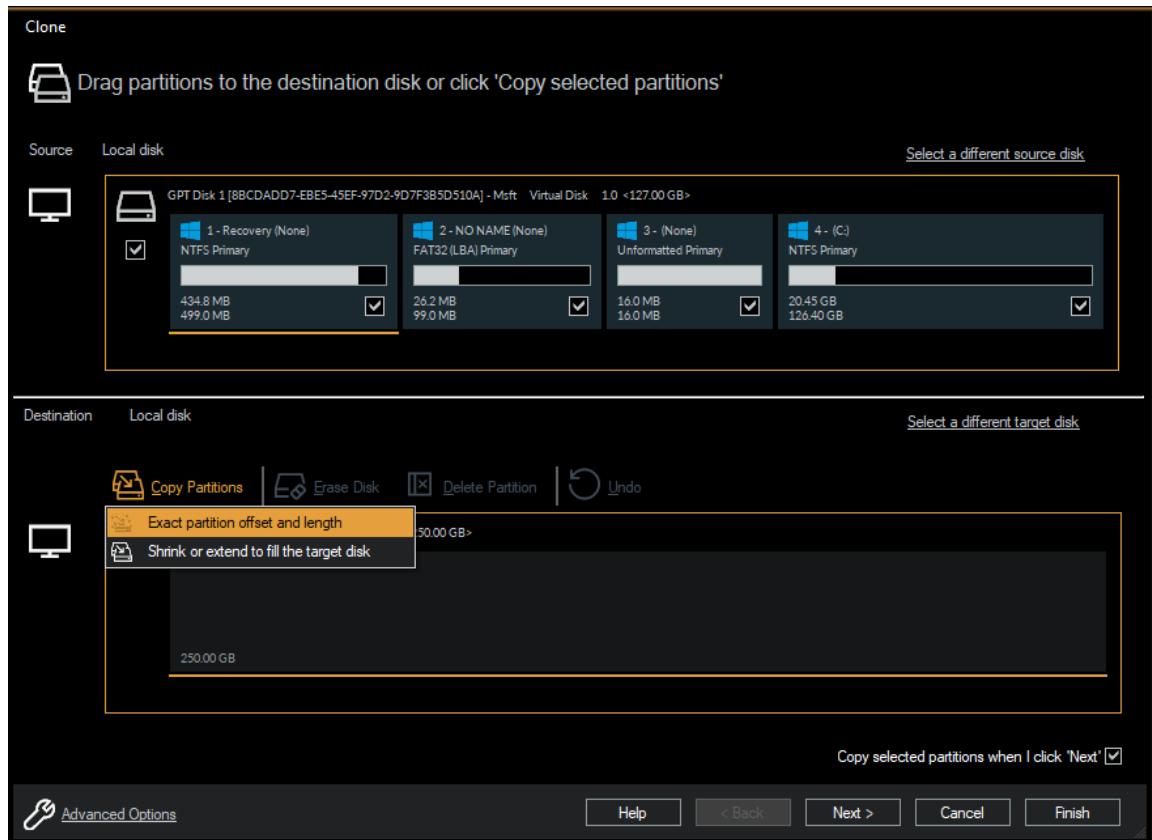
- Copying to a larger disk
- Copying to a Smaller Disk

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- 'Float Left', 'Float Right' and 'Fill Space'
- Delete Partition
- Erase Disk
- Using Layout for precise positioning

Copying to a larger disk

In the example below we have a 127 GB GPT system disk cloning to a 250 GB target disk.



Clicking 'Copy Partitions' shows a sub-menu with two options:

Exact partition offset and length	Selected partition(s) will be copied to the target maintaining the starting positions and lengths, from left to right. If the disk is smaller than the end of the last selected partition, then the last shrinkable (NTFS or FAT32) partition is shrunk to enable all partitions to be copied. If fixed size partitions are selected after the last shrinkable partition then they will be copied and floated to the end of the disk. An example of this is if a system recovery partition exists after the system drive C: and the target disk is smaller than the source.
--	---

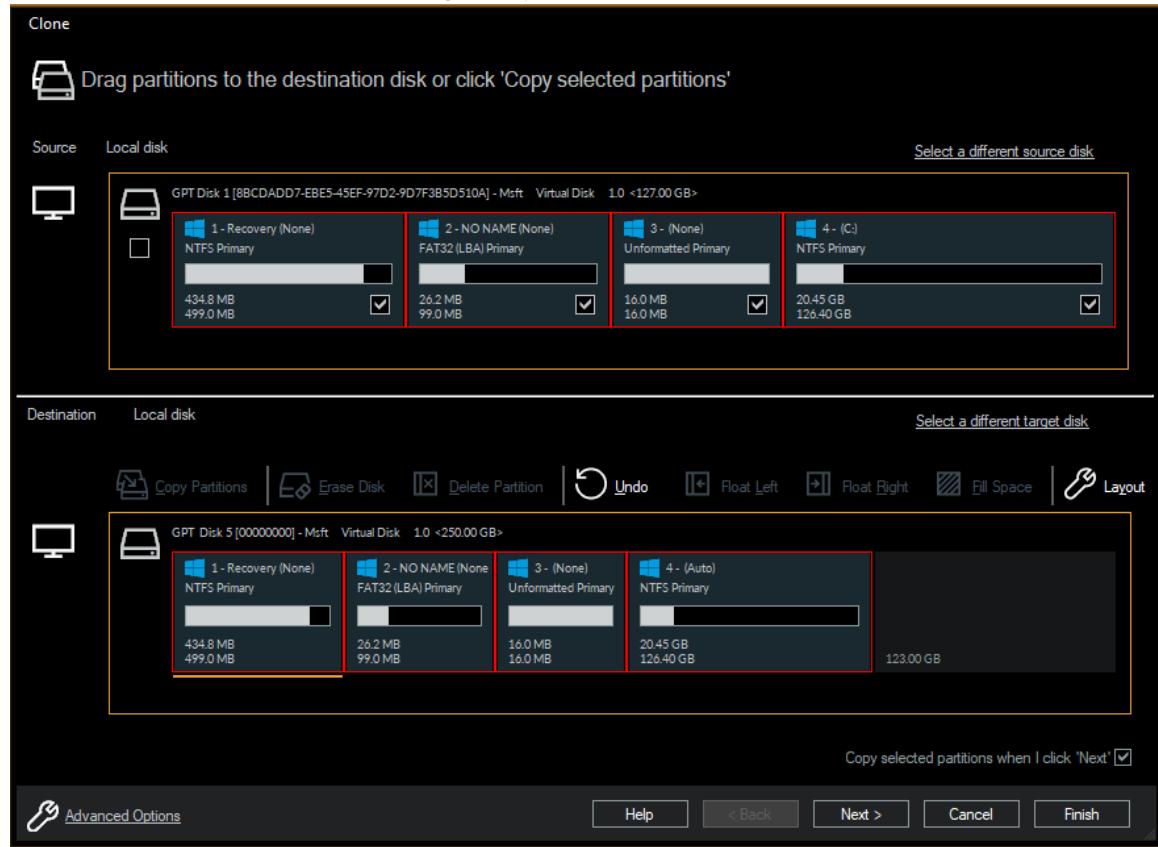
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Shrink or extend to fill the target disk	Selected partition(s) will be copied to the target and all extendable/shrinkable partitions will be proportionately resized so all partitions fill the disk.
---	---



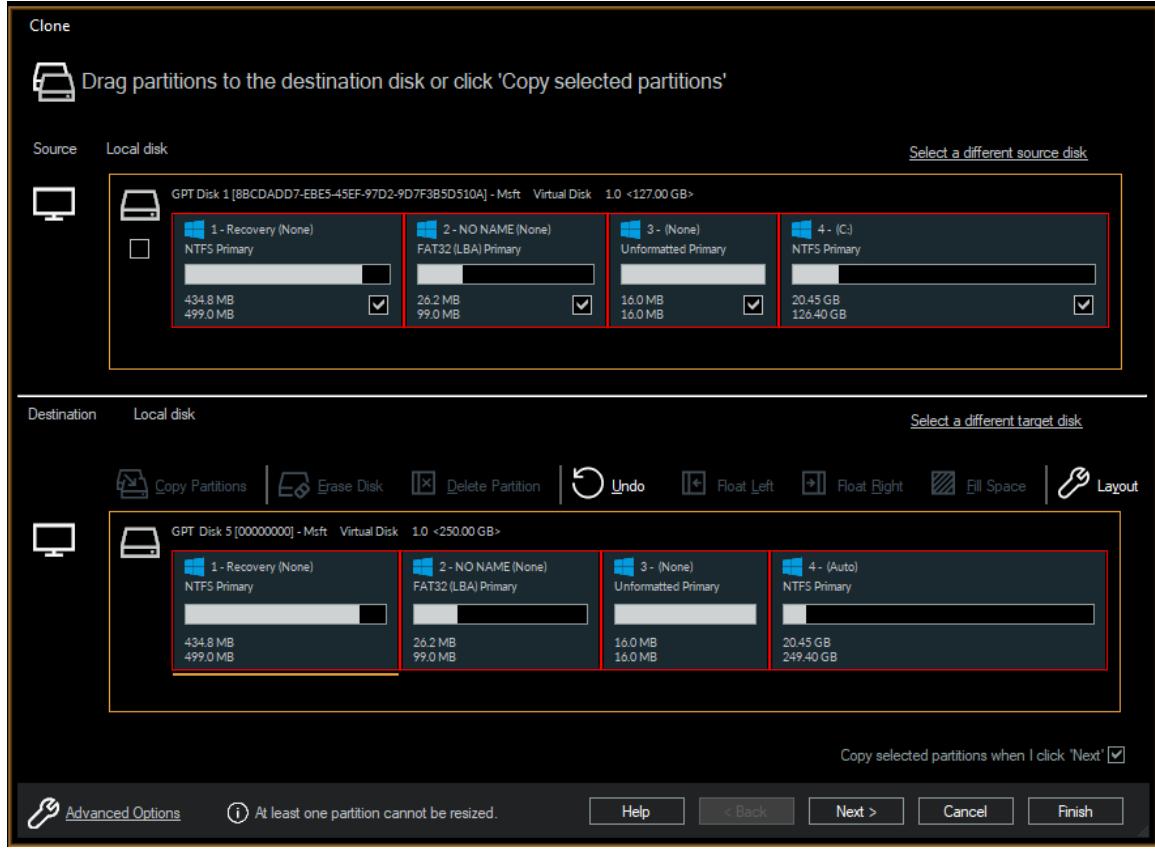
Extendable and **Shrinkable** partitions are all non-system partitions, and drive C, formatted using either NTFS or FAT32.

Result of **Exact partition offset and length** copy:



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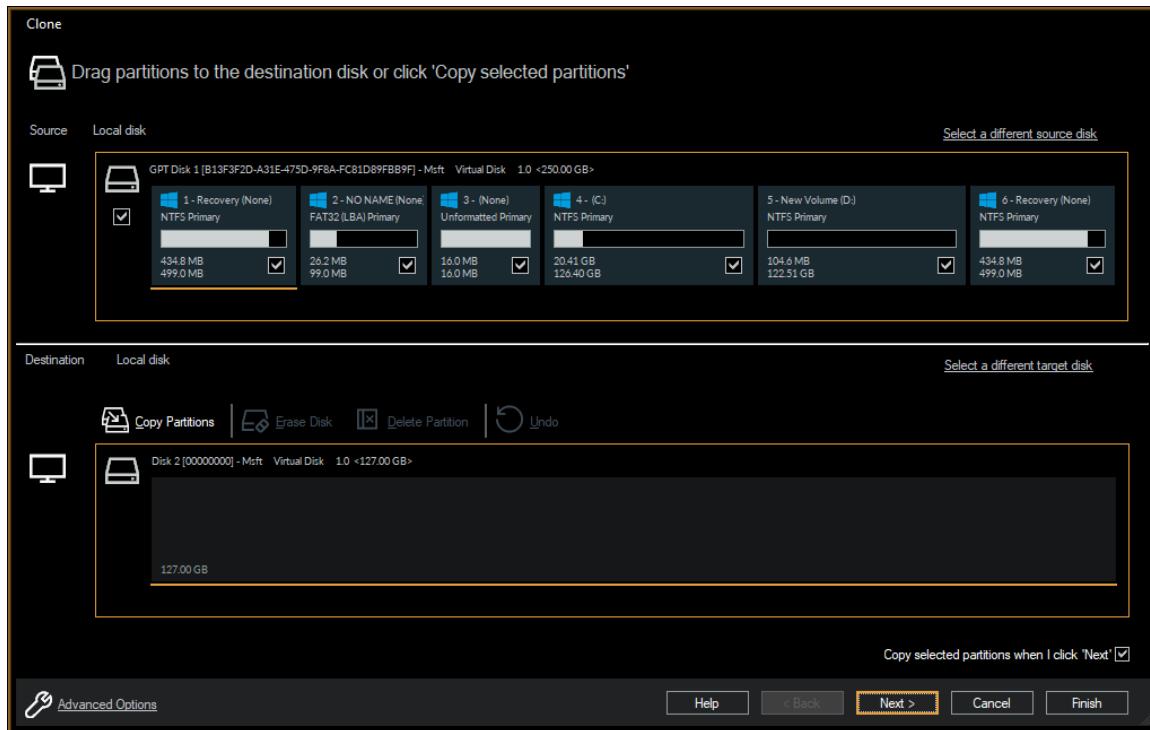
Result of **Shrink or extend to fill the target disk** copy



Copying to a Smaller Disk

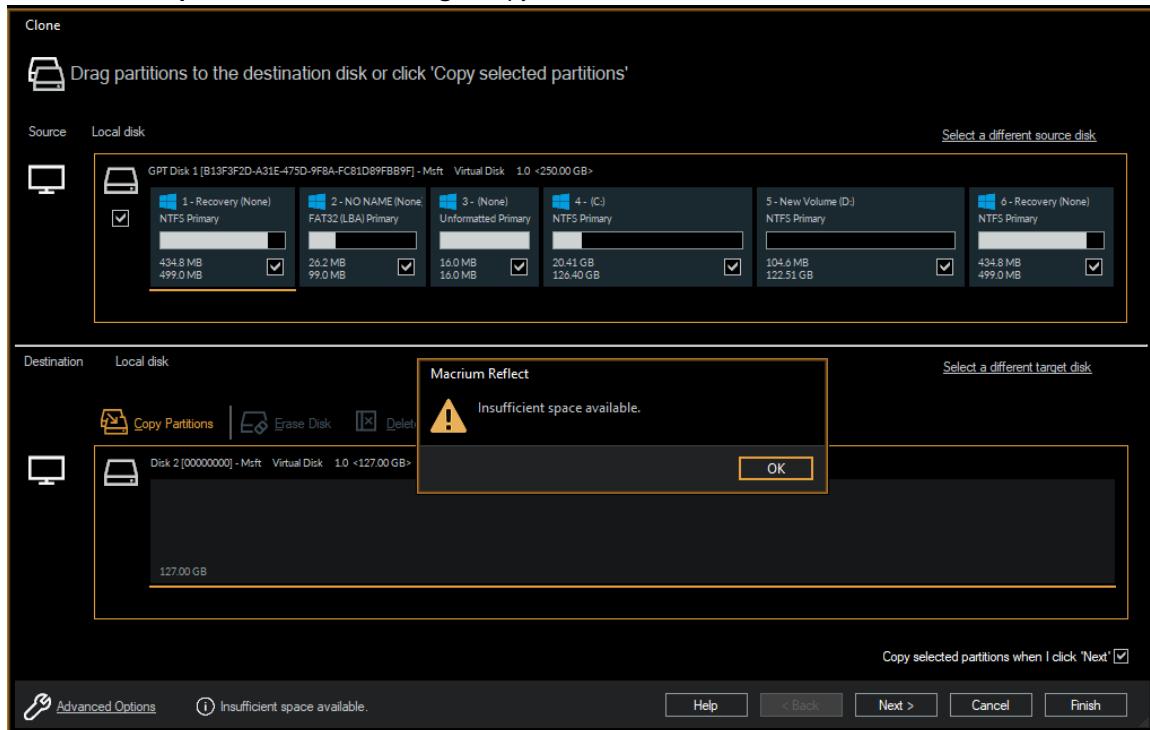
In the example below we have a 250 GB GPT system disk cloning to a 127 GB target disk.

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This is an unusual example in that there's an additional small recovery partition (6) at the end of the disk.

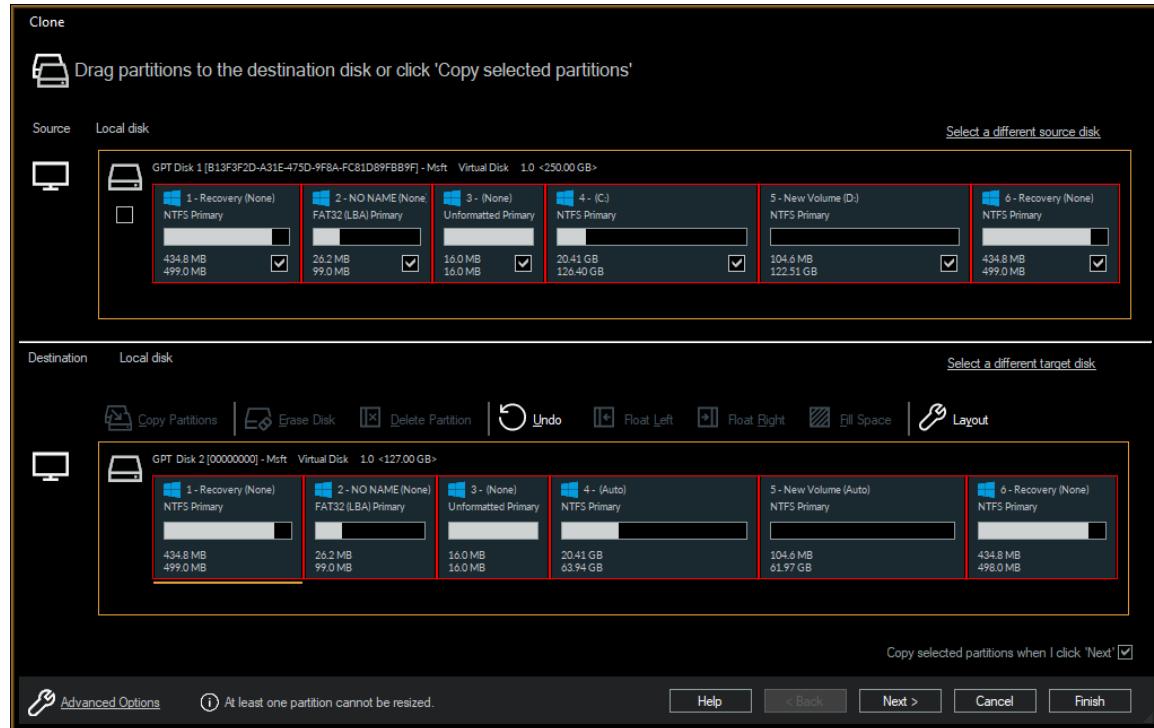
Result of **Exact partition offset and length** copy:



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This copy will not fit. No matter how much the last shrinkable partition (5 - D:) is shrunk, **there isn't enough space available to maintain the starting offset and length of drive C:.**

Result of Shrink or extend to fill the target disk copy



The last recovery partition is automatically floated to the end of the disk and partitions 4 and 5 (drive C and drive D) are proportionately shrunk to fill the space between the partition 3 and partition 6.



Note: You can further resize and move partitions using the '**Layout**' toolbar button combined with the options below.

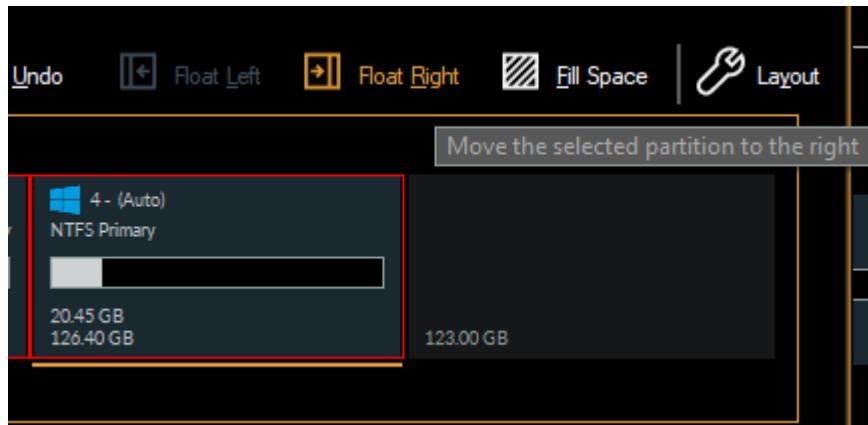
'Float Left', 'Float Right' and 'Fill Space'

Float Left	If free space is available before a copied partition then the toolbar option ' Float Left ' is available.
Float Right	If free space is available after a copied partition then the toolbar option ' Float Right ' is available.
Fill Space	In either of the above cases the toolbar option ' Fill Space ' is also available.

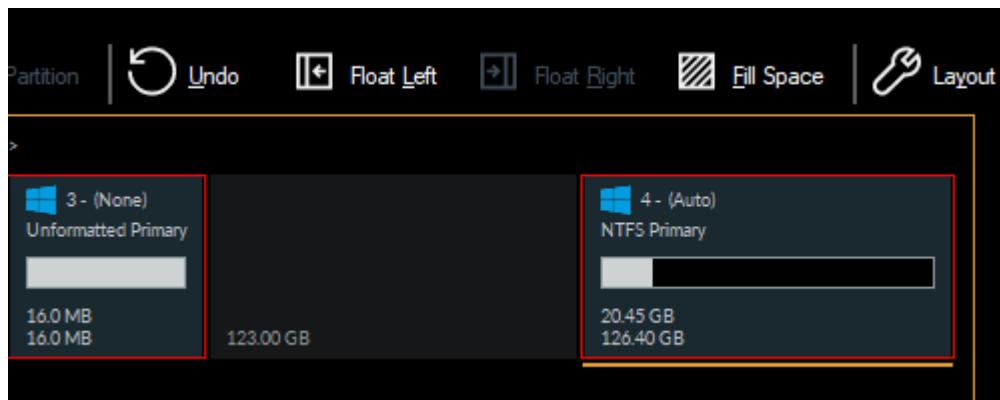
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Float Right

Before:

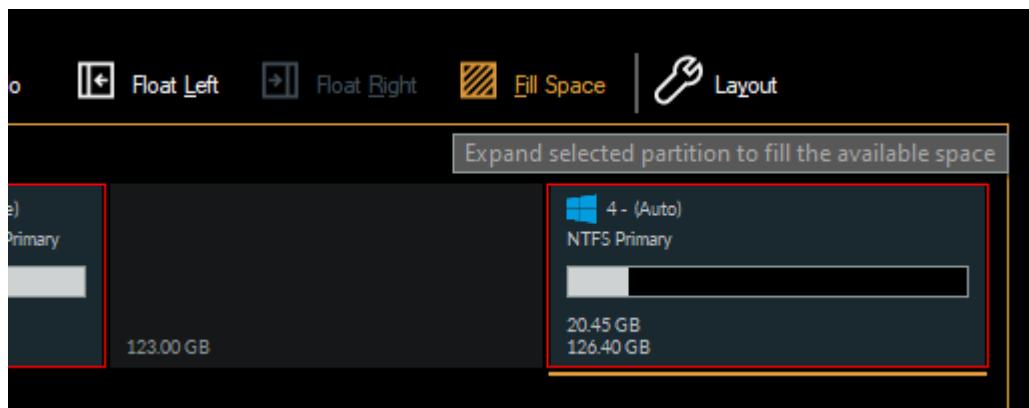


After:



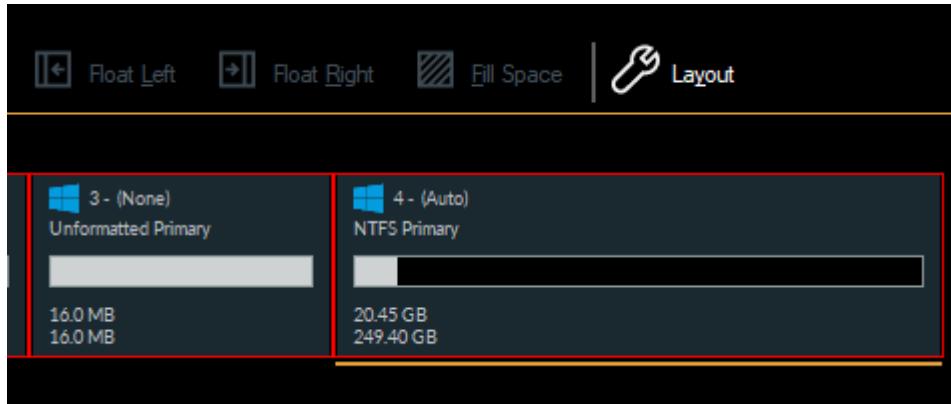
Fill Space

Before:



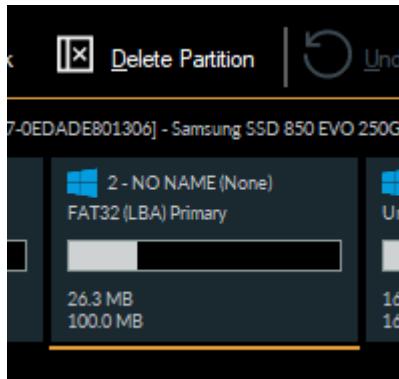
After:

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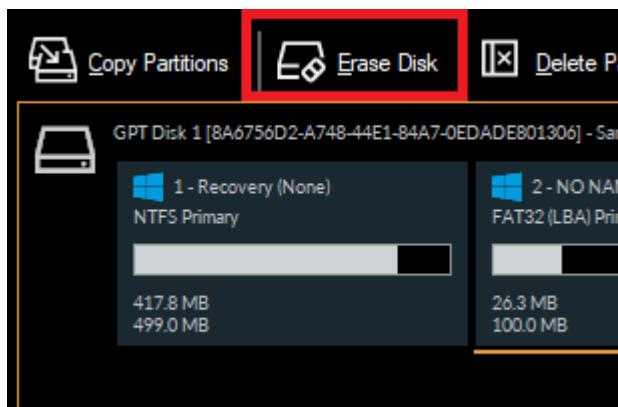
Delete Partition

Existing partitions can be deleted by selecting the partition and taking the 'Delete Partition' toolbar button



Erase Disk

All existing partition can be removed by taking the 'Erase Disk' toolbar option. This option can be useful to free up space by deleting multiple partitions with one click, however, existing partitions will be automatically deleted if copied partitions overlap their start or end sector.

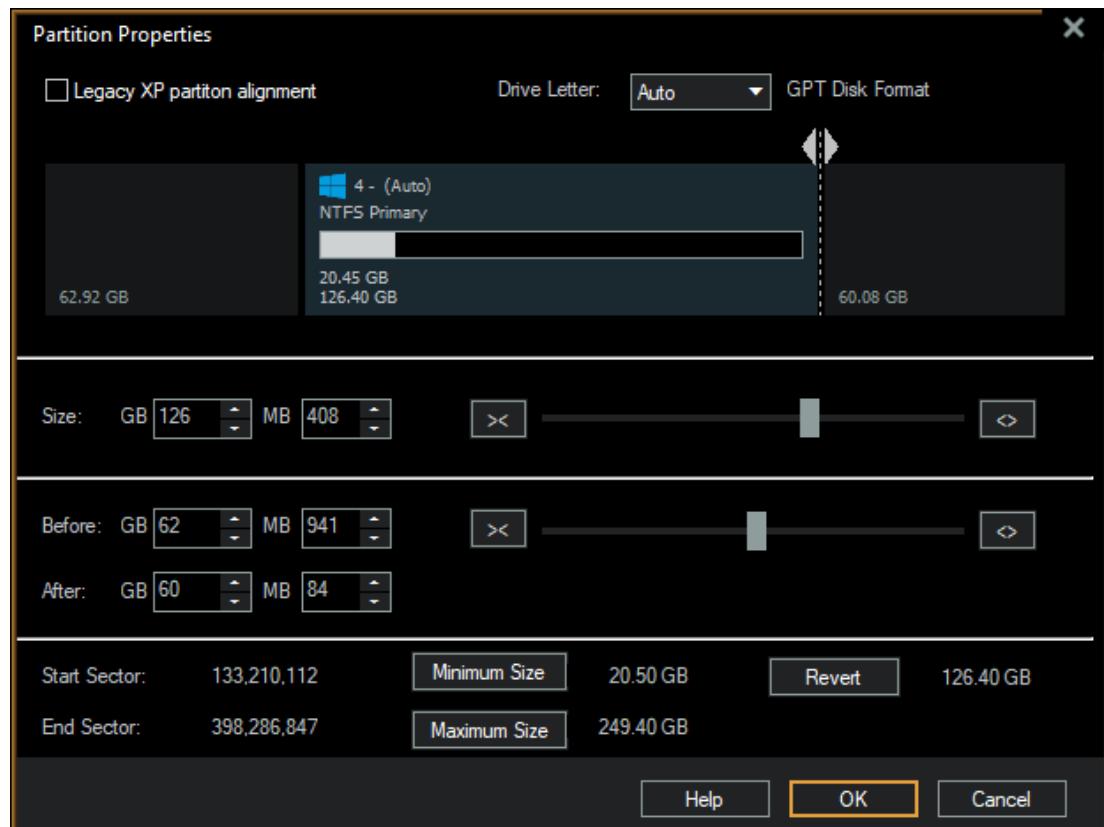


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Using Layout for precise positioning

The 'Layout' toolbar button is available if the **selected partition** on the target drive is a **copied partition that can be resized/moved or a drive letter can be chosen** after the clone/restore operation.

Example:



The partition can be resized:	By dragging the right edge of the partition, by changing the Size GB + MB values, or by moving the size slider.
The partition can be positioned:	By dragging directly, by changing the Before or After GB + MB values, or by moving the before / after sliders to increase/decrease space.



The **GB and MB values are added together**. In the example above the Size is 126GB + 408MB = 126.4 GB or 129,432MB.

Minimum Size	Floats the partition to the left and sets the partition to the minimum shrinkable size
Maximum Size	Extends the partition to fill the available space

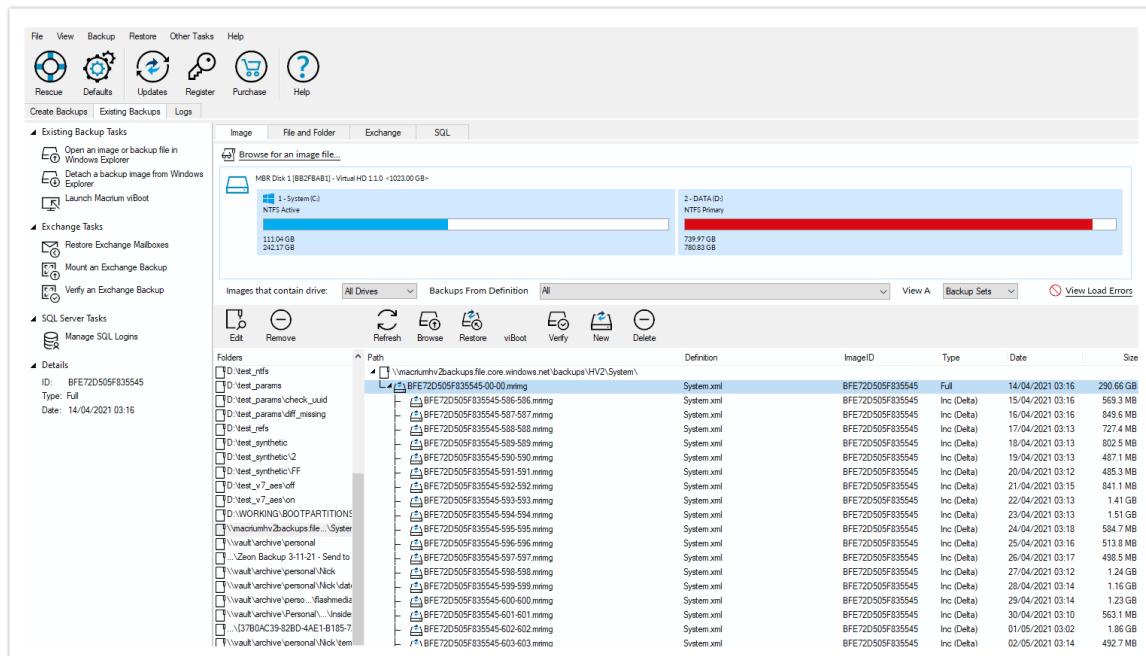
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Revert	Sets the partition to the offset and size when the dialog was opened.
---------------	---

Note: Free space can be made available either before or after by, deleting existing adjacent partitions or by shrinking or moving adjacent restored partitions.

Existing Backups View

We've renamed the 'Restore' tab in v7 to '**Existing Backups**' and added extra functionality and backup file representation.



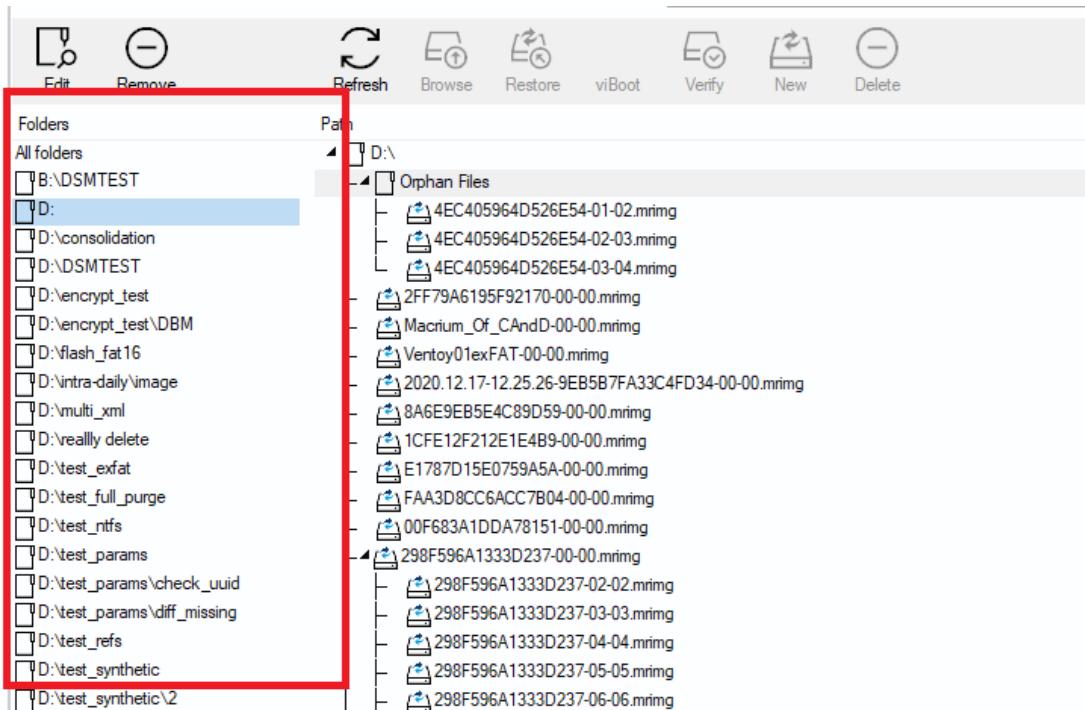
As well as the existing functionality in Macrium Reflect v7, we've added new functions to sort files, view them in context of the backup set and locate and view your backup logs.

View your backup files in a backup set tree or a flat list to easily sort by date or file name

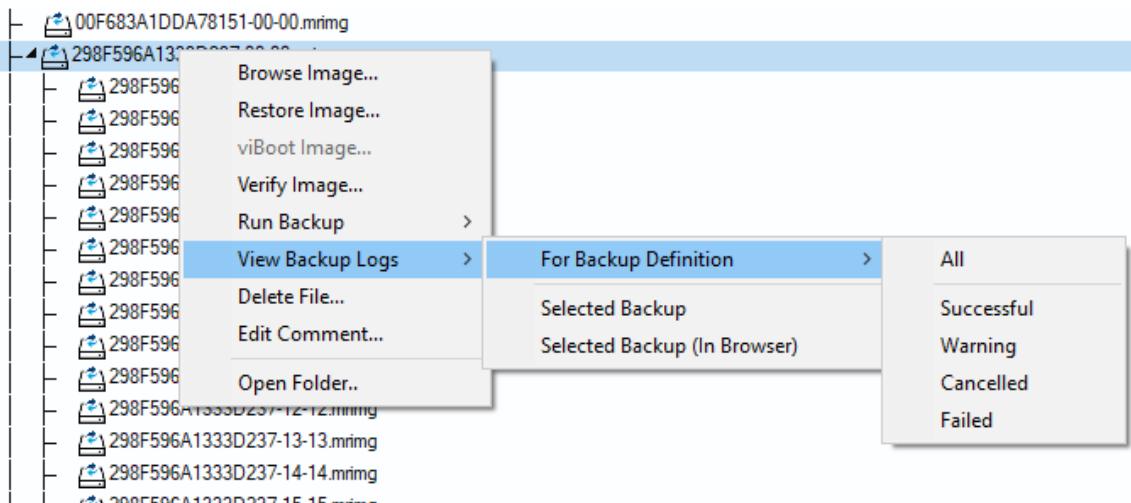
Type	Date	Size	
35545	Full	14/04/2021 03:16	290.66 GB
35545	Inc (Delta)	15/04/2021 03:16	569.3 MB

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'Folders To Search' is now implemented as a selectable list of one or all folders.

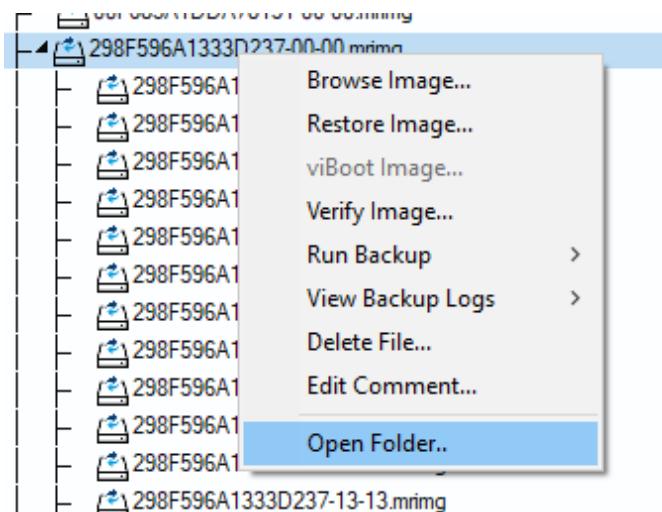


We've added the ability to directly view backup logs for a backup file, either by definition or for the file itself:

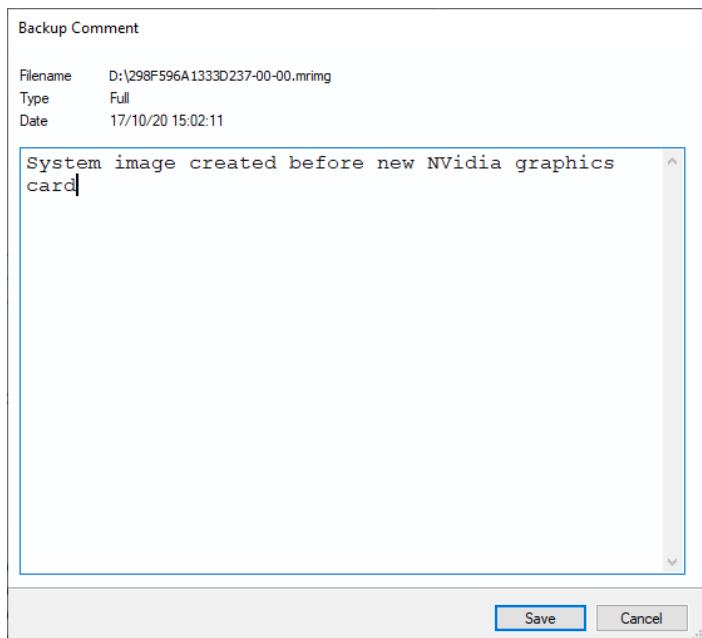


You can now also open the backup containing folder directly in Windows Explorer

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And edit the comment in existing backup files

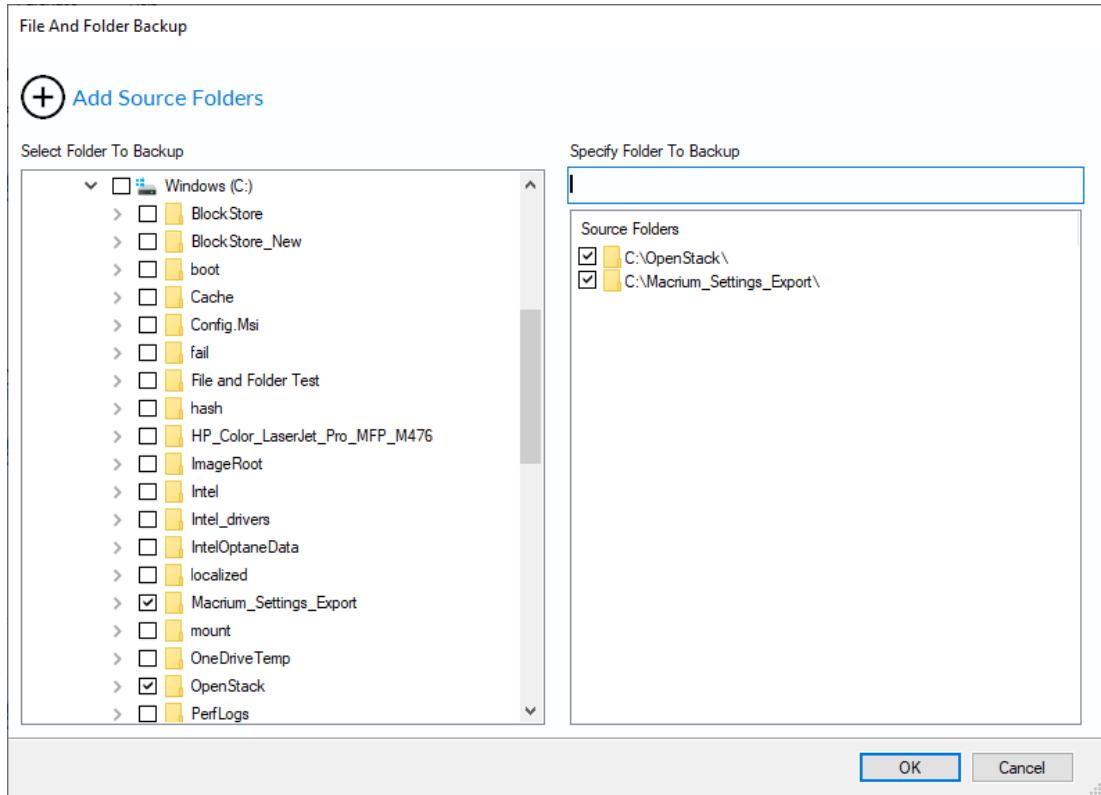


File and Folder Backup Wizard

We've improved the user interface for adding folders to your File and Folder backups.

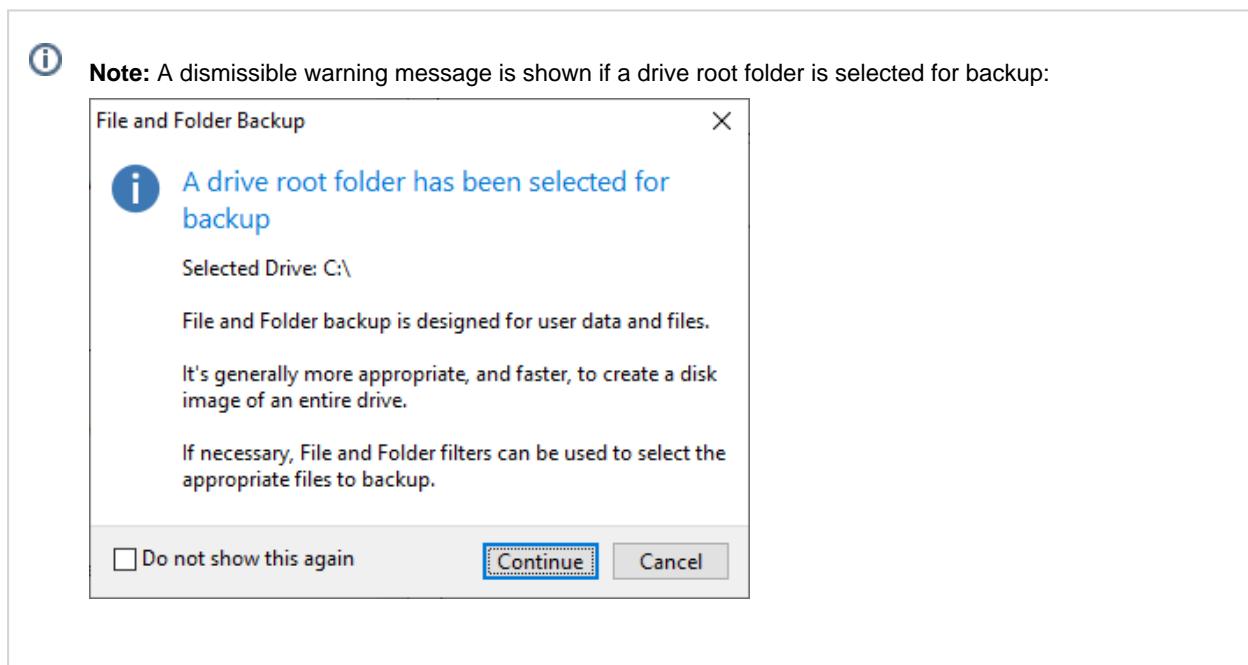
Click 'Add Source' to open the 'Add Source Folders' dialog:

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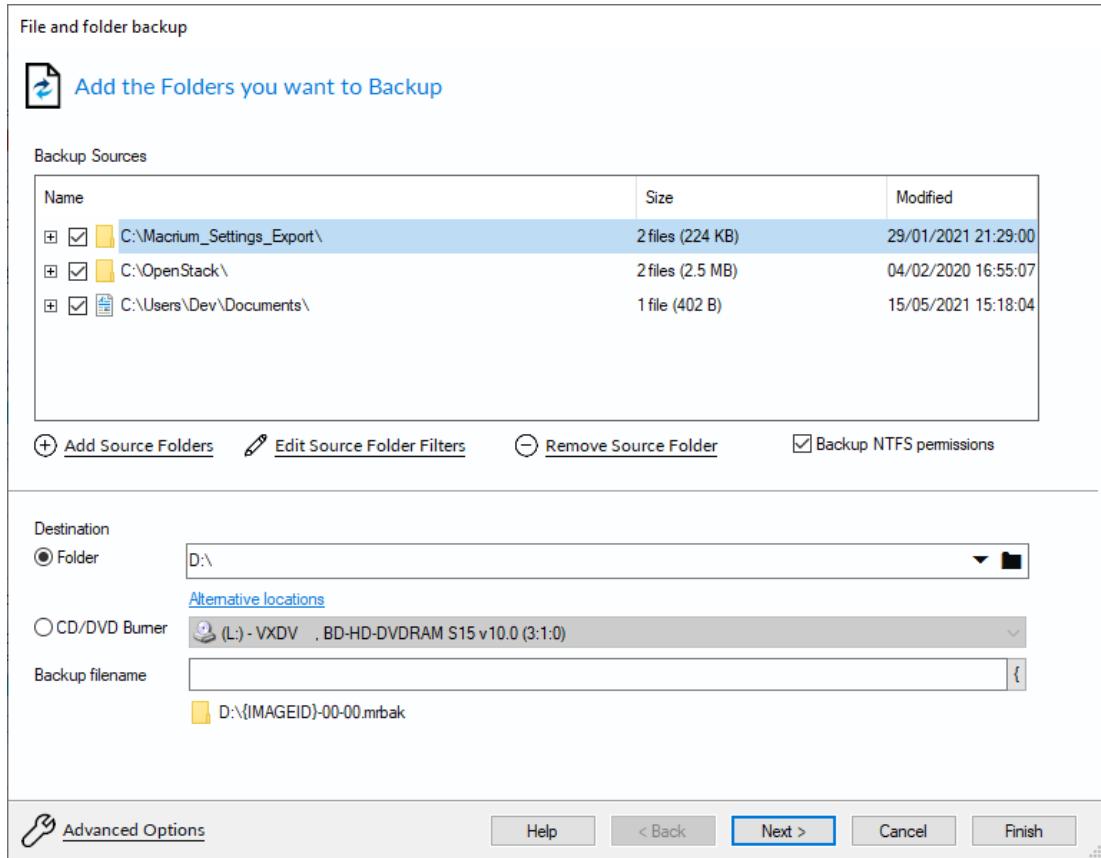
Select folders in the Explorer Tree view to add them to the list of source folders to backup.

You can also **type a path in the auto-complete edit control** above the selected folders list to manually add a path that can't be located in the folder tree, a network share for example.



Click 'OK' when complete to return to the main Wizard page.

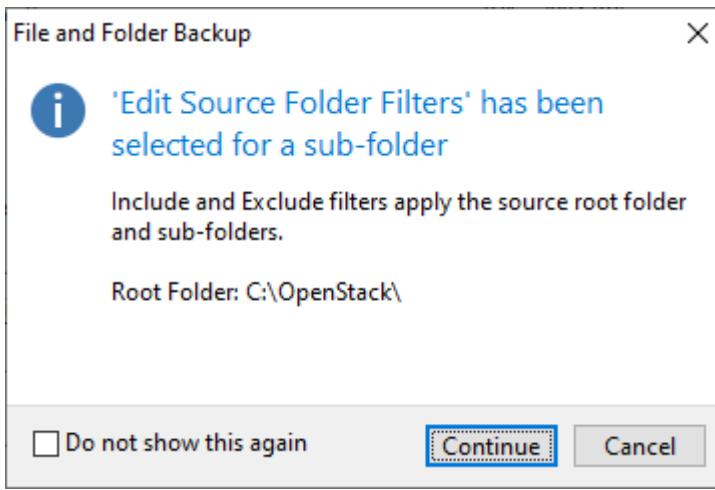
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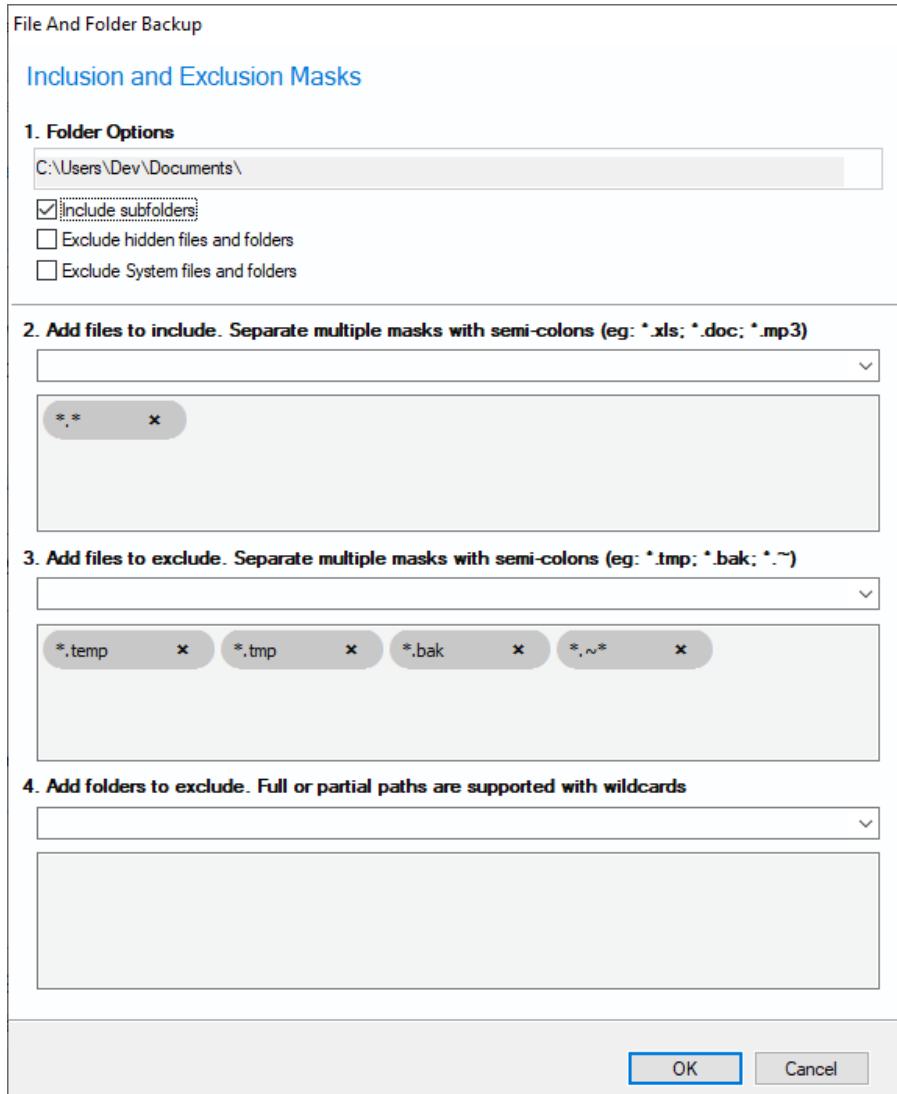
Select and deselect sub-folders in the folder tree. Click 'Edit Source Folder Filters' for further filtering options:



Note: Filters apply to source root and sub-folders. If a sub-folder is selected when 'Edit Source Folder Filters' is clicked then the following dismissible message box is shown:



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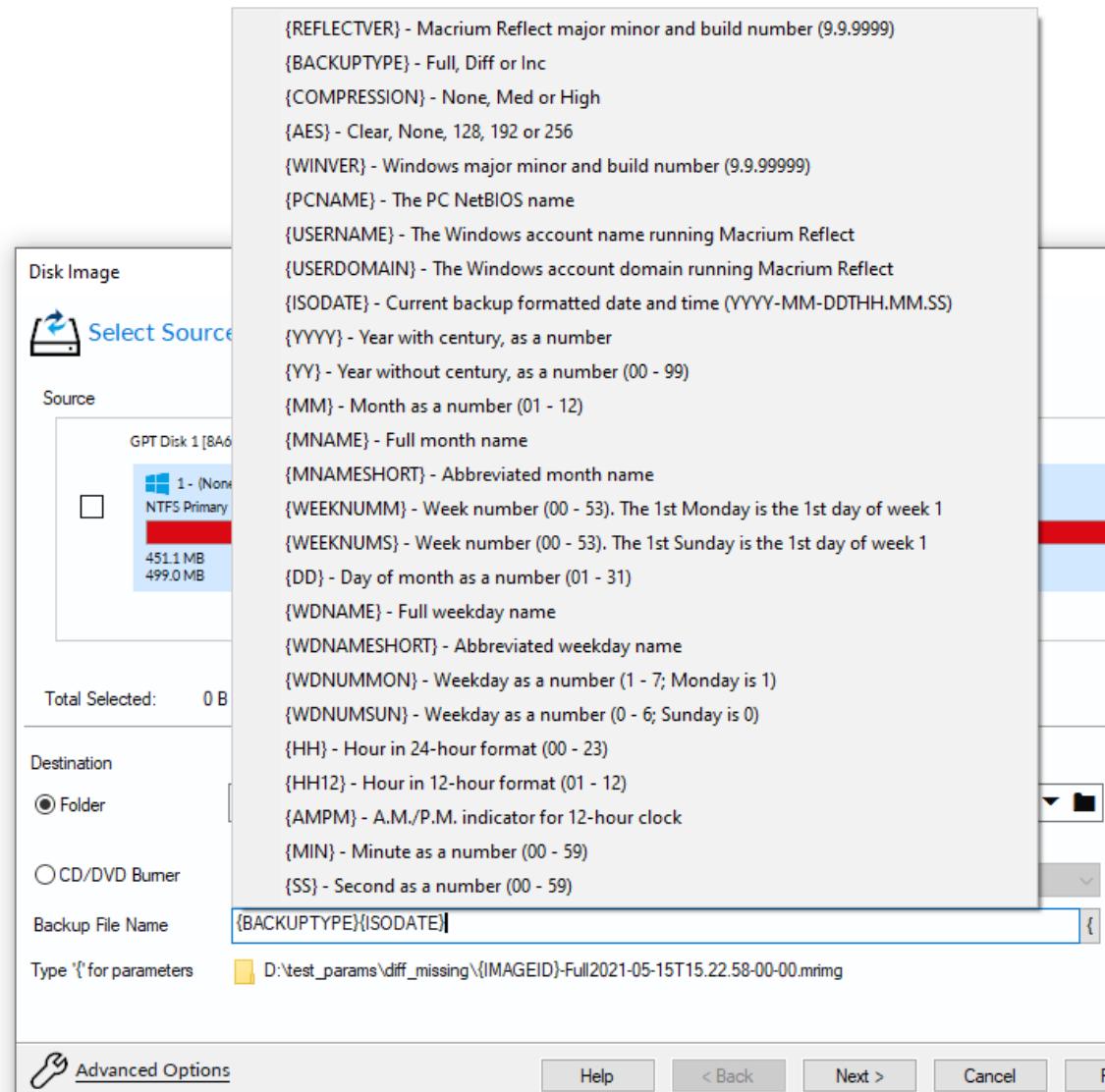
Press 'Enter' after entering inclusions and exclusions and they are now **grouped** below the edit field for **easy editing**

File Name Parameters

Run time parameters enable dynamic information to be included in backup file names at run time.

In the Image and File and Folder backup dialog simply **type '{'** or **press the '{' button** at the end of the file name edit field:

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The selected parameter from the pop-up menu will be inserted into the file name at the edit position.

All parameters are evaluated at run time, and an example of the output is shown in the formatted file name and path below the edit field.



Note: The File name 'Set prefix' (IMAGEID above) is evaluated based on the backup set and isn't selectable from the parameters list.



Note: The timestamp used for the time fields may differ by a few seconds to the backup time recorded for the backup. This is because the backup file name is created before the completion of the Volume Snapshot and the actual backup start time.

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Parameter	Description
{REFLECTVER}	Macrium Reflect major minor and build number (9.9.9999)
{BACKUPTYPE}	Full, Diff or Inc
{COMPRESSION}	None, Med or High
{AES}	Clear, None, 128, 192 or 256 Where 'Clear' is no password and 'None' is password with no AES
{WINVER}	Windows major minor and build number (9.9.99999)
{PCNAME}	The PC NetBIOS name
{USERNAME}	The Windows account name running Macrium Reflect
{USERDOMAIN}	The Windows account domain running Macrium Reflect
{ISODATE}	Current backup formatted date and time (YYYY-MM-DDTHH.MM.SS)
{YYYY}	Year with century, as a number
{YY}	Year without century, as a number (00 - 99)
{MM}	Month as a number (01 - 12)
{MNAME}	Full month name
{MAMESHORT}	Abbreviated month name
{WEEKNUMM}	Week number (00 - 53). The 1st Monday is the 1st day of week 1
{WEEKNUMS}	Week number (00 - 53). The 1st Sunday is the 1st day of week 1
{DD}	Day of month as a number (01 - 31)
{WDNAME}	Full weekday name
{WDNAMESHORT}	Abbreviated weekday name

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Parameter	Description
{WDNUMMON}	Weekday as a number (1 - 7; Monday is 1)
{WDNUMSUN}	Weekday as a number (0 - 6; Sunday is 0)
{HH}	Hour in 24-hour format (00 - 23)
{HH12}	Hour in 12-hour format (01 - 12)
{AMPM}	A.M./P.M. indicator for 12-hour clock
{MIN}	Minute as a number (00 - 59)
{SS}	Second as a number (00 - 59)

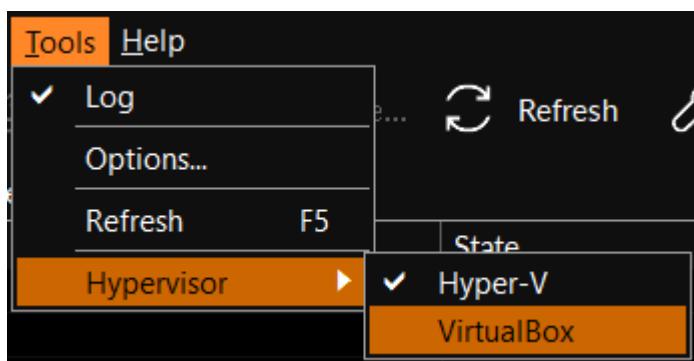
viBoot Virtual Box Support

We've added direct support for Oracle VirtualBox by implementing .mrimg to .vmdk file virtualization. VirtualBox provides an alternative to Microsoft Hyper-V for instant image virtualization. VirtualBox v6.1.4 can be run on Windows 8/Server 2012 R2 and later regardless of whether the native OS includes a Windows Hypervisor layer. In addition, VirtualBox includes a USB pass-through virtual device that enables USB drives, including flash, to be accessible from inside the Virtual Machine.

viBoot can be switched between **Hyper-V** and **VirtualBox** mode using the 'Tools' menu:

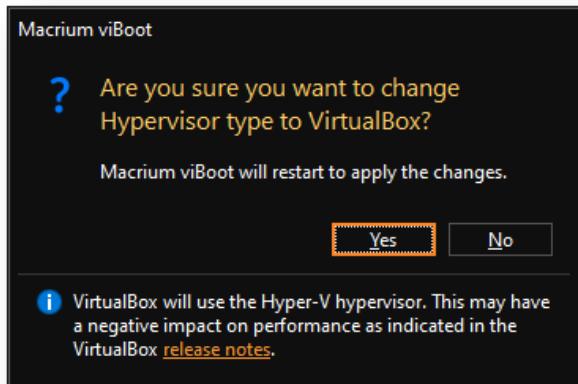
Note: VirtualBox less than v6.1.4 cannot be run on Windows where Microsoft Hyper-V service is running.

Microsoft Hyper-V feature must be disabled for **VirtualBox 6.0.xx** to function. Please run "bcdedit / set hypervisorlaunchtype off" after disabling Hyper-V feature from "Turn Windows features on or off"



Macrium viBoot will be restarted after changing Hypervisor mode. This doesn't affect the state of existing VMs, whether they are running or not:

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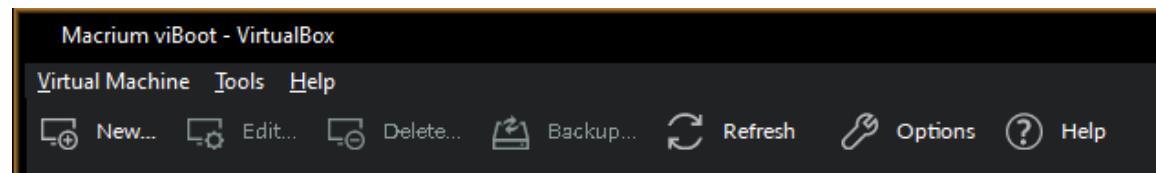


Performance Warning

If VirtualBox v6.1.4 (or later) is installed alongside Microsoft Hyper-V, VMs will not run with optimum performance.

See the [VirtualBox Change Log](#) for more information on this.

The current hypervisor type is shown in the application title bar:



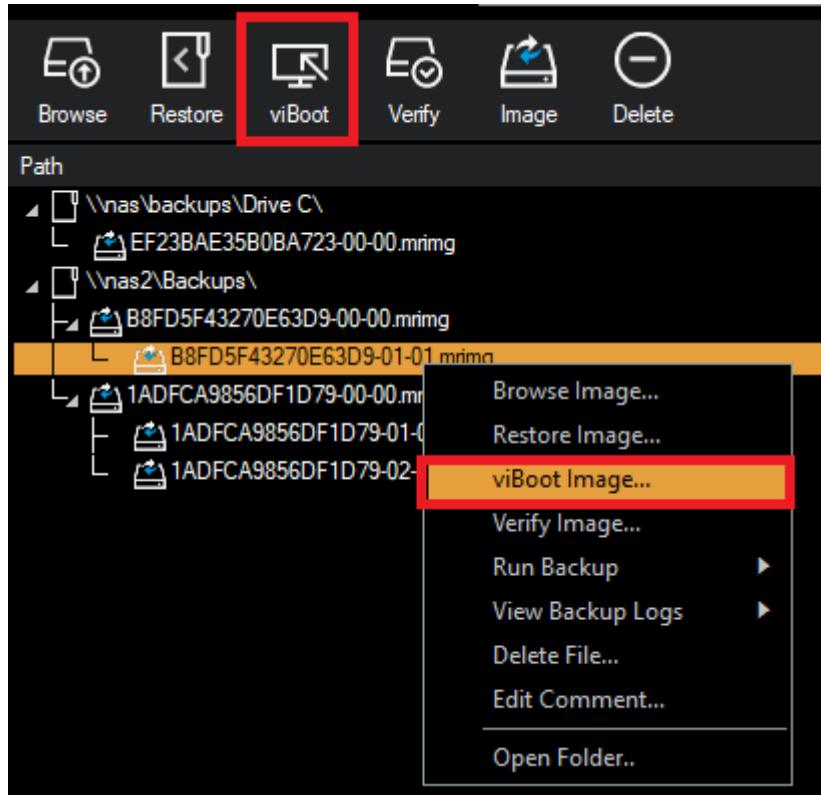
Booting an image directly from Macrium Reflect

An image that contains the Windows System and Boot partition(s) can be directly booted from the 'Restore' view in Macrium Reflect.

Boot architecture	Required Partitions
MBR - Master Boot Record	Boot partition: This may be the same partition as drive 'C:' but is likely to be a separate small (100 to 300 MB) partition named the Microsoft System Reserved partition or MSR. Windows partition: This is the partition that contains the Windows OS and will be drive C:
UEFI - Unified Extensible Firmware Interface	UEFI System Partition: A small FAT32 LBA formatted partition that doesn't have a drive letter. Windows partition: This is the partition that contains the Windows OS and will be drive C:

If an image contains the partitions required for booting then the 'viBoot' option will be available in the toolbar and in the context menu:

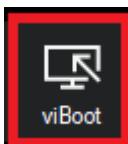
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Otherwise the option will be disabled:

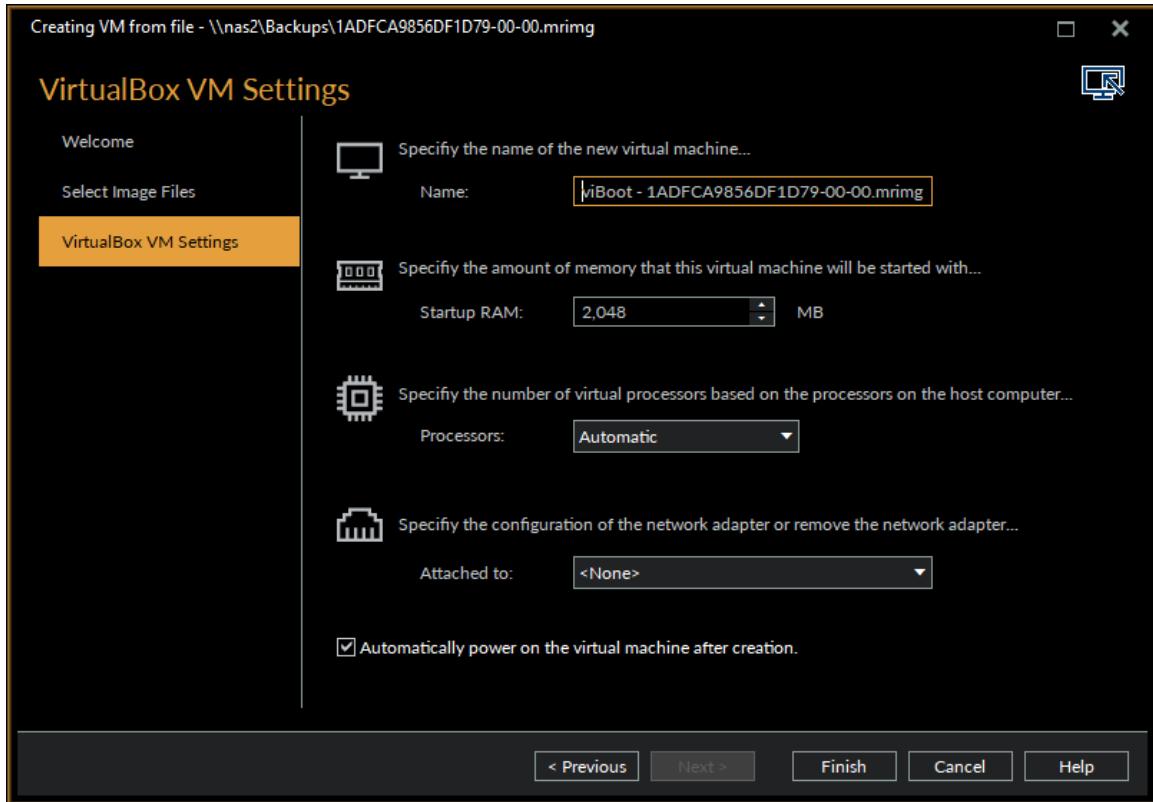
To boot an image directly with viBoot.

1. Click the 'Restore' tab.
2. Select the image.
3. Click the 'viBoot Image' toolbar button or menu option.



4. If viBoot can launch, the viBoot **Hyper-V settings dialog** will start.

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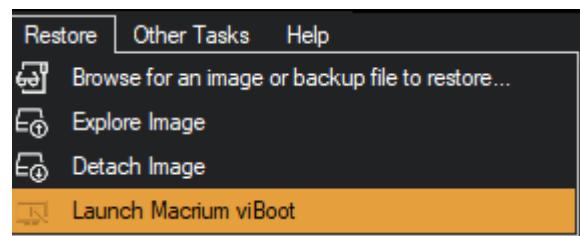


5. Make any changes to the VM properties and **click 'Finish'**

The VM will now start and boot directly into Windows.

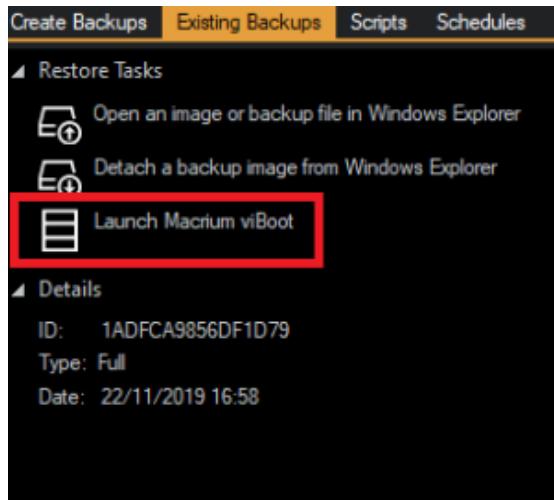
Starting the viBoot create Virtual Machine Wizard from Macrium Reflect.

Take the '**Restore**' > '**Launch Macrium viBoot**' menu option



Or, click the '**Launch Macrium viBoot**' task link on the Restore tab.

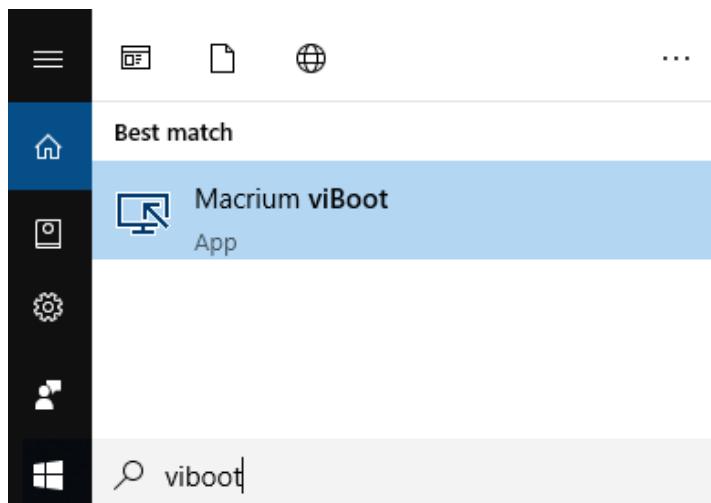
Macrium Reflect v8.0 User Guide



This will start the the viBoot Virtual Machine User Interface.

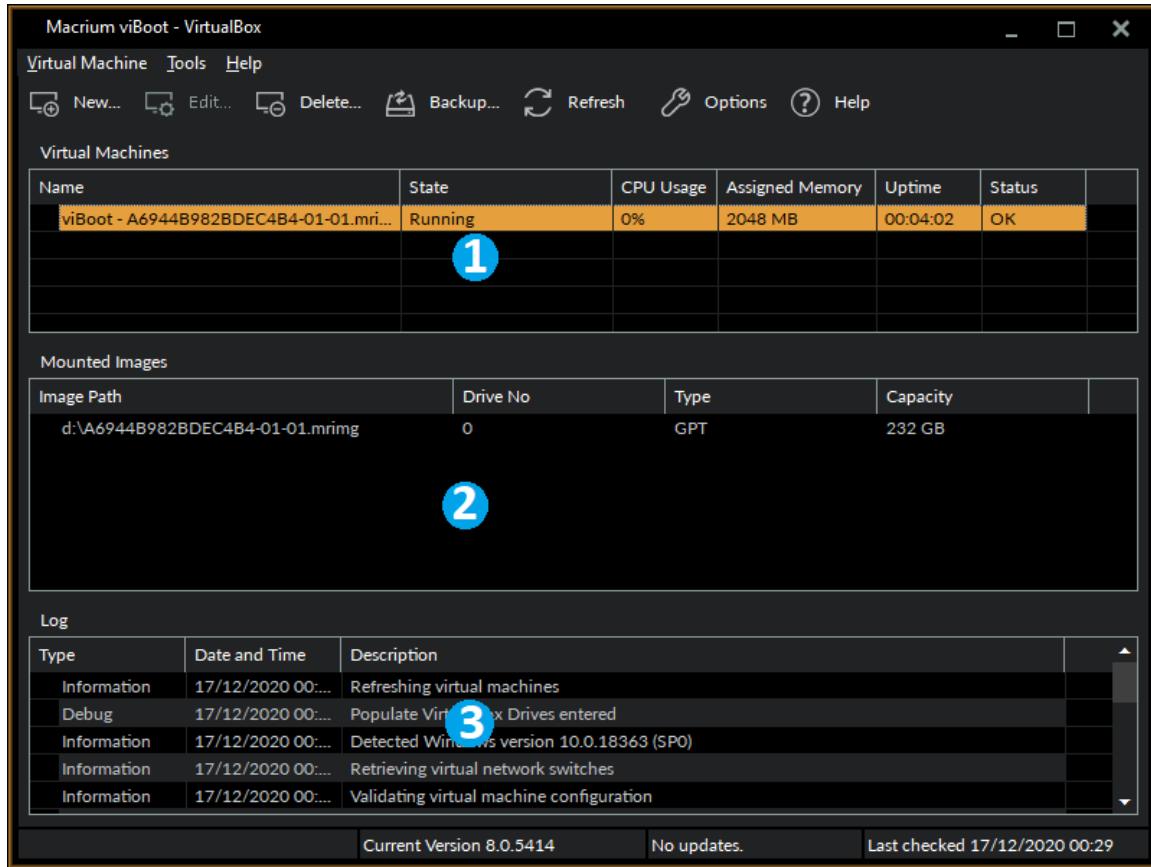
Launching viBoot as a standalone application

viBoot is installed by default during the standard Macrium Reflect installation and can be started using the installed shortcut:



Main Window

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The “Virtual Machines” view (1), displays the name of the viBoot created virtual machine, the current state of the virtual machine (Off, Running, etc) and the current CPU usage of the virtual machine. Selecting a Hyper-V virtual machine in the “Virtual Machines” view (1) will update the “Mounted Images” view (2) to list the Macrium Reflect images that are being referenced by the virtual machine.

The “Mounted Images” view (2), displays the path of the image file(s) used to create the virtual drive(s), the physical drive number assigned to the drive by Windows, the partition type of the drive (MBR or GPT) and the drive capacity.

The "Log" view (3), shows a record of the actions taken by viBoot.

Main Window Commands

Menu Item	Sub Menu Item	Description
Virtual Machine	Connect	Connect to a virtual machine.
	New...	Display the viBoot Wizard to create a new virtual machine.
	Backup...	Create a Disk image of the selected virtual machine.
	Delete...	Delete the selected virtual machine.

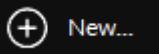
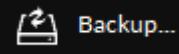
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Menu Item	Sub Menu Item	Description
	<u>S</u> tart	Start the selected virtual machine.
	<u>S</u> hut down	Shut down the selected virtual machine.
	<u>T</u> urn off	Turn off the selected virtual machine.
	<u>P</u> ause	Pause the selected virtual machine.
	<u>R</u> eset	Reset the selected virtual machine.
	<u>E</u> xit	Exit the Macrium viBoot application.
Tools	<u>L</u> og	Toggle the Log window display,
	<u>O</u> ptions...	Configure the virtual machine repository folder, and logging options.
	<u>R</u> efresh	Reload virtual machines and mounted images.
	Hypervisor	<ul style="list-style-type: none"> • Hyper-V • VirtualBox <p>This menu option is only available if VirtualBox 6.1.4 (or later) is installed on a PC running Hyper-V.</p>
Help	<u>C</u> ontents...	This help content.
	<u>A</u> bout Macrium viBoot...	viBoot version and copyright notice.

Tip

You can right-click on the virtual machine pane to display the "Virtual Machine" menu as a context menu.

Macrium viBoot toolbar:

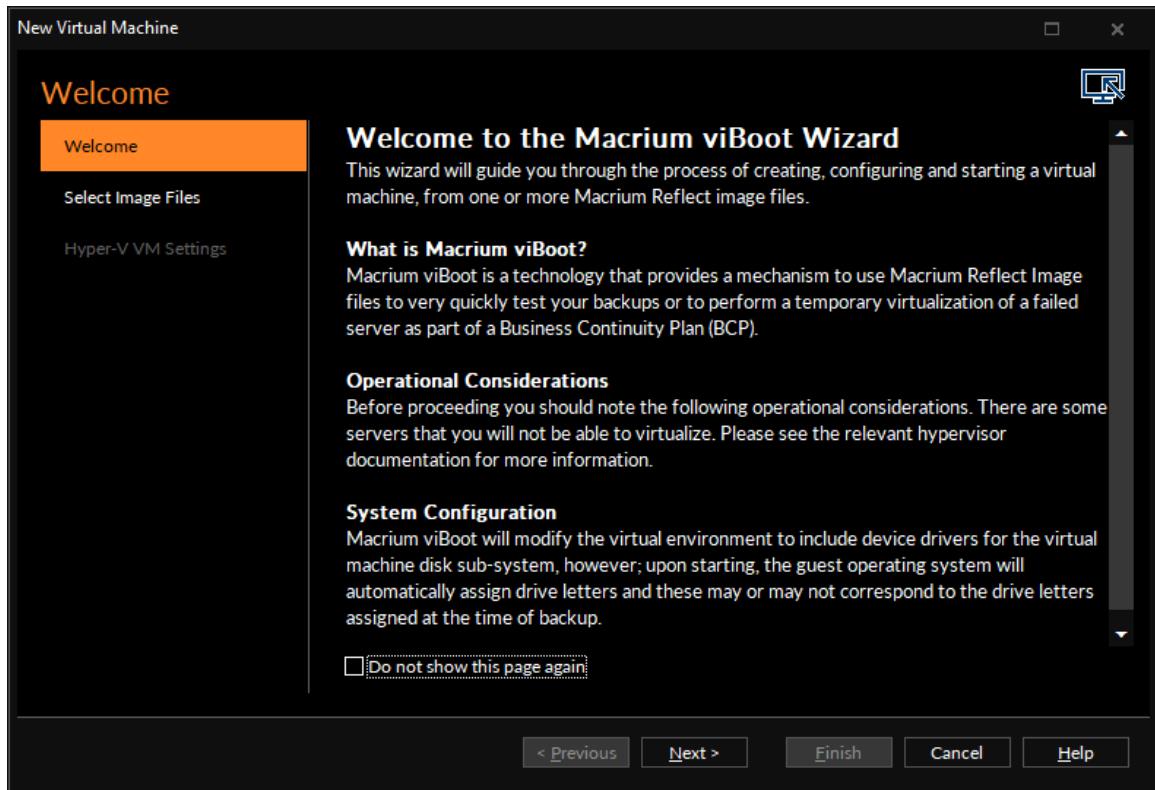
 New...	Displays the viBoot Wizard which allows you to create a new virtual machine.
 Backup...	Create an Image of the currently selected Virtual Machine.
	Deletes the currently selected virtual machine.

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 Delete...	
 Refresh	Refresh the list virtual machines and states.
 Options	Configure the virtual machine repository folder, and logging options.
 Help	Displays this help content.

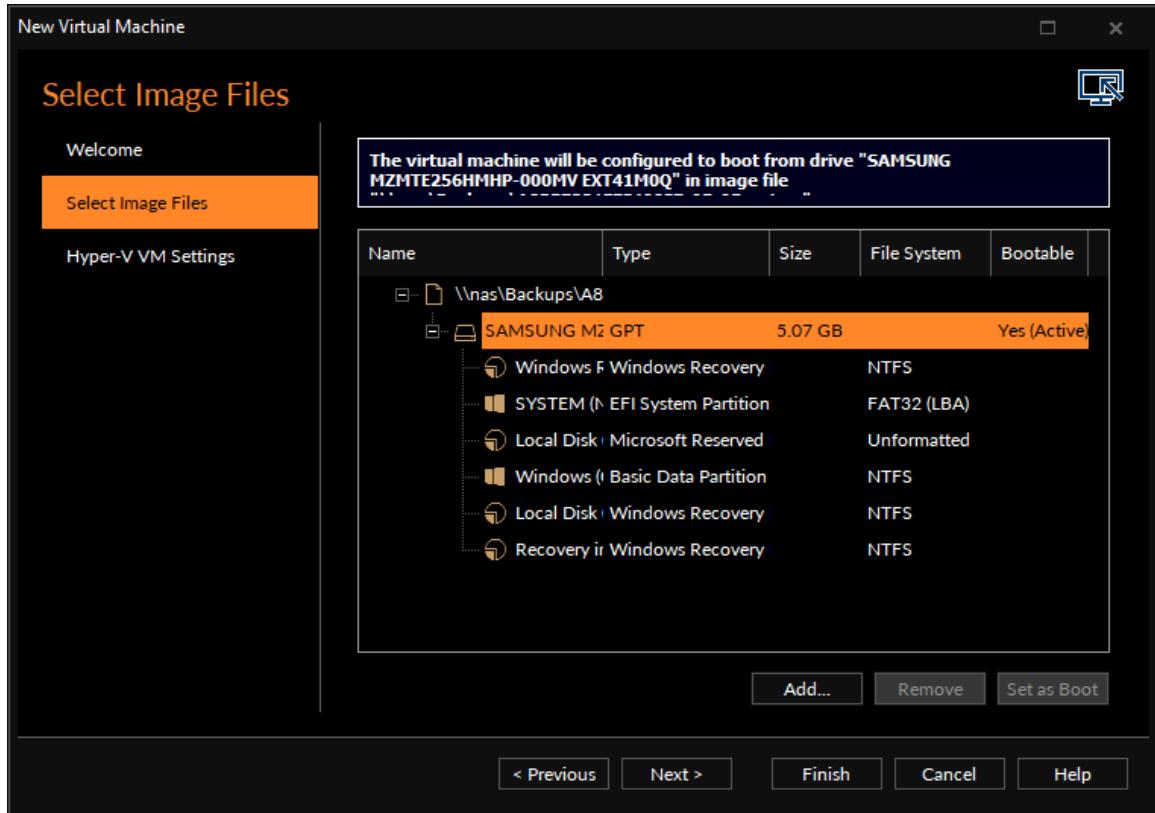
New VM Wizard

The "Welcome" page provides a brief introduction and explains some of the limitations of virtualization.



Select Image Files allows you to add one or more Macrium Reflect image files to be used for the virtual machine.

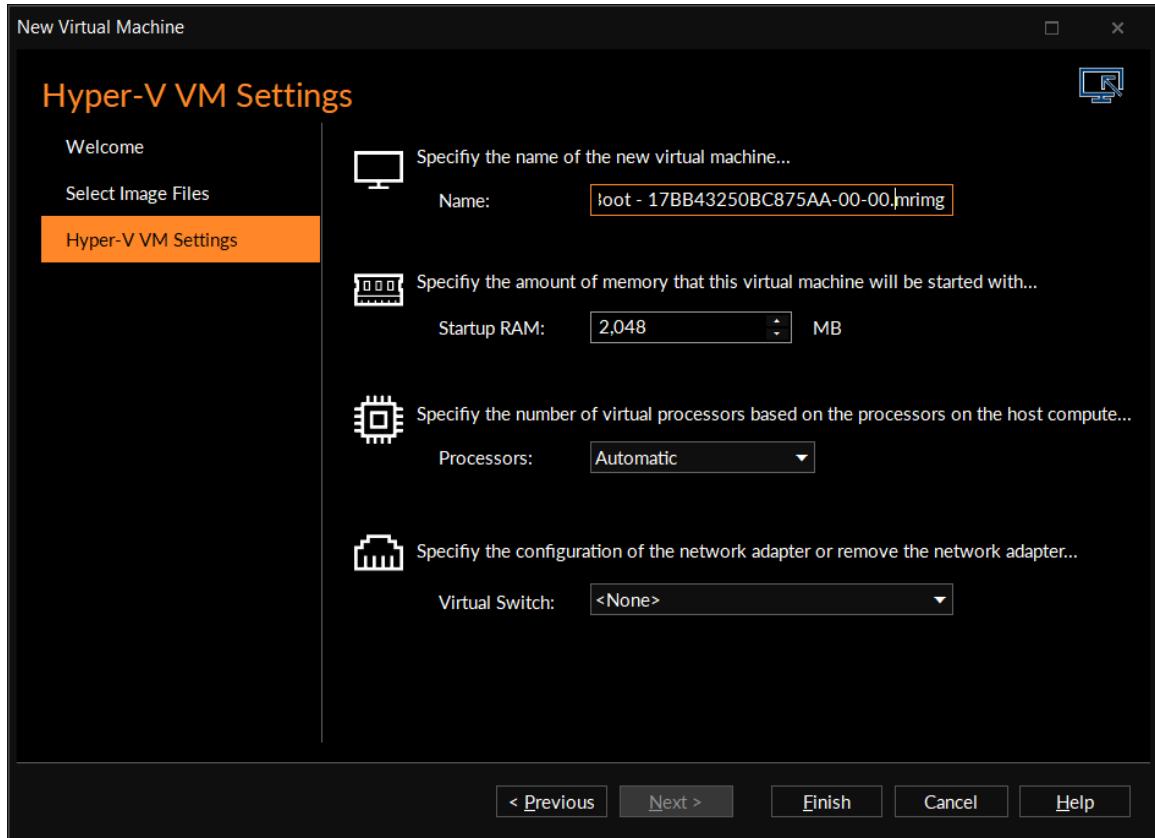
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The first bootable disk will be marked as the boot disk. If there are multiple disks that are bootable, these can be set to be the boot disk by selecting the disk and clicking the "Set as Boot" button.

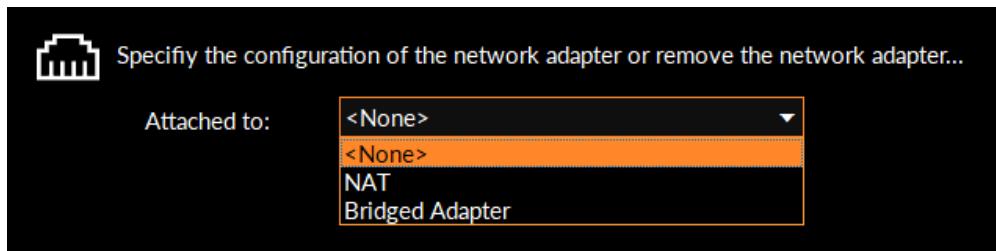
Hyper-V VM & VirtualBox Settings allows you to configure the virtual machine. The RAM and CPU are limited to match the host computer. If the number of processors is set to "Automatic", viBoot will interrogate the Windows settings from the image files to set the correct number of processors. A Virtual Switch of "<None>" ensures that the new virtual machine is not connected to the network.

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VirtualBox VM settings are similar to Hyper-V except that NAT and Bridged Adapter options are supported. These can be changed later via VirtualBox Manager.

Please see [VirtualBox documentation](#) for more details.



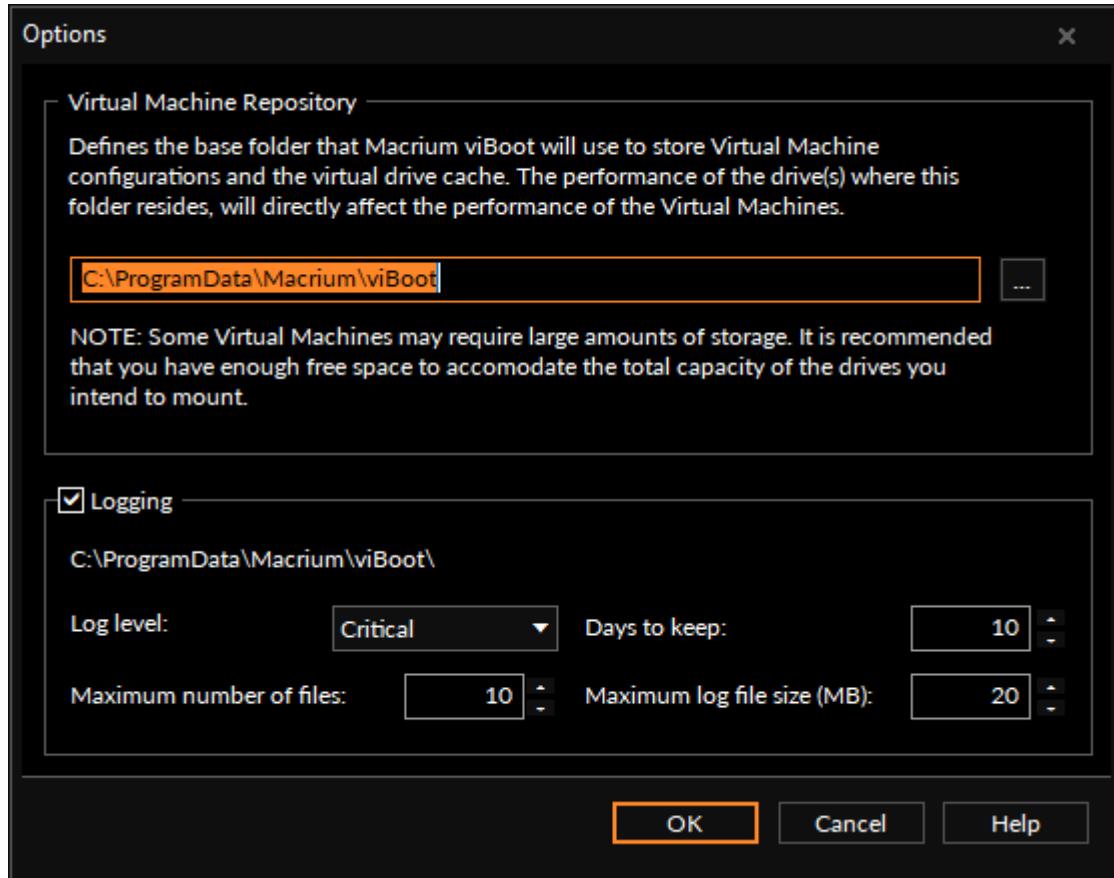
Please note that no changes whatsoever, are made to the original image files.

Options

The “Options” button on the Macrium viBoot main toolbar, will display the “Options” dialog box. From here you can modify some of the behavior of Macrium viBoot.

The “Virtual Machine Repository” specifies the folder that Macrium viBoot will use to store Virtual Machine configurations and the virtual machine drive cache.

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Macrium viBoot writes a log of actions taken by the application. This file is saved to "%LOCALAPPDATA%\Temp\Macrium". The log file is configured by the following options:

Log level - Controls type of information written to the log file:

- Critical
- Error
- Warning
- Information
- Debug

Maximum number of files - Number of log files to keep before purging. A value of zero will disable this check.

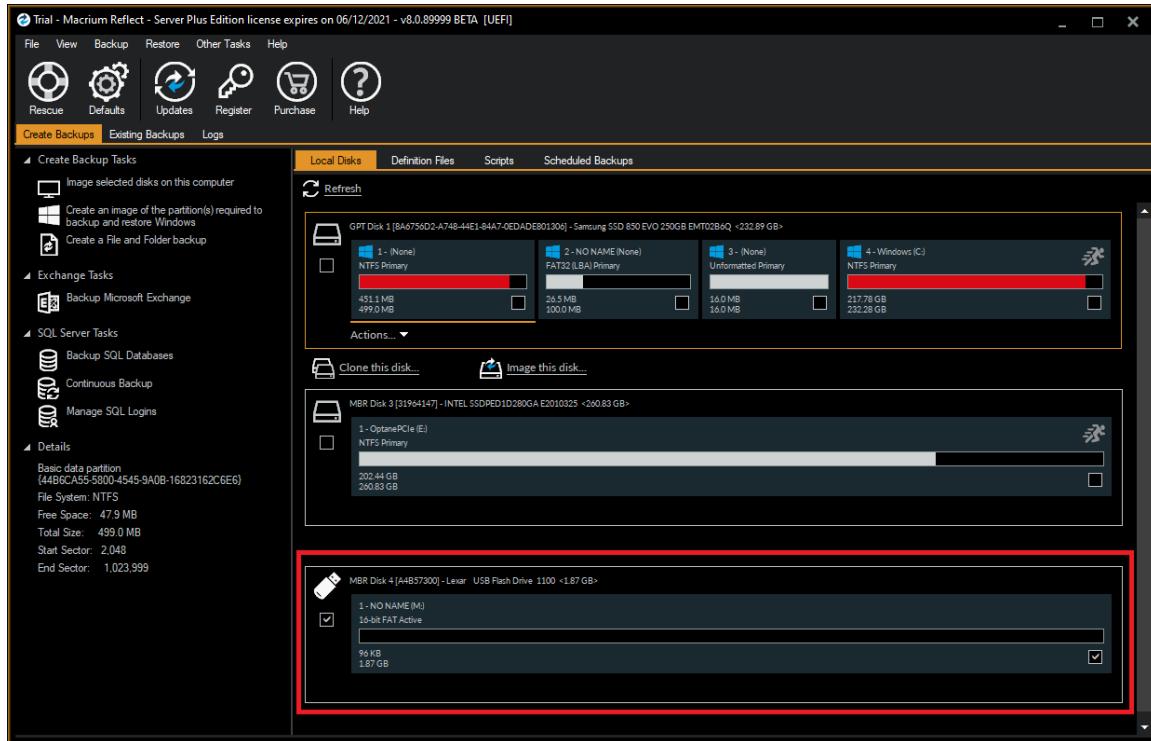
Days to keep - Log files older than the specified number will be purged. A value of zero will disable this check.

Maximum log file size(MB) - Maximum file size for the log file, before a new log file is created. A value of zero will disable this check.

Removable Media Imaging and Cloning Support

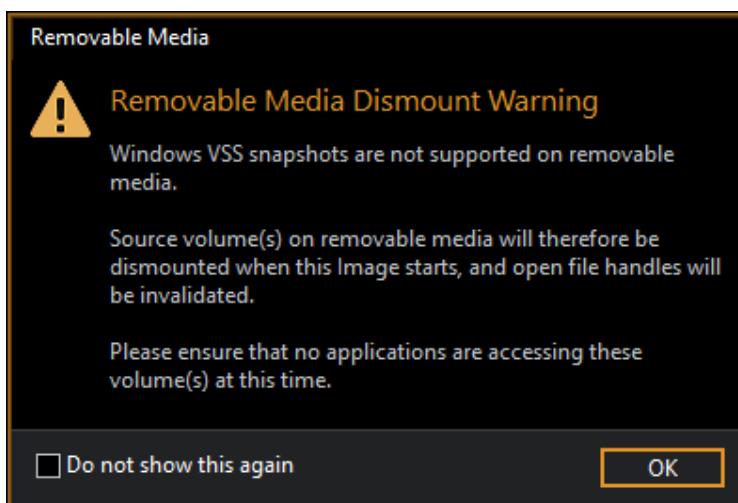
v8.0 includes support for imaging and cloning USB Flash drives. Flash drives can be imaged and cloned using the same functionality, and UI, as regular internal disk drives. USB Flash drives can be cloned to other USB flash drives or internal disks. Flash drives show in the Reflect main window alongside internal disks:

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Note: Removable media does not support the creation of Microsoft Volume Shadow Copies. To successfully image and clone removable drives **Macrium Reflect must first dismount the drive volume(s)**. This means that any open files currently accessing the volume(s) on the flash drives being imaged or cloned will be invalidated. In most cases this won't cause any problems, Explorer will gracefully close, for example, however, please ensure that any applications that might try to write to the volumes during imaging or cloning are closed before proceeding.

A warning message will be displayed when saving a new image or clone definition where currently mounted removable media is defined as a source.



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Redesigned Log View

The Log view page has been extensively redesigned in v8 to make locating logs much easier. We've also improved the performance when accessing and searching large quantities of logs, as may be necessary when running Intra-Daily backups.

The Log View now has a 'Filter' tab that lists logs according to the filter selections at the top of the tab:

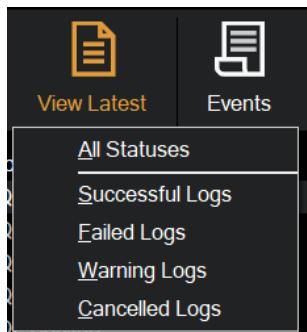
The screenshot shows the Macrium Reflect software interface with the 'Logs' tab selected. At the top, there's a toolbar with icons for Rescue, Defaults, Updates, Register, Purchase, and Help. Below the toolbar, there are three tabs: 'Create Backups', 'Existing Backups', and 'Logs'. The 'Logs' tab is active. A 'Filter' tab is open, displaying a search bar with the text 'SQL Backup - 18/02/2021 13:05' and two other entries. Below the search bar are filter options for 'Type' (All types), 'Status' (Successful, Failed, Warning, Cancelled), and 'Backup Definition' (All). To the right of these filters are buttons for 'Tab switch on log open' and 'Clear Filters'. The main area displays a list of logs with columns for Result, Date, Type, Definition, ImageID, Log Filename, and Completion Message. The list includes various log entries such as failed SQL backups, successful image backups, and warning messages.

Tab switch on log open:	If enabled , a double click or taking the 'View' toolbar or context menu option will cause the newly opened log tab to be selected and opened. If not enabled , the log list will retain the focus and the newly opened log tab will glow for a short time to draw attention to its location.
Clear Filters:	Returns all filter options to the default 'All' state.
Type:	<ul style="list-style-type: none">• All Types• Image• Image Restore• File Folder Backup• File Folder Restore• Clone

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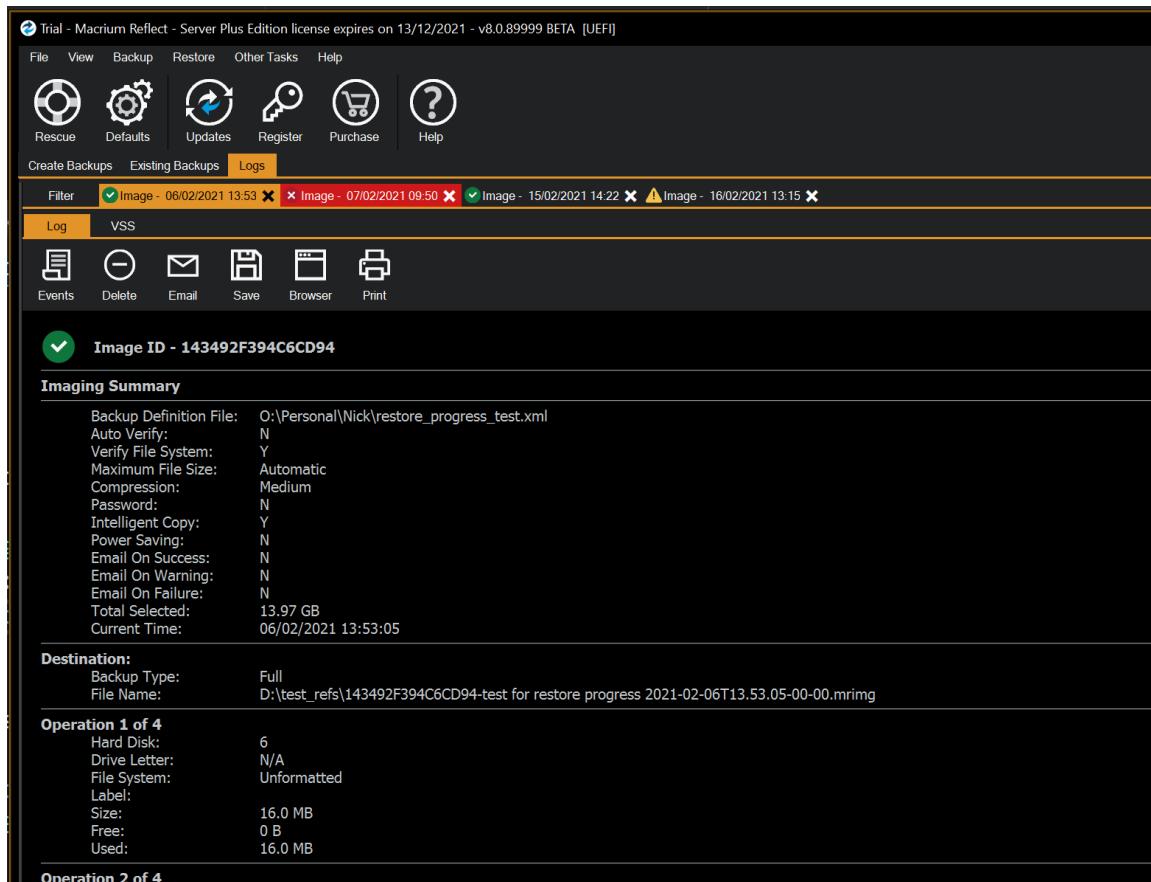
Activity	<ul style="list-style-type: none">• All Logs• Today• Last 7 Days• Last 30 Days• Latest• In Range
Status	<ul style="list-style-type: none">• Successful• Failed• Warning• Cancelled
Backup Definition:	All backup definitions with a log for the selected type.

The 'View Latest' toolbar button provides a quick shortcut to show the latest logs of the selected status or for all statuses:



Double clicking a log line, or taking the 'View' context menu **opens the selected log** in a new tab:

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The latest tab opened is inserted to the right of the filter tab, and has sub tabs for the HTML log, VSS log, and for File and Folder, lists of copied and deleted files.

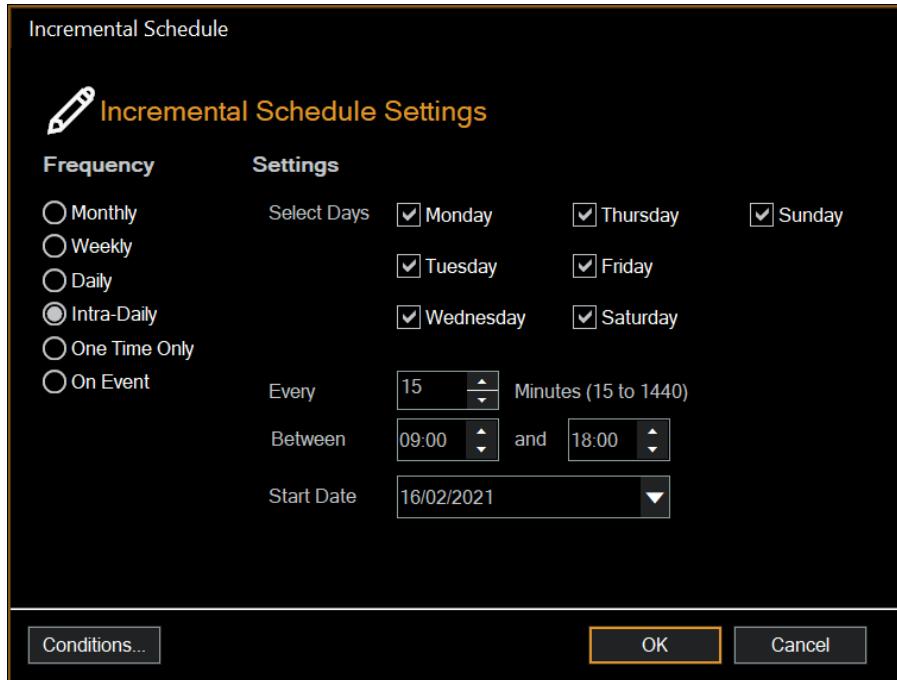
Error logs have red color coded tabs, and all tabs show an icon indicating the log 'state'.

Intra-Daily Schedules

Intra-Daily Frequency

Macrium Reflect v8.0 now includes Intra-Daily scheduling of backups for a minimum of 15 minute intervals between start times for selected days.

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Note: Intra-daily schedules in the 'Scheduled Backups' tab will show the task description as provided by Windows. This will be localized and shows the start time and duration rather than the end time:

e.g., **Every 15 minutes from 09:00 for 8 hour(s)**

We are aware of this issue and we're considering options to overcome the inconsistency.

We've also added an '**Intra-daily Backup Set**' Template to assist with setting up common use cases for this new scheduling frequency:

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Backup Plan Templates

Manage Backup Plan Templates

Intra-Daily Backup Set

 New Template  Edit Description  Delete Template

Schedules

Backup Type	Schedule
Full	At 09:00 on the first Mon of every month, starting 16/02/2021
Differential	At 09:00 every Mon, Tue, Wed, Thu, Fri of every week, starting 16/02/2...
Incremental	Every 15 minute(s) from 09:00 for 510 minutes every Mon, Tue, Wed, T...

 Add Schedule  Edit Schedule  Delete Schedule

Retention Rules

Apply retention rules to matching backup sets in the target folder

<input checked="" type="checkbox"/> Full	Keep	12	Backups
<input checked="" type="checkbox"/> Differential	Keep	4	Backups
<input type="checkbox"/> Incremental	Keep	10	Backups

Create a Synthetic Full if possible

Run the retention purge before the backup

The default template defines the following backups:

- **Full** at 09:00 on the first Monday of each month.
- **Differential** every weekday morning at 09:00
- **Incrementals** between 09:00 and 17:30 every weekday.

Retention:

- Retain **12 Full** backups
- Retain **4 Differential** backups

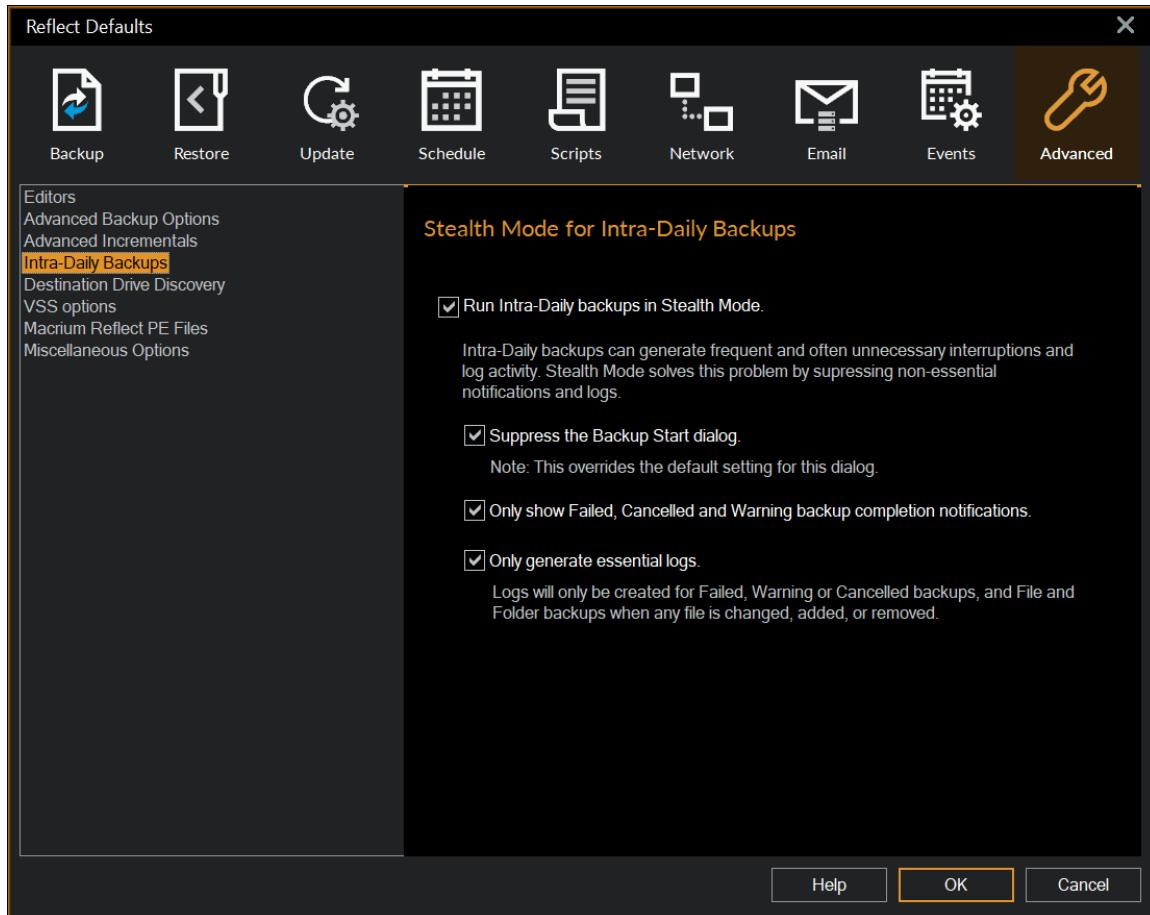
Intra-Daily Stealth Mode



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Note: Intra-Daily scheduled scripts, PowerShell, VB-Script or MS-DOS Batch files, must be regenerated to be compatible with Stealth mode. An extra parameter is passed in the schedule command and this needs to be processed by the script.

Stealth mode is set by taking '**Other Tasks**' > '**Edit Defaults**' > '**Advanced**' > '**Intra-Daily**'



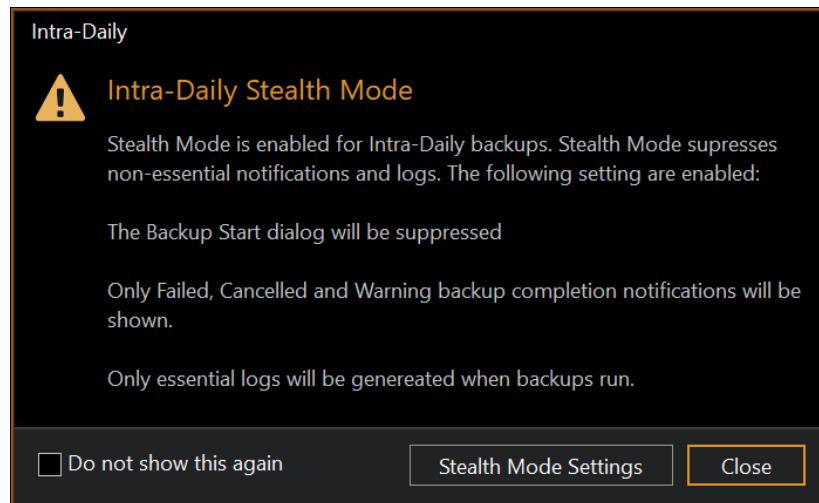
Intra-daily backups can generate frequent and often unnecessary interruptions and log activity. Stealth Mode solves this problem by suppressing non-essential notifications and logs:

Suppress the Backup Start dialog.	Never show the Backup Start dialog that is shown when a scheduled backup is triggered. Note: This overrides the default setting for the dialog.
Only show Failed, Cancelled and Warning completion notifications.	Taskbar popups and notifications will not be shown for successful backups.
Only generate essential logs.	Logs will only be generated for Failed, Warning or Cancelled backups, and File and Folder backups when any file is changed, added, or removed.

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Note: To mitigate against the possibility of missed backups going unnoticed, a future release of Macrium Reflect will include a daily exception to compare expected schedule backups with a daily scheduled backups run.

Intra-Daily Stealth mode is enabled by default, and if an Intra-daily schedule is selected then the following dialog is shown:



Click 'Stealth Mode Settings' to open the defaults dialog to change or confirm.

Select 'Do not show this again' to stop this message being shown in the future.

You can re-enable by taking 'Other Tasks' > **Edit Defaults** > 'Advanced' > 'Miscellaneous'.

Download and install your purchase

Thank you for purchasing Macrium Reflect v8.0. To help you quickly install your purchased product please see below.

Quick Start

Installing a v7 to v8 upgrade key

Simply check for updates in your v7 install and follow the instruction. Your v8 key will be automatically provided so there's no need to enter it.

Macrium Reflect v8.0 User Guide

Upgrade to Macrium Reflect v8



Macrium Reflect v8 is available.

You have a valid v8 license key
Do you want to download and install Macrium Reflect v8?

Now

Later

Never



Note: Upgrading to v8 will retain all settings and image data

For more help and information see [Installing a Macrium Reflect v7 to v8 Upgrade](#)

Installing a v8 full product key

Download the [Macrium Reflect Download Agent](#), enter your license key, click 'Download' and follow the instruction.

Select Installation Package

Select Macrium Reflect software to download

Choose Edition

Or enter license key

Home

76-6VRE-JQEZ-8NH2-JERA-CXPY-EYPHCFE



For more help and information see [Installing Macrium Reflect](#)

Related articles:

- [Installing a Macrium Reflect v7 to v8 Upgrade](#)
- [Installing Macrium Reflect](#)
- [Installing and updating Macrium Reflect offline](#)
- [Unique Registration Code](#)
- [Upgrade FAQ](#)
- [Upgrading to v8 from v6](#)

Installing a Macrium Reflect v7 to v8 Upgrade

This article explains how to download and install Macrium Reflect v8 upgrades.

- [Upgrading to Macrium Reflect v8 with a v7 key entitled to a free upgrade](#)
- [Upgrading to Macrium Reflect v8 from an existing v7 Installation using a purchased upgrade key](#)
- [Upgrading to Macrium Reflect v8 without an existing installation of v7](#)

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- License key format
- Related articles

We've made upgrading from v7 an easy process, and v8 is fully compatible with Images, backup definitions and settings created with v7. See [New in Version 8](#) for more information on what's available.



You can purchase upgrade keys using our online Renewal Wizard here: <https://www.macrium.com/upgrade-renewal-wizard>

Upgrading to Macrium Reflect v8 with a v7 key entitled to a free upgrade

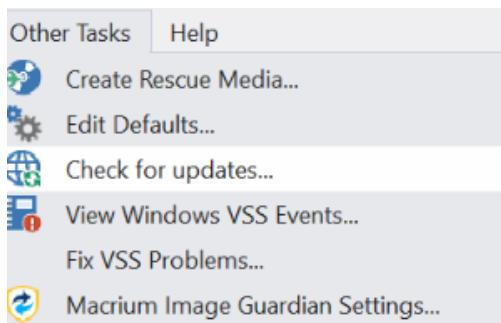
Free upgrades to v8 from v7 are available to customers with an active Support and Maintenance subscription and for v7 keys purchased on or after 15th November 2020.



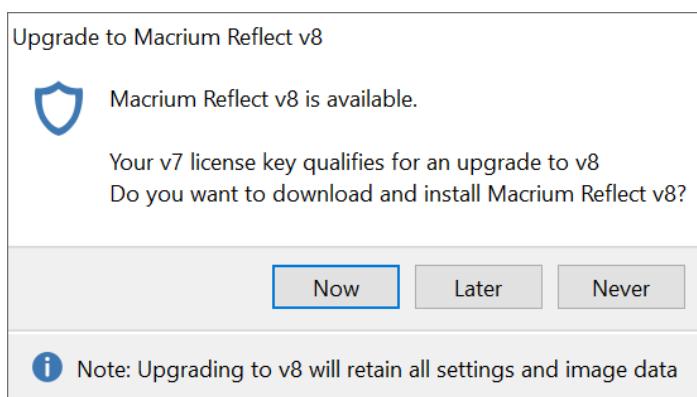
Before you begin, ensure that you are at the latest release of Macrium Reflect v7 by taking the '**Other Tasks**' > '**Check for updates**' menu option.

If your v7 key isn't currently installed, then [please install before upgrading](#).

1. Take the '**Other Tasks**' > '**Check for updates**' menu option:



2. The following message prompt is displayed:

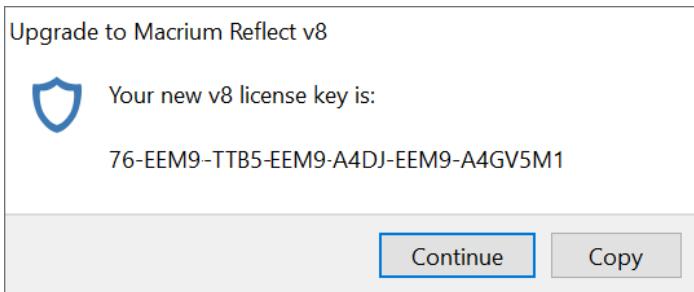


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Click 'Now' to upgrade immediately.

Note: If you click 'Never' then further attempts to update your installation will only check for v7 updates. To override this **hold the 'Ctrl' key down** when you take the 'Check for updates..' menu option.

3. Your new key will be shown in the following message box:



To save your key for future reference, use the 'Copy' button to copy your new key to the Windows clipboard

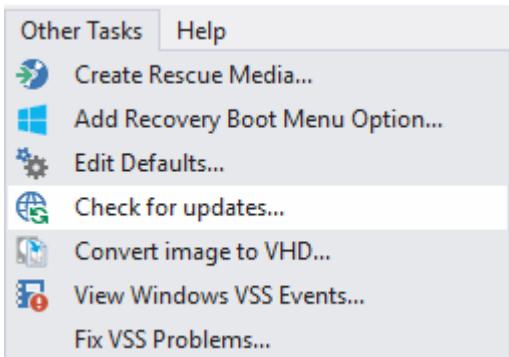
Clicking '**Continue**' or '**Copy**' will download the Full Macrium Reflect v8 Installer for your purchased edition.

The installer will start automatically and **your new v8 key will be pre-populated in the installation.**

Upgrading to Macrium Reflect v8 from an existing v7 Installation using a purchased upgrade key

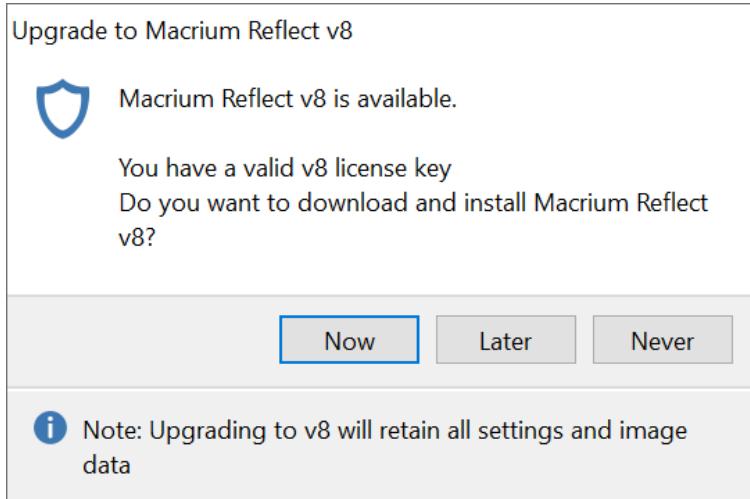
Note: The v8 upgrade purchasing process will automatically assign your new v8 key to your v7 installation. **Before you begin**, ensure that you are at the latest release of Macrium Reflect v7 by taking the '**Other Tasks**' > '**Check for updates**' menu option.

1. Take the 'Other Tasks' > 'Check for updates' menu option:



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The following message prompt is displayed:



Click 'Now' to download the Full Macrium Reflect v8 Installer for your purchased edition. The installer will start automatically.

Click 'Later' to repeat the next time you check for updates.

Click 'Never' not to be prompted again.

To override this **hold the 'Ctrl' key down** when you take the 'Check for updates..' menu option.



Note: If your purchases v8 upgrade key has already been installed then you will not be offered the v8 install option.

Upgrading to Macrium Reflect v8 without an existing installation of v7

Following the normal [Installing Macrium Reflect](#) procedure and enter your purchased v8 key from your purchase receipt.

License key format



Note: If you are unable to locate your v7 keys then please see this page <https://www.macrium.com/myorders/index> to request your order history

Macrium reflect v7 keys

Macrium Reflect v8.0 User Guide

Product	Key format
v7 Home	56-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXXXXX
v7 Workstation	57-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXXXXX
v7 Server	58-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXXXXX
v7 Server Plus	59-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXXXXX

Macrium reflect v8 keys

Product	Key format
v8 Home	76-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXXXXX
v8 Workstation	77-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXXXXX
v8 Server	78-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXXXXX
v8 Server Plus	79-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXXXXX

Related articles

[Upgrade FAQ](#)

[Troubleshooting installer issues](#)

Installing Macrium Reflect

Release Notes

The latest release notes for Macrium Reflect v8 can be found here: http://updates.macrium.com/reflect/v8/latest_release_notes.asp



For additional information on upgrading v7 to v8 please see [Installing a Macrium Reflect v7 to v8 Upgrade](#)

This article explains how to install Macrium Reflect on an Internet connected PC using the Macrium Reflect download agent.

Macrium Reflect v8.0 User Guide

For a description on installing to an offline (non Internet connected) PC please see [here](#)

- Downloading the Macrium Reflect Installer
- Modifying the default selections
- Resolving Download Issues
- Related articles

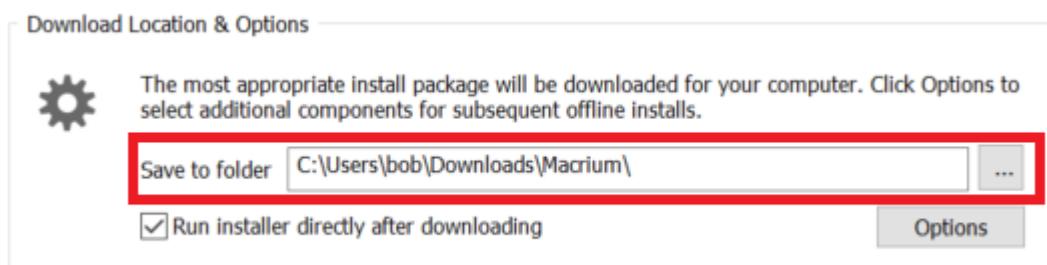
Downloading the Macrium Reflect Installer

1. Click this link to download and run the Macrium Reflect Download Manager
2. If you have purchased Macrium Reflect then **Click 'Enter license key'** and **enter your license key** to automatically download your purchased product.



i To download a 30 day trial **Click 'Choose Edition'** and **select the Macrium Reflect Edition** from the dropdown list to the right.
Note: You can also enter your purchased license key in the trial installer once downloaded.

3. **Enter the folder** where the downloads will be saved to or **Click '...'** to select a folder.



Macrium Reflect v8.0 User Guide

4. Click 'Run installer directly after downloading' to run the installation package as soon as the download completes successfully.

Note: If you intend to install on another computer then leave this item unchecked.

5. Click Download to start downloading your installation files.

Modifying the default selections

To change which files are downloaded files **click the 'Options' button** before downloading.

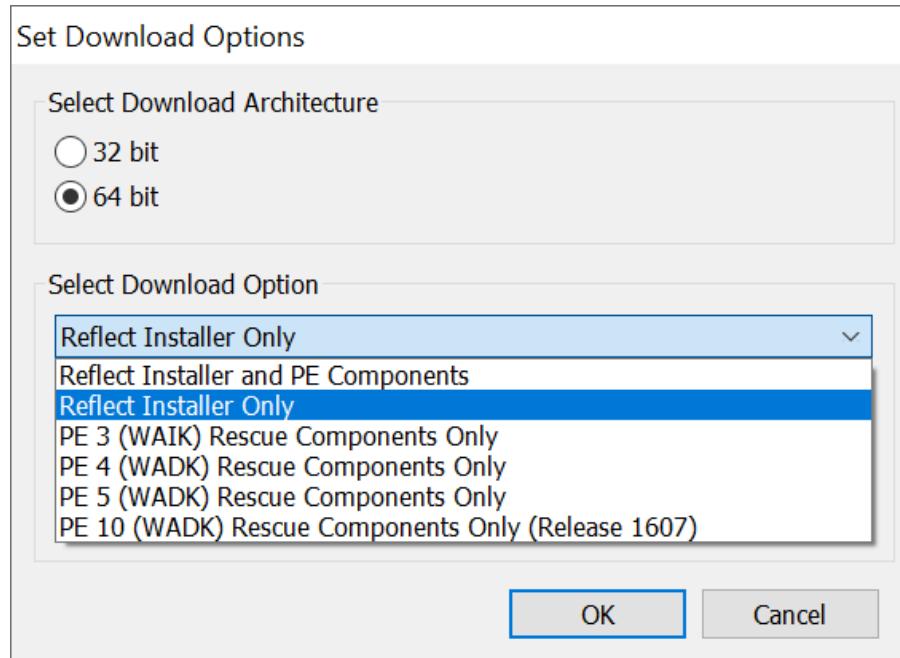


The default, and most usual, option is '**Reflect Installer Only**'. Windows 7 and later installation already include a '**Windows Recovery Environment**' (WinRE), and this is the best choice for creating Macrium Reflect rescue media. Other Windows PE environments chosen when building your rescue media will be downloaded on demand.

It's only necessary to include 'Rescue Components' when downloading if installing to a PC without an Internet connection, and Windows RE isn't available on the offline PC.

By default, the most appropriate installation for your PC will be selected for download. This is based on operating system, architecture, and existing rescue media components.

Select download options and architecture.



Macrium Reflect v8.0 User Guide

Option	Description	
Reflect Installer and PE Components	Downloads both the Macrium Reflect installer and the default Windows PE component files for currently running *Windows OS :	
PE	Windows Version	
PE 3.1	Windows XP, Windows 7, Windows Vista, Server 2003, Server 2008, Server 2008R2	
PE 10	All other Windows versions.	
*This is the default option for Windows Vista and XP		
Reflect Installer Only	Downloads the Macrium Reflect installer for the chosen trial or entered license key. This is the default option for Windows 7 and later	
PE 3 (WAIK)	Downloads the Windows PE 3.1 components to file PE3x86.zip or PE3x64.zip	
PE 4 (WADK)	Downloads the Windows PE 4 components to file PE4x86.zip or PE4x64.zip	
PE 5 (WADK)	Downloads the Windows PE 5 components to file PE5x86.zip or PE5x64.zip	
PE 10 (WADK)	Downloads the Windows PE 10 components to file PE10x86.zip or PE10x64.zip	

For more information on the different versions of Windows PE see this help page.



The 'PE 3, PE 4, PE 5 or PE 10 Components only' options can be used to download just the PE component files. The downloaded .zip file can be supplied when building the Windows PE rescue media or copied to a different PC.

Resolving Download Issues

Download Failures (Error Code: 1)

Download failures can generally be attributed to either an unstable internet connection or anti virus/malware software interfering with the download. Please try the following steps to resolve the issue

- Reboot the computer to clear any internet cache files

Macrium Reflect v8.0 User Guide

- Disable anti virus/malware software for the duration of the download and installation of Macrium Reflect.
- Download the Macrium Reflect installer on its own. If the internet connection is unstable, the prolonged download of WinPE components can be postponed and attempted from within the Macrium Reflect software
- Perform a Clean Boot of Microsoft Windows (see: [this link for more help](#)) to remove any third party components possibly affecting the download
- Download the installer on another computer

MD5 Checksum Failures (Error Code: 2)

MD5 checksum failures can generally be attributed to either an unstable internet connection or anti virus/malware software. Please try the following steps to resolve the download issue:

- Reboot the computer to clear any internet cache files
- Anti virus/malware or another third party process has either locked or quarantined the downloaded file preventing the MD5 check. Temporarily disable these forms of software for the duration of the download and install process
- Perform a Clean Boot of Microsoft Windows (see: [this link for more help](#)) to remove any third party components possibly affecting the download

Related articles

[Upgrade FAQ](#)

[Troubleshooting installer issues](#)

Installing and updating Macrium Reflect offline

This article explains how to install Macrium Reflect on a PC that isn't connected to the Internet. For information on installing on an Internet connected PC please see [here](#).

- Download the installer and PE components.
- Offline installation of your purchased license.
- Ensuring your software is up to date.
- How to identify the architecture of your target machine.
- Related articles

Macrium Reflect uses an Internet connection to:

- Download the installer and Microsoft components to enable building of the PE based rescue environment
- Validation of your license during installation.
- Notification and download of updates



This article refers to the machine you wish to install Reflect on as the "target PC" and the machine connected to the Internet as the "online PC".

Macrium Reflect v8.0 User Guide

You will need access to a computer that is connected to the Internet and a device to copy files to the target PC.

Download the installer and PE components.

Download the Macrium Reflect Download Agent to your PC and run it.

Select Choose the edition or select Enter license key and enter your key.

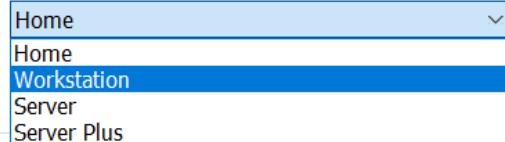
Select Installation Package



Select Macrium Reflect software to download

Choose Edition

Or enter license key



The download agent is automatically configured for the computer it is running on. You will need to reconfigure it to reflect your target PC instead. Do this by **clicking the Options button**.

Set Download Options

Select Download Architecture

- 32 bit
 64 bit

Select Download Option

- Reflect Installer Only
Reflect Installer and PE Components
Reflect Installer Only
PE 3 (WAIK) Rescue Components Only
PE 4 (WADK) Rescue Components Only
PE 5 (WADK) Rescue Components Only
PE 10 (WADK) Rescue Components Only (Release 1607)

OK

Cancel

Choose the download architecture - 32 or 64 bit - for your offline PC. See the "How to identify the architecture of your target machine" at the end of this article.



Macrium Reflect v8.0 User Guide

The default, and most usual, option is '**Reflect Installer Only**'. Windows 7 and later installation already include a '**Windows Recovery Environment**' (**WinRE**), and this is the best choice for creating Macrium Reflect rescue media.

It's only necessary to include 'Rescue Components' when downloading if installing to XP or Vista, or if Windows RE isn't available on the offline PC.

Option	Description							
Reflect Installer and PE Components	Downloads both the Macrium Reflect installer and the default Windows PE component files for XP and Vista <table border="1"><thead><tr><th>PE</th><th>Windows Version</th></tr></thead><tbody><tr><td>PE 3.1</td><td>Windows XP, Windows 7, Windows Vista, Server 2003, Server 2008, Server 2008R2</td></tr><tr><td>PE 10</td><td>All other Windows versions.</td></tr></tbody></table>		PE	Windows Version	PE 3.1	Windows XP, Windows 7, Windows Vista, Server 2003, Server 2008, Server 2008R2	PE 10	All other Windows versions.
PE	Windows Version							
PE 3.1	Windows XP, Windows 7, Windows Vista, Server 2003, Server 2008, Server 2008R2							
PE 10	All other Windows versions.							
	This is the best option for Windows Vista and XP							
Reflect Installer Only	Downloads the Macrium Reflect installer for the chosen trial or entered license key. This is the best option for Windows 7 and later if the offline PC includes Windows RE.							
PE 3 (WAIK)	Downloads the Windows PE 3.1 components to file PE3x86.zip or PE3x64.zip							
PE 4 (WADK)	Downloads the Windows PE 4 components to file PE4x86.zip or PE4x64.zip							
PE 5 (WADK)	Downloads the Windows PE 5 components to file PE5x86.zip or PE5x64.zip							
PE 10 (WADK)	Downloads the Windows PE 10 components to file PE10x86.zip or PE10x64.zip							

For more information on the different versions of Windows PE see [this help page](#).



If you require the same PE version as the default Windows PE component files for this PC (see table above)

Select '**Reflect installer and PE components**'. This will download the required files in **one** download step. Click OK, then un-check "Run installer directly after downloading", and Click download.

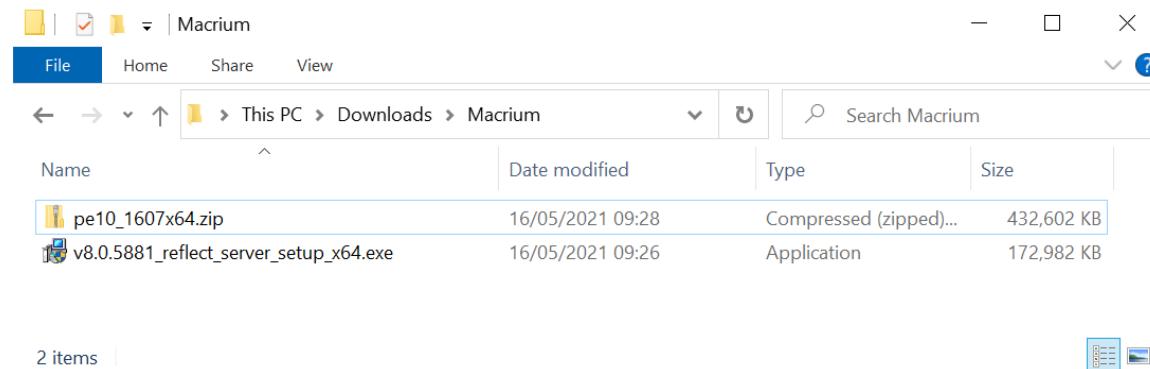
Macrium Reflect v8.0 User Guide



If you require a specific PE version

This will require **two** downloads. First, **select 'Reflect Installer Only'**, **click OK**, then **un-check 'Run installer directly after downloading'**, and **Click download**. After the first download is complete, **click 'Options'** again, choose the desired **'PE X rescue components only'**, **click 'OK'** and then **Click 'Download'**.

Once the download(s) complete, you will find two new files in the folder saved to...



The file names will vary dependent on your selections. There will be an installer .exe file and a PE components zip file.

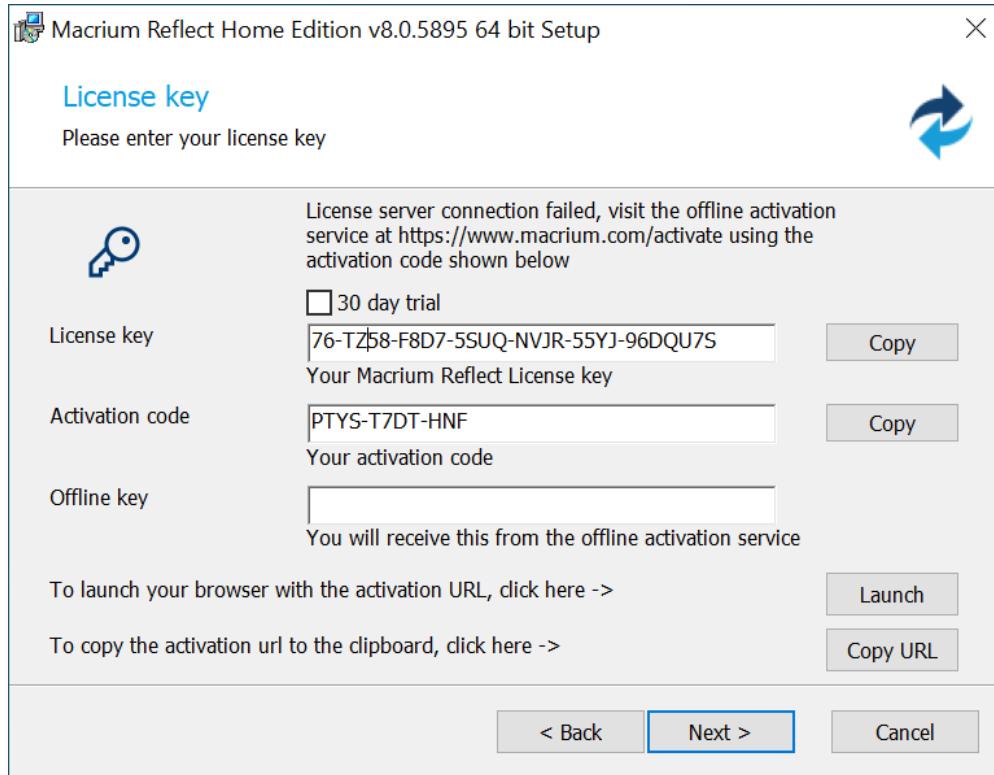
Copy these two files to your target PC and run the installer ensuring that the zip file is in the same folder. You will then be able to install your software and generate PE rescue CDs.

Offline installation of your purchased license.

Note: This step is not necessary for the Free or Trial Editions of Macrium Reflect.

When you run the installer on your target PC, instead of the automatic activation, you will be given an activation code. **189S-N9PK-ADV** in the example below.

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Navigate to <http://www.macrium.com/keyregistration.aspx> on your online PC and enter your license key and activation code.

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It's our business to protect your data

[Home](#)

Key Registration

Please enter your licence key and activation code below.

Licence Key

Activation Code

Submit

Click 'Submit' and you will receive an offline key as shown below.

Registration Successful

Licensee Macrium Software
Order Number MR14915
Offline key UMVH-UJ3E-8B1P-AU34-Q8ZW-TAHT-15

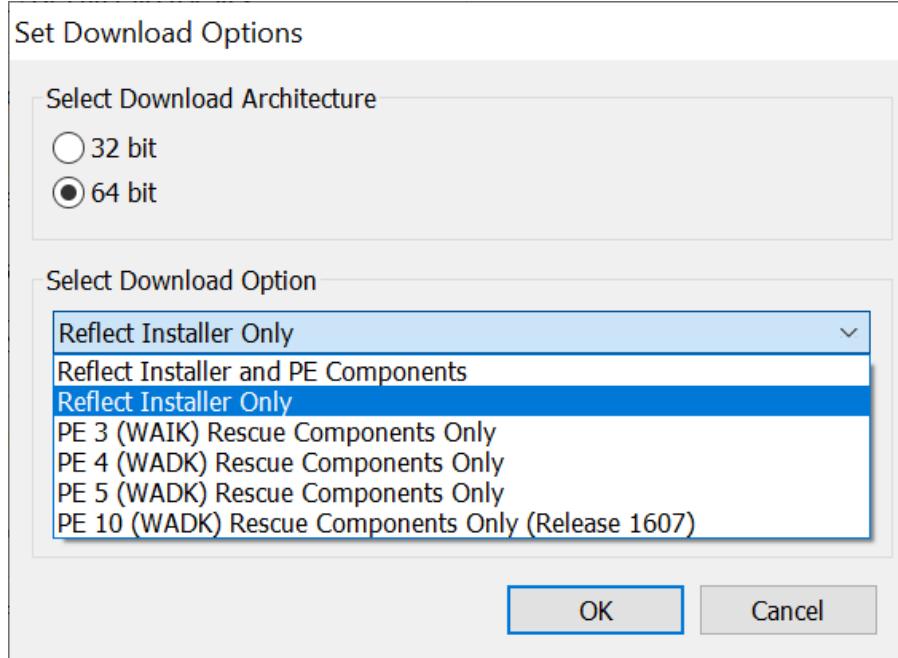
Enter the Offline key in the install dialog to complete installation.

Ensuring your software is up to date.

Note: For online installations, update notifications and patching is automatic.

Check the [change log](#) web page periodically for updates. If you see an update that is relevant to your system, follow the steps in 1. above, but **choose the 'Reflect Installer' option** in the download agent.

Macrium Reflect v8.0 User Guide



How to identify the architecture of your target machine.

Run msinfo32 (type **Windows Key + R** and then **type msinfo32**) and note the system type.

x86-based PC indicates that the target machine is 32 bit and x64-based PC indicates a 64bit system.

System Information		
File	Edit	View
System Summary	Item	Value
Hardware Resources	OS Name	Microsoft Windows 10 Pro
Components	Version	10.0.19042 Build 19042
Software Environment	Other OS Description	Not Available
	OS Manufacturer	Microsoft Corporation
	System Name	MS-W-0
	System Manufacturer	To Be Filled By O.E.M.
	System Model	To Be Filled By O.E.M.
	System Type	x64-based PC
	System SKU	To Be Filled By O.E.M.
	Processor	Intel(R) Core(TM) i9-9900K CPU @ 3.60GHz, 3600 ...
	BIOS Version/Date	American Megatrends Inc. P1.00, 27/08/2018
	SMBIOS Version	3.1
	Embedded Controll...	255.255
	BIOS Mode	UEFI

Related articles

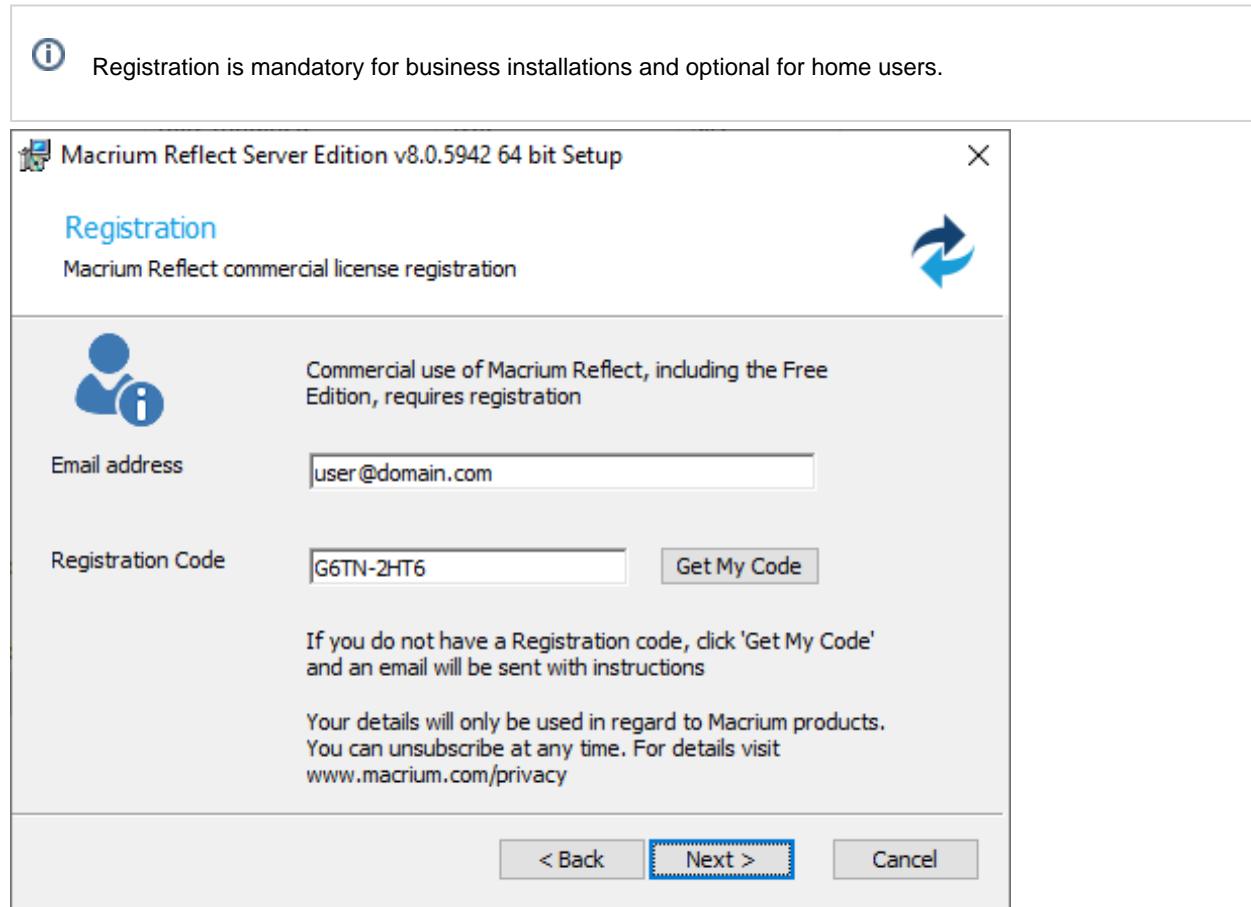
[Upgrade FAQ](#)

[Troubleshooting installer issues](#)

Macrium Reflect v8.0 User Guide

Unique Registration Code

Registering your installation of **Macrium Reflect Free or Trial of Home, Server or Server Plus** requires entering a **Unique Registration Code** to confirm your registration.

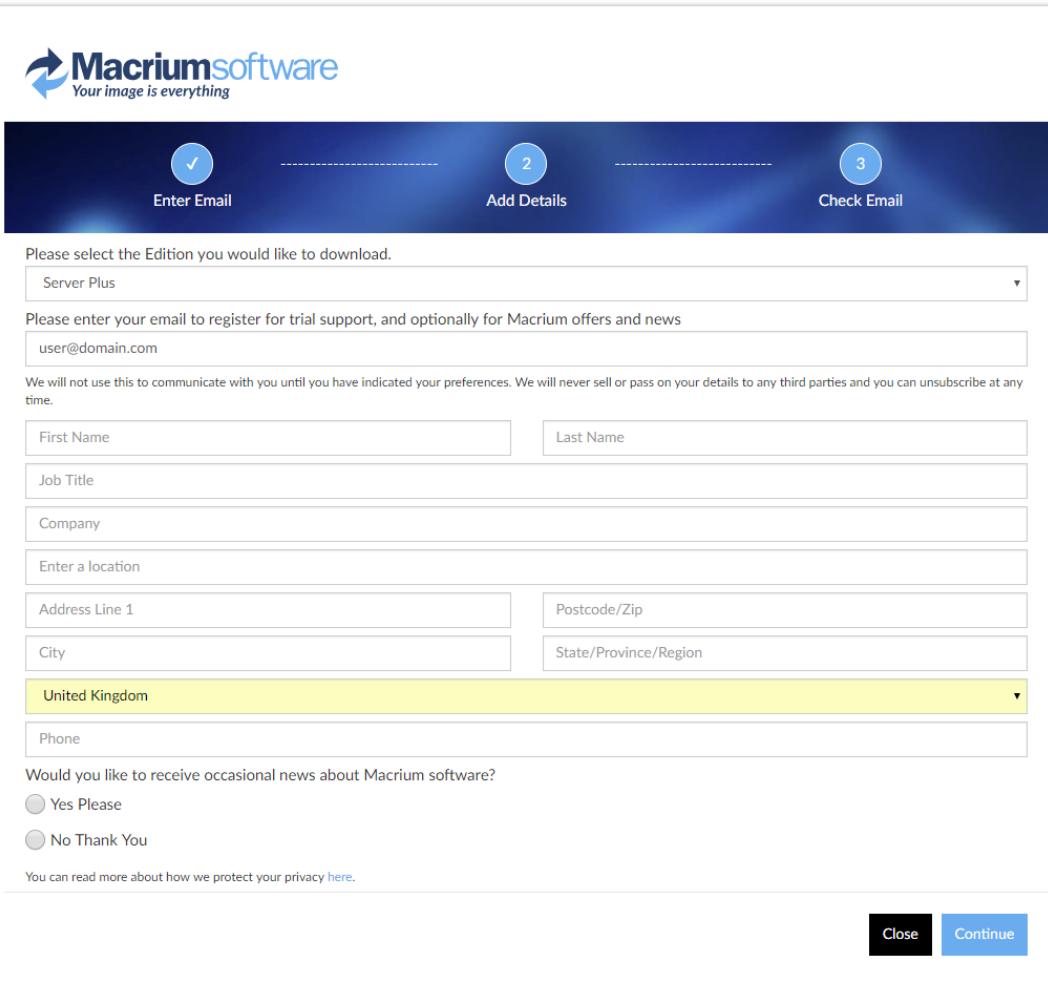


If you don't have a registration code or if you have previously registered but don't have the code handy then click 'Get My Code'.

If you haven't previously registered then you will be emailed a link to an online registration to continue:

For business users:

Macrium Reflect v8.0 User Guide



The screenshot shows a registration form for Macrium software. At the top, there's a logo for Macrium Software with the tagline "Your image is everything". Below the logo is a blue header bar with three circular icons labeled 1, 2, and 3, corresponding to the steps: "Enter Email", "Add Details", and "Check Email".

The main form area starts with a dropdown menu for selecting the Edition, currently set to "Server Plus". It then asks for an email address to register for trial support and Macrium offers/news, with "user@domain.com" entered.

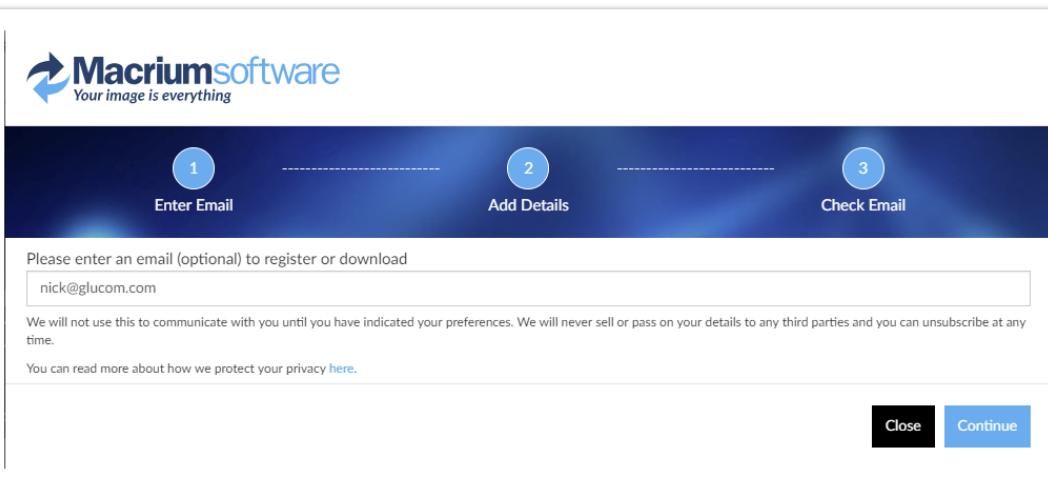
Below that, a note states: "We will not use this to communicate with you until you have indicated your preferences. We will never sell or pass on your details to any third parties and you can unsubscribe at any time." There are fields for First Name, Last Name, Job Title, Company, Enter a location, Address Line 1, Postcode/Zip, City, State/Province/Region, and a dropdown for Country (United Kingdom selected). There's also a Phone field.

A question follows: "Would you like to receive occasional news about Macrium software?" with two radio button options: "Yes Please" (selected) and "No Thank You".

At the bottom, a note says: "You can read more about how we protect your privacy [here](#)".

At the very bottom right are two buttons: "Close" and "Continue".

For home users:



This registration form is similar to the previous one but is specifically for home users. The steps are labeled 1, 2, and 3: "Enter Email", "Add Details", and "Check Email".

The first step asks for an email address (optional) to register or download, with "nick@glucom.com" entered.

The second step includes a note: "We will not use this to communicate with you until you have indicated your preferences. We will never sell or pass on your details to any third parties and you can unsubscribe at any time." and a link to privacy information.

The third step has a "Continue" button at the bottom right.

If you have already registered or after completing the form above you will receive an email containing your Registration Code to enter in the installer.

Macrium Reflect v8.0 User Guide

Thank you for your interest in Macrium Reflect.

Your Registration Code is : !*URC*!

This code is paired with your email address. Use copy and paste to enter it when prompted in the installer registration page.

For more information please see here:

<https://knowledgebase.macrium.com/display/KNOW80/Unique+Registration+Code>

We hope you find our software useful.

The Macrium Team

At any time, you can unsubscribe or update your communication options here.

https://www.macrium.com/consent?id=!*URC*!

Please read about how we protect your privacy here.

<https://www.macrium.com/terms-and-privacy-statement>

Upgrade FAQ

Introduction

This FAQ covers some of the commonly encountered queries regarding transitioning from Macrium Reflect v7 to v8.

How do I download the v8 Installer if I've purchased an upgrade?

Enter your v8 key in the Macrium Reflect download manager. Your v8 key will begin with 76-, 77-, 78- or 79-.

If you got an existing v7 install then there's no need to download, just take the 'Other Tasks' > 'Check for updates' menu option and follow the prompts.

Please see [Installing a Macrium Reflect v7 to v8 Upgrade](#)

What's the difference between the Home Edition and the Workstation Edition of Macrium Reflect v7?

These two editions are functionally identical. The Workstation Edition includes an annual support and maintenance product. This adds continual support and free major version updates for the duration of the subscription. Year 1 is included in the the Workstation Edition product price.

Can v8 read and restore images created with Macrium Reflect v6 or v7?

Yes, v8 is backwards compatible with all Images and File and Folder backups created with earlier versions of Macrium Reflect.

Will I need to recreate my v7 backup XML definition files?

No, your v7 backup definition files will be loaded into v8 without any conversion.

Macrium Reflect v8.0 User Guide

Can Version 8 be installed over v7? Will both v7 and v8 be on the hard drive? Should v7 be uninstalled first?

Versions 7 and 8 will not exist on your system at the same time. The version 8 installer will uninstall version 7, as part of the install process.

Will the old Rescue CDs still work?

Version 8 rescue media is compatible with version 7 images, however, we recommend that you update to the latest v8 rescue media after installation..

Why can't I change the install location?

For update installs, the facility to change install location is disabled as your scheduled tasks will fail as they reference the reflect program folder.

If you do wish to change the install location

1. Remove any scheduled tasks.
2. Uninstall Reflect.
3. Install, note now you can change the install location.
4. Setup your scheduled tasks.

After purchasing an upgrade, can I continue to use my v7 license on another computer?

The v8 upgrade is discounted on the basis that you are upgrading your license. Therefore you still are only licensed to use reflect on a single computer. Your v7 license key will be revoked as part of the upgrade process.

Upgrading to v8 from v6

If you have purchased a v6 to v8 upgrade, or if your v6 license key has active support and maintenance, then you can upgrade your v6 installation to v8

Your v6 installation needs to first be upgraded to v7

Upgrading to Macrium Reflect v7 from an existing v6 Installation with a free upgrade key.

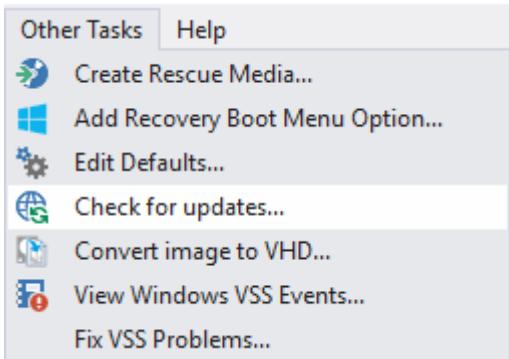
Free upgrades to v7 from v6 are available to customers with an active Support and Maintenance subscription and for v6 keys purchased on or after 26th November 2016.



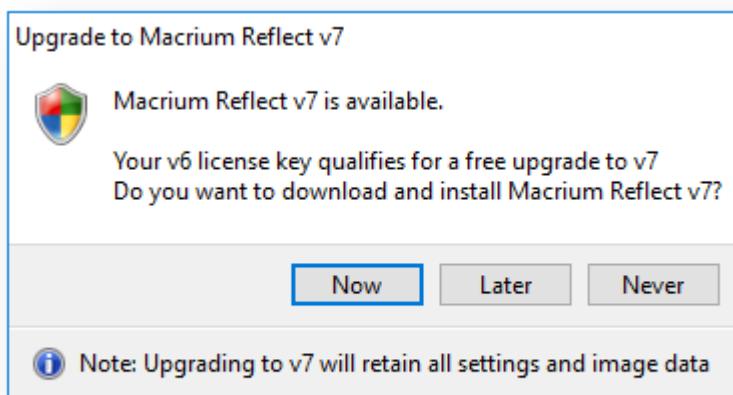
Before you begin, ensure that you are at the latest release of Macrium Reflect v6 by taking the '**Other Tasks**' > '**Check for updates**' menu option.

1. Take the '**Other Tasks**' > '**Check for updates**' menu option:

Macrium Reflect v8.0 User Guide



2. The following message prompt is displayed:

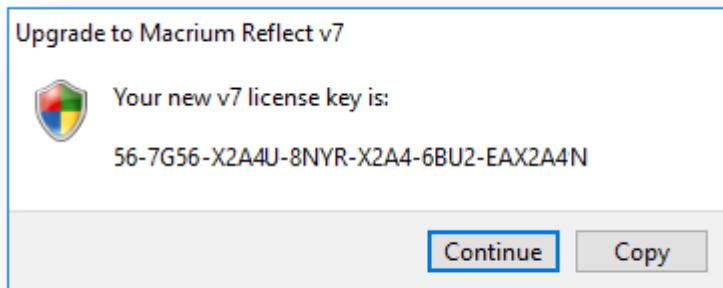


Click 'Now' to upgrade immediately.

Note: If you click 'Never' then further attempts to update your installation will only check for v6 updates. To override this **hold the 'Ctrl' key down** when you take the 'Check for updates..' menu option.

3. You new key will be shown in the following message box:

Macrium Reflect v8.0 User Guide



To save your key for future reference, use the 'Copy' button to copy your new key to the Windows clipboard

Clicking '**Continue**' or '**Copy**' will download the Full Macrium Reflect v7 Installer for your purchased edition. The installer will start automatically.

Then you can upgrade your v7 installation to v8.

Upgrading to Macrium Reflect v8 with a v7 key entitled to a free upgrade

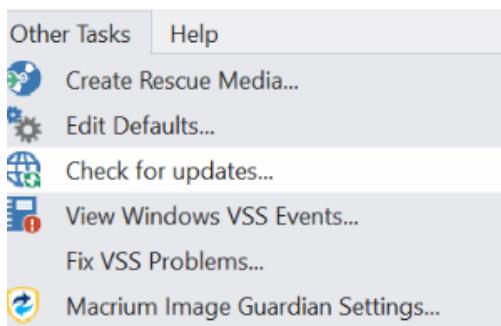
Free upgrades to v8 from v7 are available to customers with an active Support and Maintenance subscription and for v7 keys purchased on or after 15th November 2020.



Before you begin, ensure that you are at the latest release of Macrium Reflect v7 by taking the '**Other Tasks**' > '**Check for updates**' menu option.

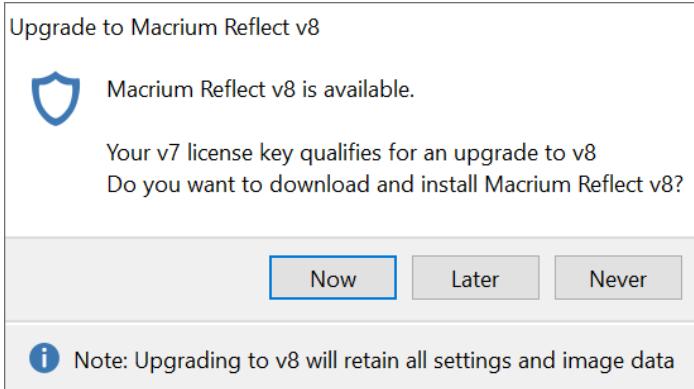
If your v7 key isn't currently installed, then [please install before upgrading](#).

1. Take the '**Other Tasks**' > '**Check for updates**' menu option:



2. The following message prompt is displayed:

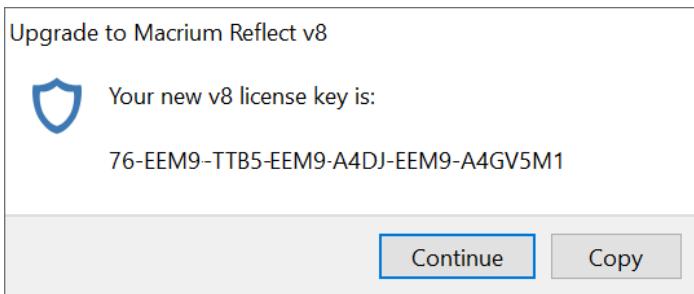
Macrium Reflect v8.0 User Guide



Click 'Now' to upgrade immediately.

Note: If you click '**Never**' then further attempts to update your installation will only check for v7 updates. To override this **hold the 'Ctrl' key down** when you take the 'Check for updates..' menu option.

3. Your new key will be shown in the following message box:



To save your key for future reference, use the 'Copy' button to copy your new key to the Windows clipboard

Clicking '**Continue**' or '**Copy**' will download the Full Macrium Reflect v8 Installer for your purchased edition.

The installer will start automatically and **your new v8 key will be pre-populated in the installation**.

Macrium Reflect Quick Start

Macrium Reflect is intuitively designed and organized with simple to follow wizards guiding you through tasks. If you have never used backup software before, however, you might feel some trepidation, needing a little extra guidance to get you started.

- First create rescue media
- Imaging disks
- Backing up files and folders

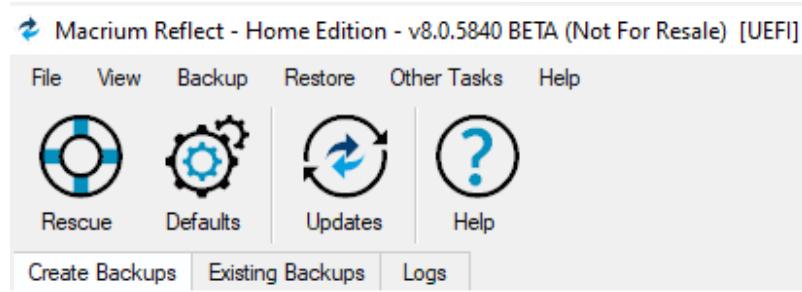
Macrium Reflect v8.0 User Guide

- Cloning disks
- Scheduling, retention, and disk space
- Restoring files and folders
- Restoring images
- ReDeploying computers
- Scripting backup processes
- Managing Macrium files in Windows

First create rescue media

We recommended that the first time you use Macrium Reflect, you create bootable rescue media before performing any other tasks.

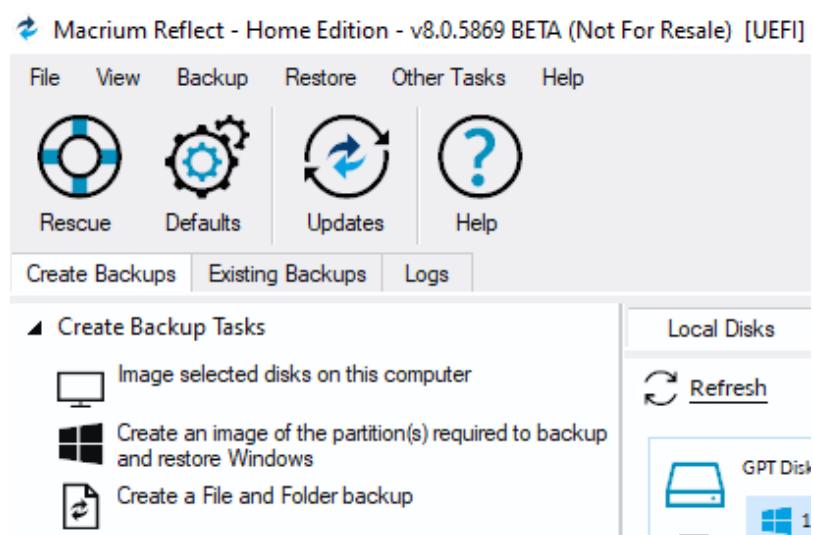
Click the **Rescue** icon to access the Rescue Media Builder wizard.



For further guidance see [Creating rescue media](#).

Imaging disks

Disk imaging is a backup task and can be accessed from the **Create Backups** taskbar.



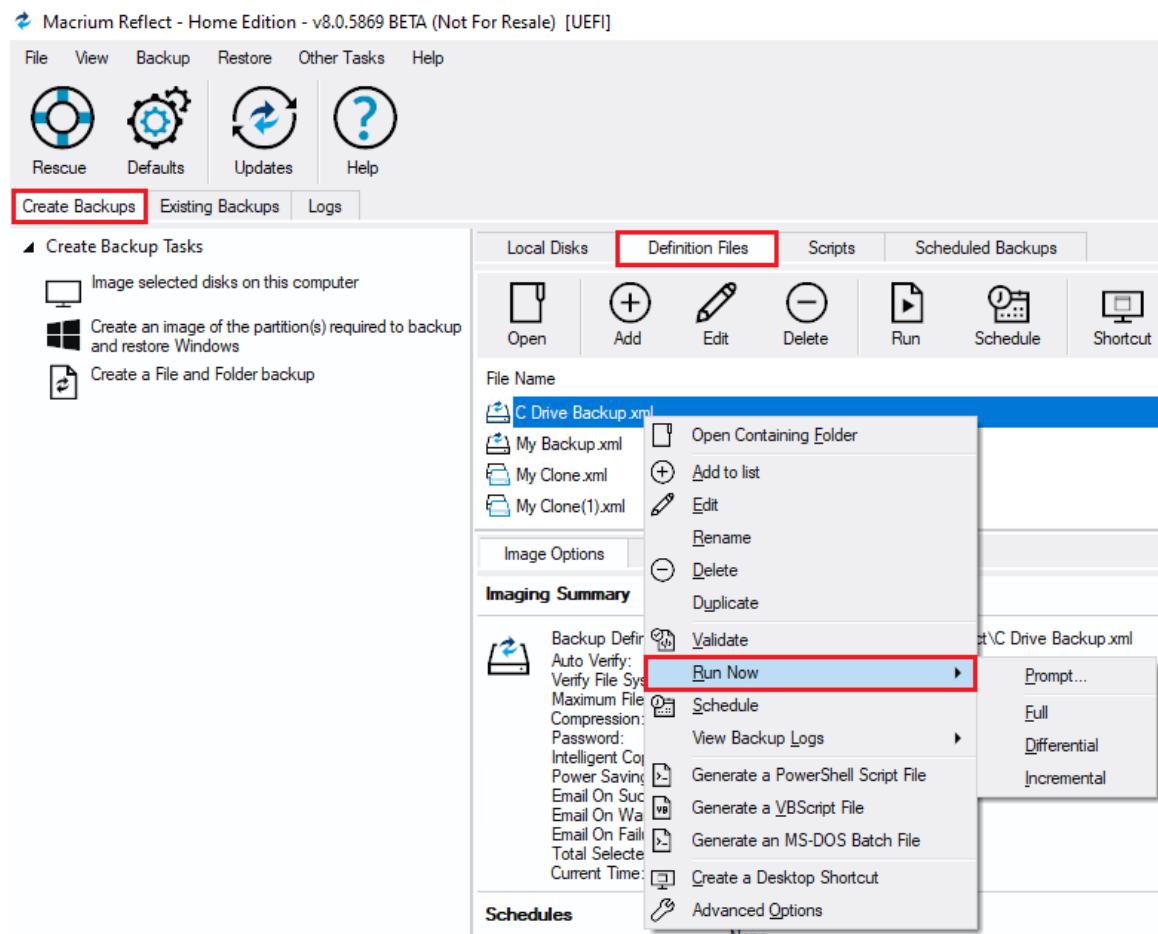
For further guidance see [Creating a backup of your computer](#).

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Differential and incremental disk images

After your first Full Image, you can run Differential and/or Incremental Images to capture changes made since the Full Image was created. Differential Images capture all changes since the Full, and Incremental Images capture changes since the last Image. This is usually substantially faster than creating another Full backup and also gives you the same number of restore points and flexibility. Differential and Incremental Images create Image 'sets' that contain a chain of dependent Image files. Macrium manages these Image sets for you.

Right-click the backup definition that you want to run and select the type of image to create.

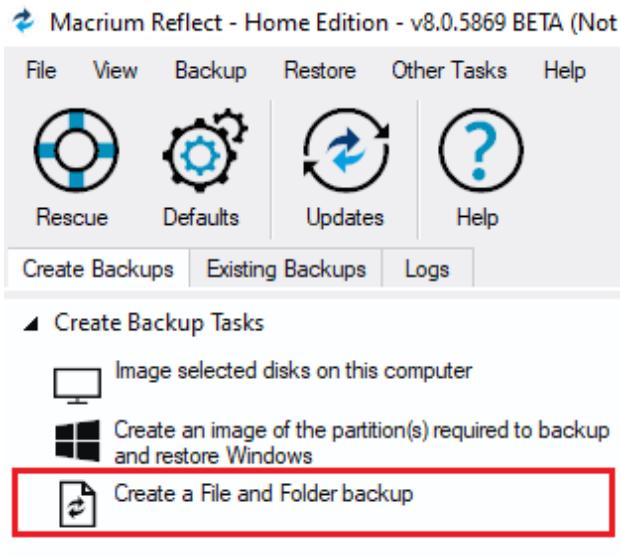


For more information see [Differential and incremental disk images](#).

Backing up files and folders

Creating Full, Differential, and Incremental backups of specific files or folders can optimize backup speed and disk space requirements. The wizard can be accessed from the **Create Backups** task bar.

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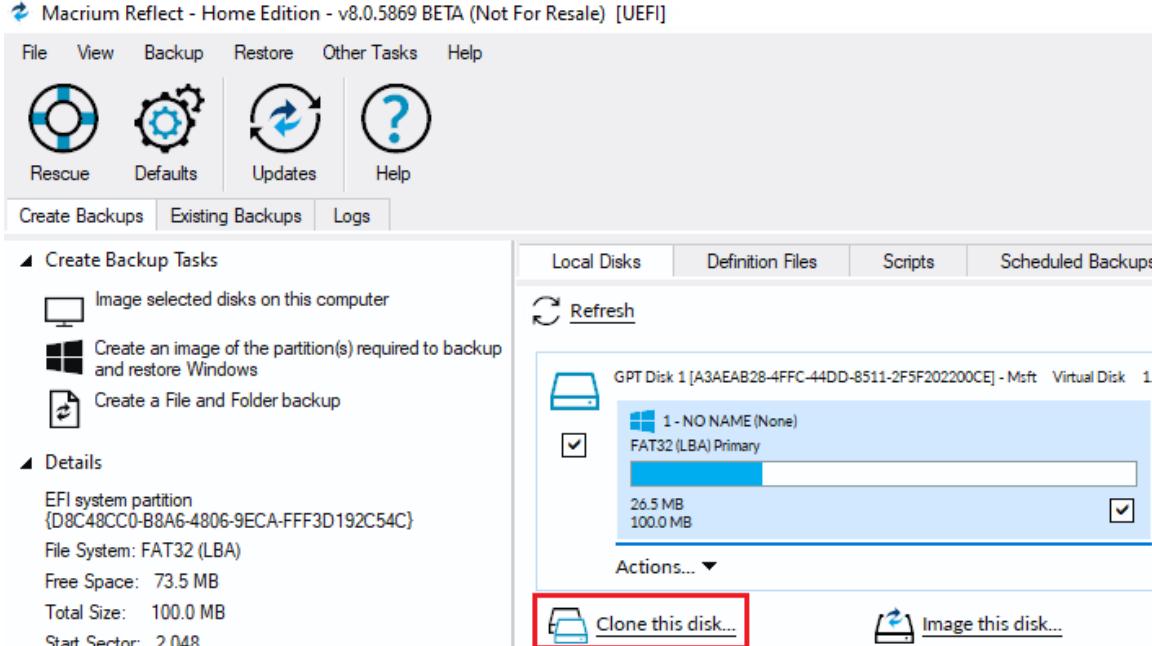


For more information see [Backing up files and folders](#).

Cloning disks

Cloning is particularly useful if you are upgrading to a new, larger hard drive or if you need to quickly swap failed disks out of your system.

Select the disk or partition you require from the **Create Backups** screen and click **Clone this disk**.



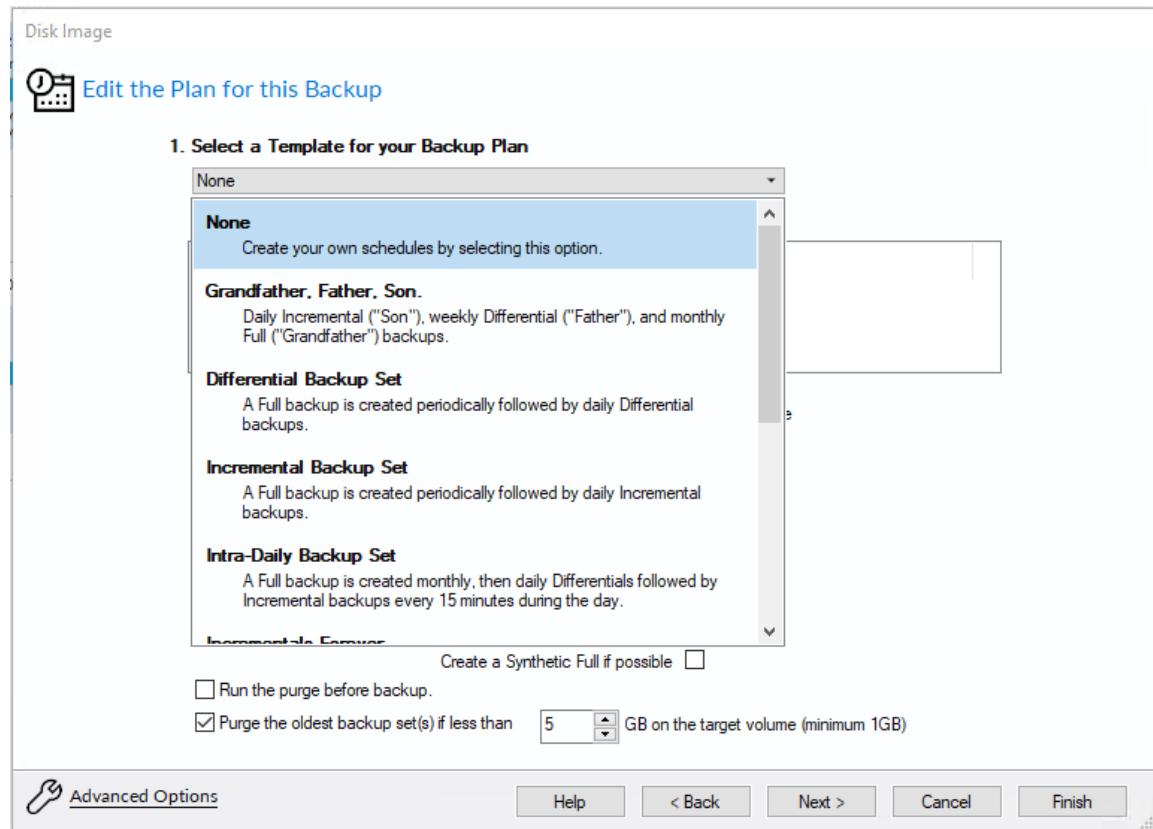
For more information see [Cloning a disk](#).

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Scheduling, retention, and disk space

Whenever you create a backup, regardless of the type, you have the option to create a backup plan using the scheduling and retention wizard.

Click below **Select a Template for your Backup Plan** to select from industry best practice backup plans templates, quick-start backup plan templates, or even templates that you have created. You can even skip over scheduling to simply take advantage of the retention rules for managing your disk space.



You can then customize the plan to suit your needs.

You can view, edit, cancel or run scheduled backups from the **Scheduled Backups** screen.

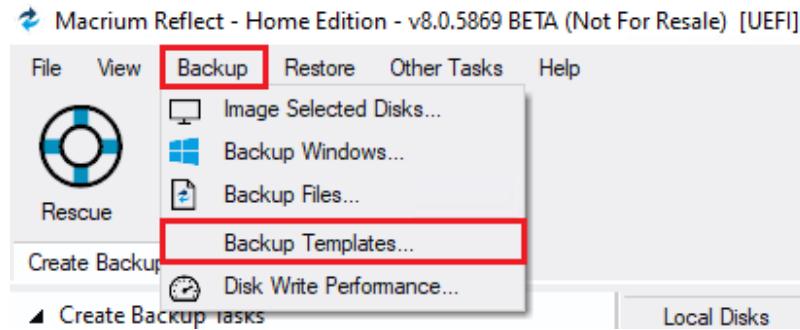
Scheduled Backups						
Name	Schedule	Next Run Time	Last Run Time	Status	Last Result	User Account
Clone - My Clone.xml (C:\Users\Admin\Documents\Reflect)						
Clone	At 09:00 every day, starting 01/05/2021	13/05/2021 09:00	12/05/2021 16:12	Ready	0x800710e0 Error	SYSTEM
Image - My Backup(1).xml (C:\Users\Admin\Documents\Reflect)						
Full	At 09:00 on the first Mon of every month, starting 12/05/2021	07/06/2021 09:00	Never	Ready	Task has not yet run	SYSTEM
Differential	At 09:00 every Mon of every week, starting 12/05/2021	17/05/2021 09:00	Never	Ready	Task has not yet run	SYSTEM
Referenced File - My Backup(1).xml						
Image Options		XML View				

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Backup plan templates

Macrium Reflect includes templates for automating industry best practice backup plans that help you maximize retention for your available storage space. These can be accessed and modified, or you can create your own backup templates.

To manage backup plan templates click **Backup** and select **Backup Templates...**

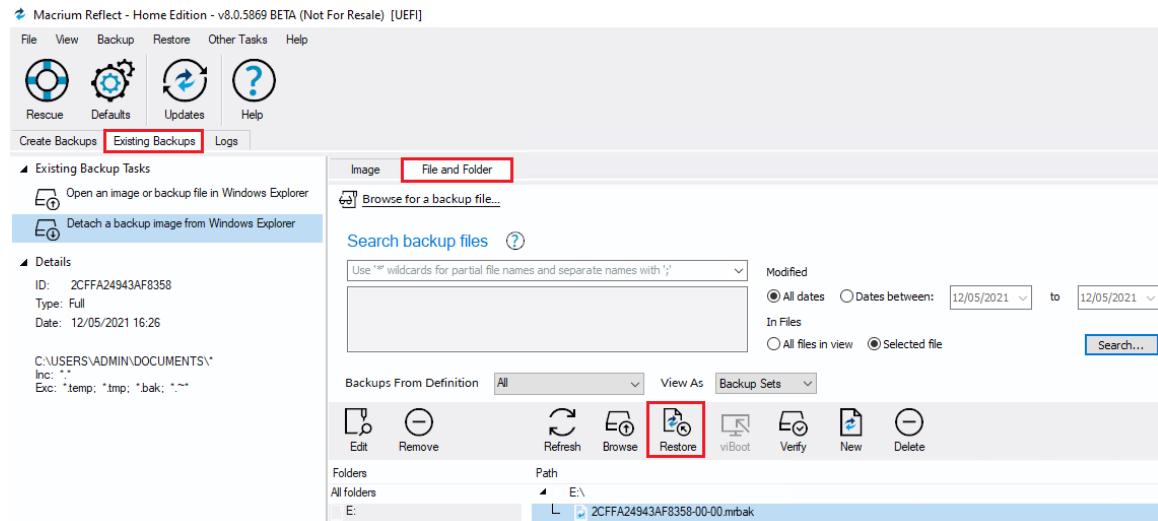


For more information about using backup templates see [Scheduling backups](#).

For more information about retaining backups and backup plans see [Retention and consolidation](#).

Restoring files and folders

To directly restore the contents of a file and folder backup use the Macrium Reflect file and folder restore feature.

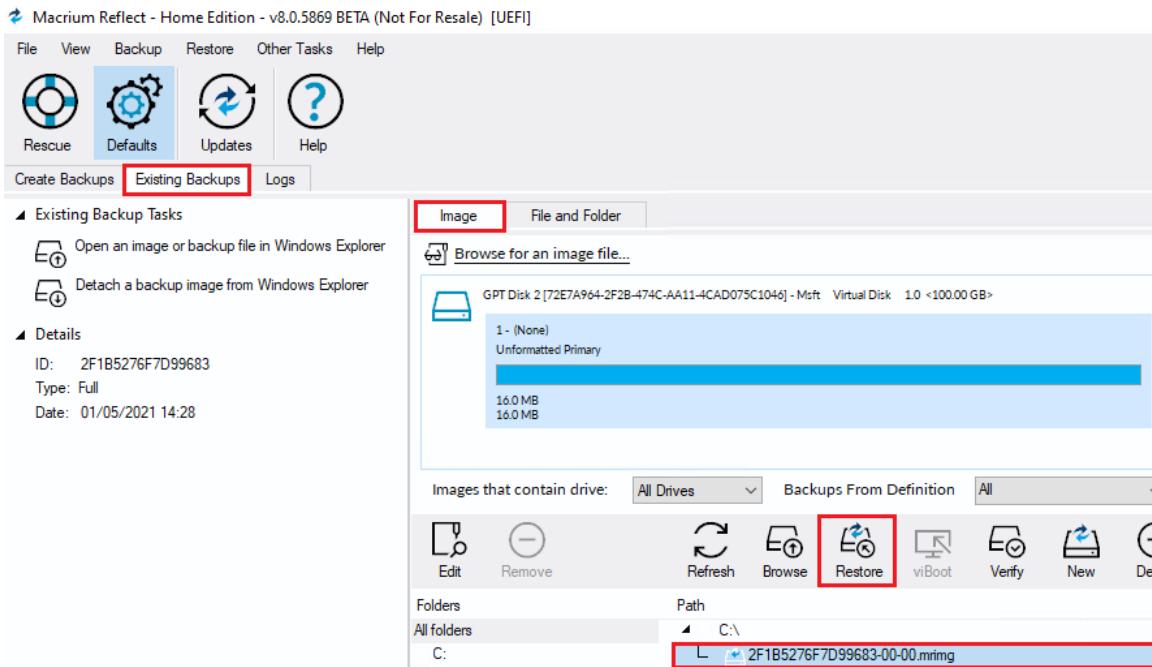


For more information see [Restoring a file and folder backup](#).

Restoring images

Select the **Existing Backups** taskbar, choose the image you want to restore, then click **Restore**.

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For more information see [Restoring an image from within Windows](#).

Note: If you are unable to boot Windows you can still restore an image by booting from the Macrium Reflect rescue media and using the temporary Macrium Reflect to find and restore images.

ReDeploying computers

Macrium ReDeploy is included in all licensed editions of Macrium Reflect. With ReDeploy you can restore an image to a replacement computer or even create various types of virtual hard drives to virtualize the machine, a technique sometimes called Physical to Virtual or P2V. ReDeploy modifies an existing offline operating system to work with new hardware.

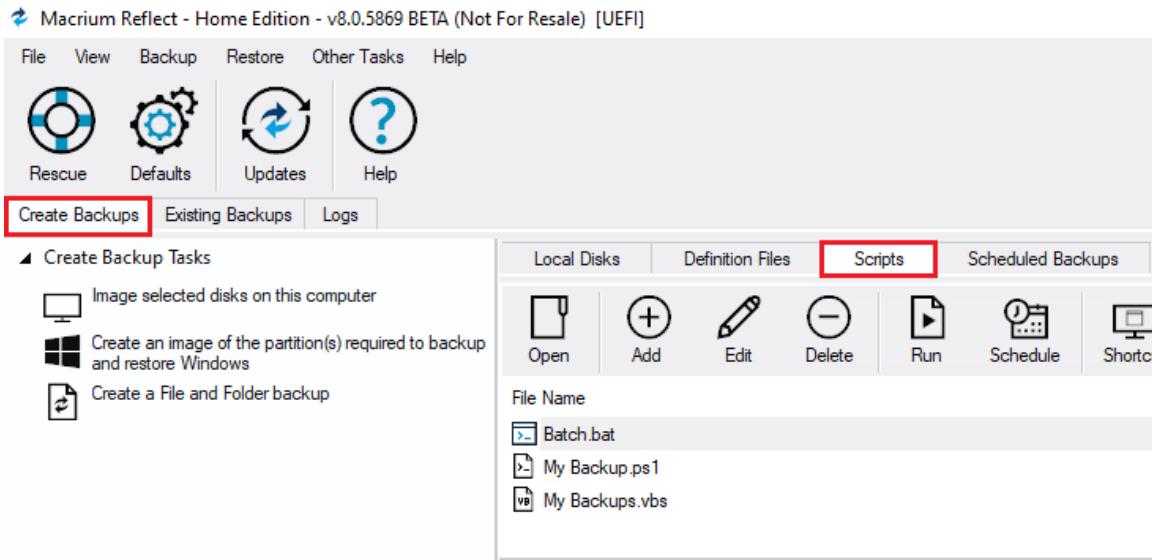
1. Restore your system image to the PC being deployed before running ReDeploy.
Note: There is no need to reboot your PC after restoring an Image and before you run ReDeploy.
2. Boot the target PC with the Windows PE rescue CD or USB equivalent.
3. On the **Existing Backups** task pane, click **ReDeploy Restored Image to new hardware**.

For more information see [Re-deploying Windows to new hardware using Macrium ReDeploy](#).

Scripting backup processes

In the **Scripts** tab, you can manage script files, run, or schedule them to run later. You can even create a desktop shortcut for convenience.

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Managing Macrium files in Windows

Wherever you browse for files in Windows programs or Windows Explorer, you can find Macrium Reflect functions by right-clicking on drives or Macrium files. If you have file extensions showing, Macrium files have the extensions .mrimg for images or .mrbak for file and folder backups. Otherwise, you can look for the icons.

With Macrium Reflect installed, directly from Windows you can:

- Image drives
- Run Macrium XML definition files
- Mount and unmount images for browsing
- View file Macrium properties in the file properties dialog
- See comments in Windows Explorer columns
- See a popup summary of the file contents by hovering the mouse pointer

Note though, the best way to view backup sets is in the Macrium Reflect interface itself where it can automatically collate the multiple files involved in incremental and differential backups and you can manage them as a set.

Windows Explorer shell integration

Macrium Reflect is integrated with Windows Explorer giving you the following features:

- Context-sensitive menus
- Windows Explorer columns
- .mrimg and .mrbak file properties
- File Infotips
- Extended support for Reflect XML definition files

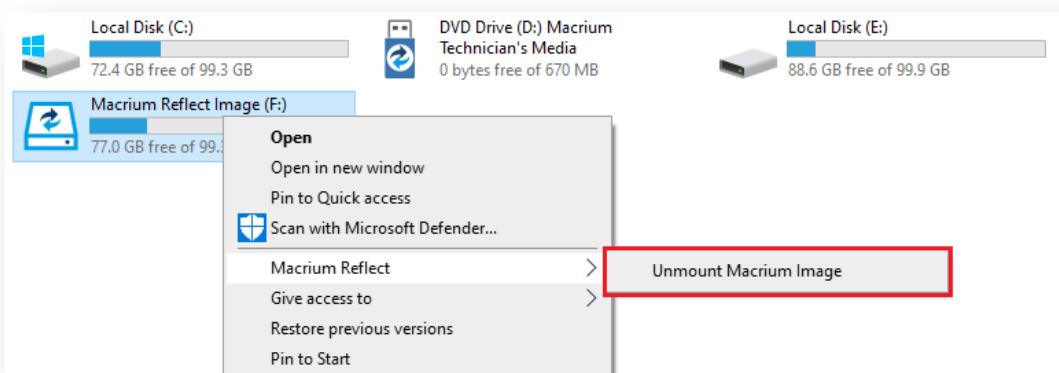
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Context-sensitive menus

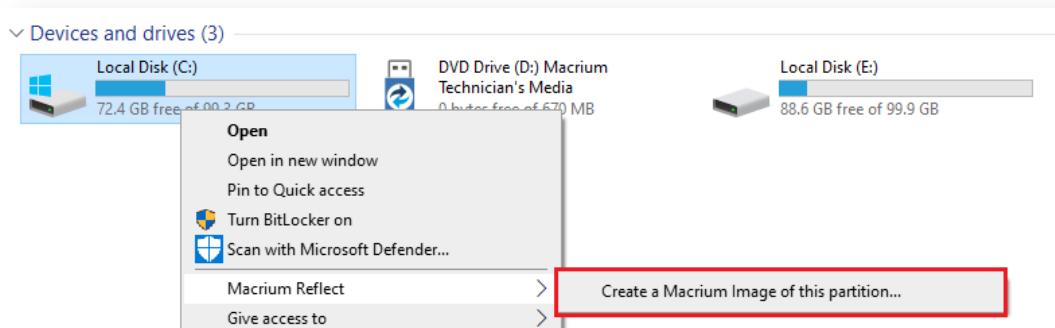
Right-click on Reflect .mrimg and .mrbak files to **Explore Image** or **Restore** an image.



You can then right-click on the disk to unmount the image



You can also image individual drives by **selecting the drive, right-clicking**, and selecting the **Macrium Reflect** option then **Create a Macrium Image of this partition...**



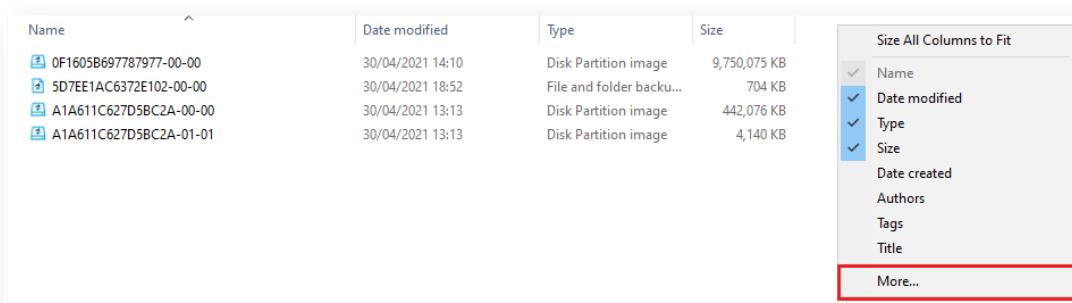
Macrium Reflect v8.0 User Guide

Windows Explorer columns

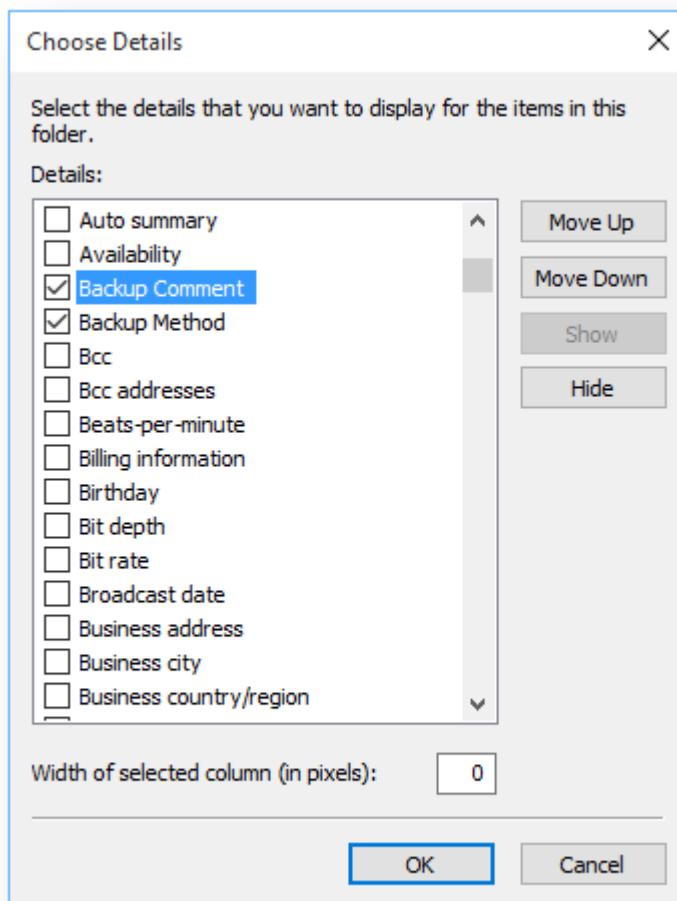
You can add columns in Windows Explorer to show the Backup Method and the comments stored with the backups.

Open a folder containing Macrium Reflect backup files, right-click on any Explorer column heading and select More

...



Scroll and select **Backup Comment** and **Backup Method**



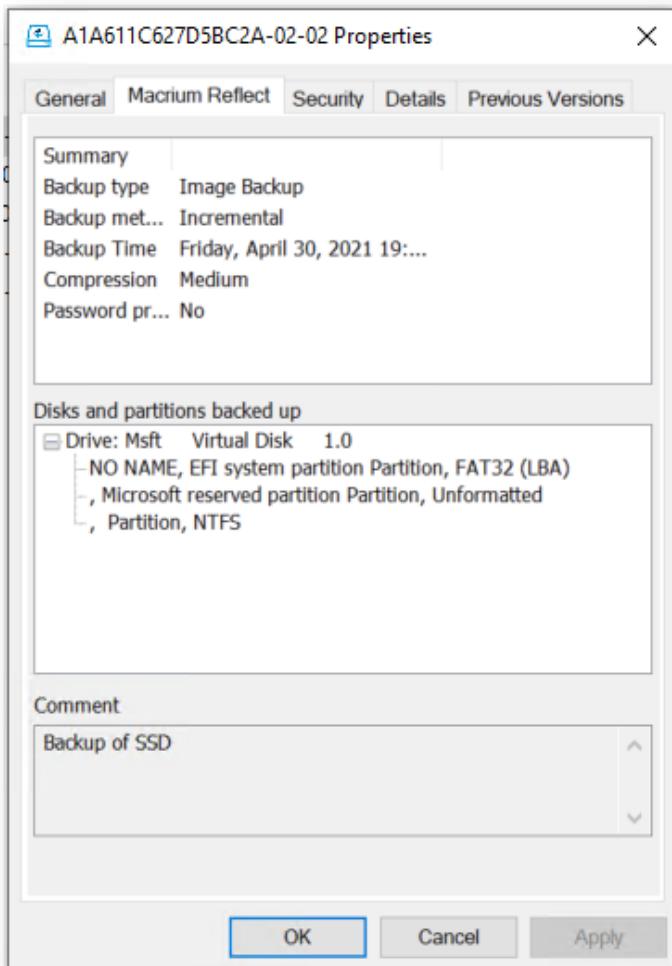
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The columns are then added to the Explorer view:

Name	Date modified	Type	Size	Backup Comment	Backup Method
A1A611C627D5BC2A-02-02	30/04/2021 19:29	Disk Partition image	4,223 KB	Backup of SSD	Incremental
0F1605B697787977-00-00	30/04/2021 14:10	Disk Partition image	9,750,075 KB		Full
5D7EE1AC6372E102-00-00	30/04/2021 18:52	File and folder backu...	704 KB		Full
A1A611C627D5BC2A-00-00	30/04/2021 13:13	Disk Partition image	442,076 KB		Full
A1A611C627D5BC2A-01-01	30/04/2021 13:13	Disk Partition image	4,140 KB		Incremental

.mrimg and .mrbak file properties

Right-click and select **Properties** to view the Macrium Reflect properties pane on image and backup files. This gives information about the file such as the backup method and time of backup as well as volumes or folders that have been backed up.



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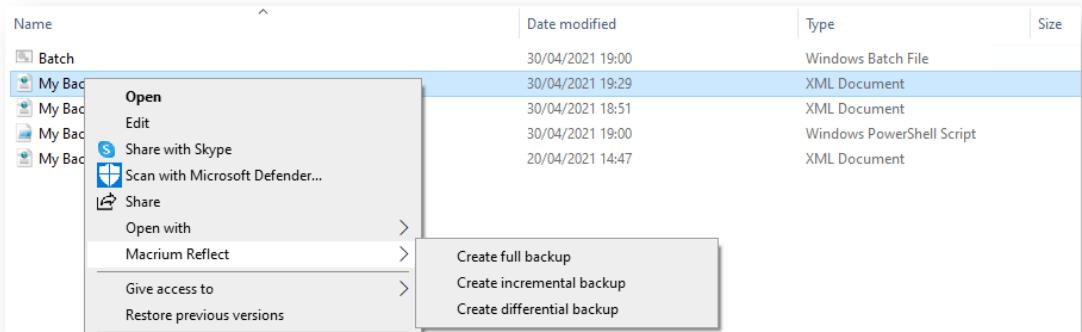
File Infotips

Hover the mouse over a Macrium image or backup file, you can get a brief summary of the file including the file type (Image or Backup), backup method, compression level, and if the file is password protected.

Name	Date modified	Type	Size	Backup Comment	Backup Method
A1A61C627D5BC2A-02-02	30/04/2021 19:29	Disk Partition image	4,223 KB	Backup of SSD	Incremental
0F1605B697787977-00-00	30/04/2021 14:10	Disk Partition image	9,750,075 KB		Full
5D7EE Macrium Reflect Image Backup	2021 18:52	File and folder backu...	704 KB		Full
A1A61 Backup Method: Incremental	2021 13:13	Disk Partition image	442,076 KB		Full
A1A61 Compression: Medium	2021 13:13	Disk Partition image	4,140 KB		Incremental
A1A61 Password protected: No	2021 13:13				

Extended support for Reflect XML definition files

You can run full, differential, and incremental backups by right-clicking on XML definition files. Select the Macrium Reflect option and then the backup type you wish to perform.



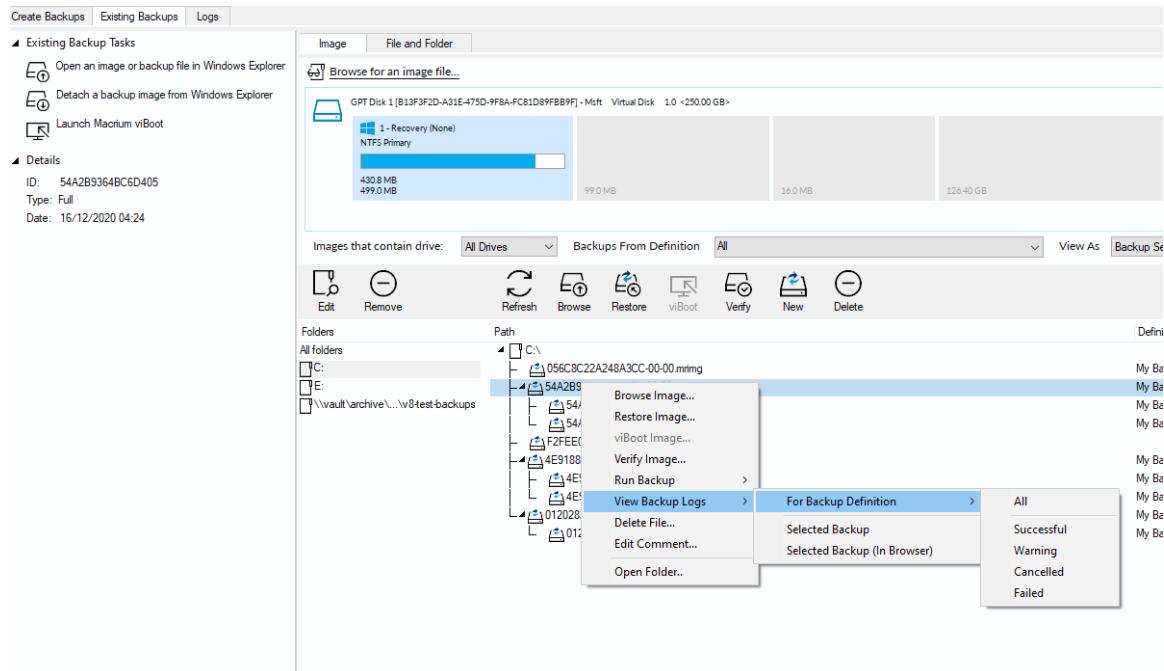
Reviewing your backup history

Macrium Reflect makes it easy to access logs of all types of backups and restores. Logs can be searched for using the 'Logs' tab and directly accessed from backup files in the 'Existing Backups' tabs.

Accessing logs from the 'Existing Backups' tab

Select the 'Existing Backups' tab, select 'Image' or 'File and Folder' and right click on the backup file of interest.

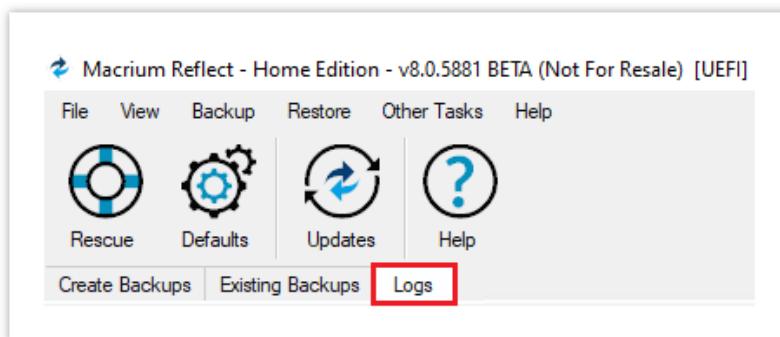
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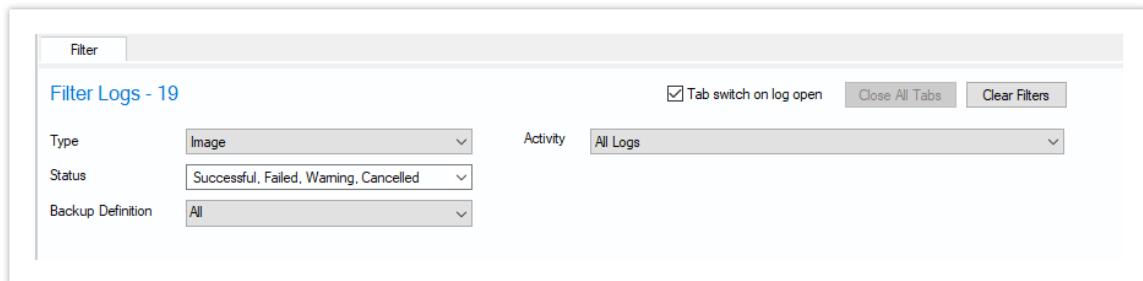
'View Backup Logs' enables all logs to be viewed for the Backup Definition that created the file or the individual backup, either in the Macrium Log Viewer or in your default web browser.

Navigating Logs in the Macrium Log Viewer

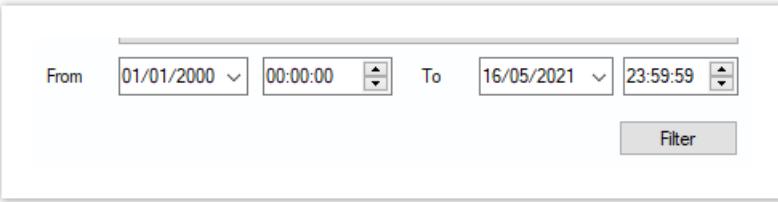
Click the **Logs** tab in the main user interface



Logs are initially sorted in descending date order and there's a log **'Filter'** at the top of the page to quickly search for logs of interest.



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Type:	All Types Image Image Restore File and Folder Backup File and Folder Restore Clone SQL Backup SQL Restore Exchange Backup Exchange Restore
Status:	Successful Failed Warning Cancelled
Backup Definition	All backup definitions with a log for the selected type.
Tab switch on open	If enabled , a double click or taking the 'View' toolbar or context menu option will cause the newly opened log tab to be selected and opened. If not enabled , the log list will retain the focus and the newly opened log tab will glow for a short time to draw attention to its location.
Clear filters	Returns all filter options to the default 'All' state.
Activity	All logs Today Last 7 Days Last 30 Days Latest - The last backups for the current selection criteria In Range - From and To dates with a 'Filter' button to generate the list: 

Accessing logs in the log list

'View' Button

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The screenshot shows the 'Logs' tab in the Macrium Reflect interface. At the top, there are three tabs: 'Create Backups', 'Existing Backups', and 'Logs'. Below the tabs is a 'Filter' bar with dropdown menus for 'Type' (set to 'All types'), 'Status' (set to 'Successful, Failed, Warning, Cancelled'), and 'Backup Definition' (set to 'All'). Below the filter are several icons: Refresh, Purge, Recent, Events, Delete, View (which is highlighted with a red box), and Email. A table below lists backup results. The columns are 'Result', 'Date', 'Type', and 'Definition'. The data includes:

Result	Date	Type	Definition
Cancelled	13/05/2021 09:00	Clone	
Success	12/05/2021 16:26	File Backup	
Success	03/05/2021 22:00	Image	My Backup.xml
Success	03/05/2021 21:59	Image	My Backup.xml
Success	03/05/2021 21:59	Image	My Backup.xml
Cancelled	03/05/2021 21:57	Image	C Drive Backup.xml
Success	03/05/2021 20:50	Image Restore	

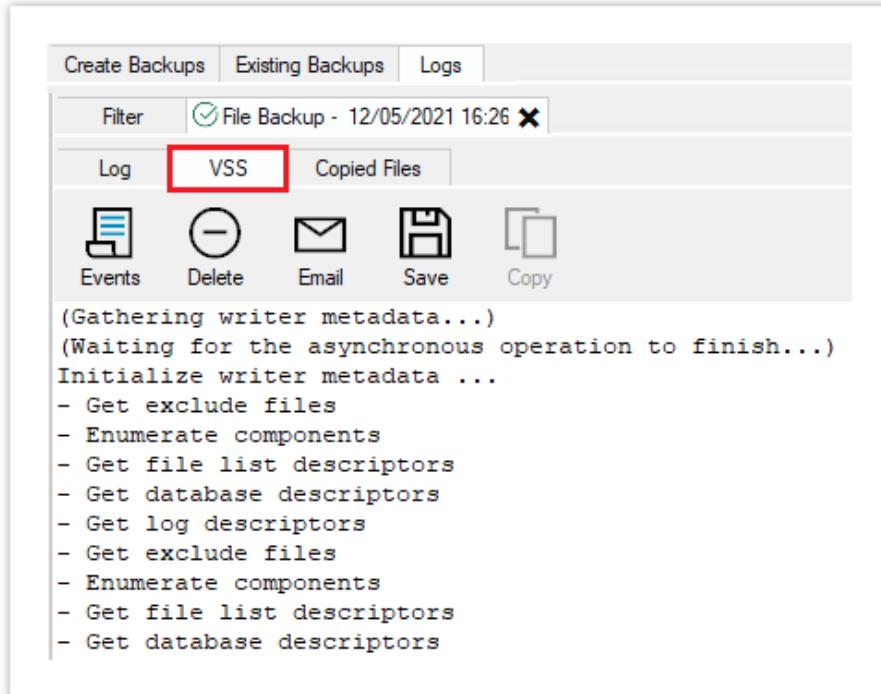
The log will then open in a new tab.

The screenshot shows the detailed backup summary for a successful file backup. At the top, it displays the backup ID: 'Backup ID - 2CFFA24943AF8358'. Below this is a 'Backup Summary' section containing the following configuration details:

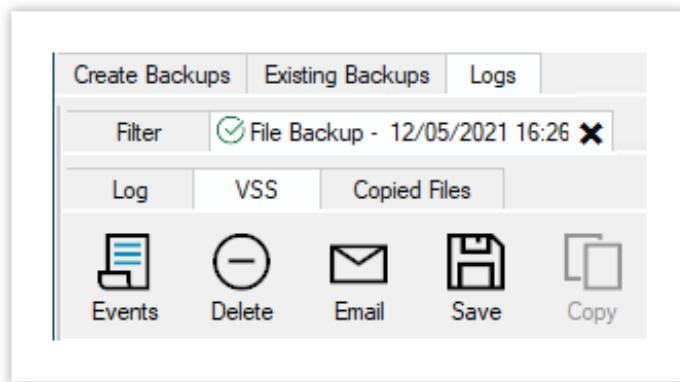
Auto Verify:	N
Maximum File Size:	Automatic
Compression:	Medium
Password:	N
NTFS Permissions:	Y
Folder Reparse Points:	Follow user reparse points, do not follow system reparse points
Backup set matching:	Similar - Match on backups with at least one matching folder
Power Saving:	N
Email On Success:	Y
Recipients:	username@gmail.com; username1@gmail.com
Email On Warning:	N
Email On Failure:	Y
Recipients:	username@gmail.com; username1@gmail.com
Current Time:	12/05/2021 16:26:14

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If the log has a VSS log, this can be viewed by selecting **VSS**.

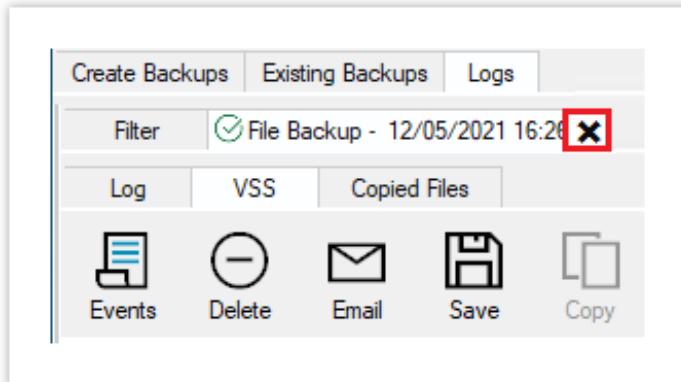


Open logs can be saved, opened in a browser, printed, or emailed.



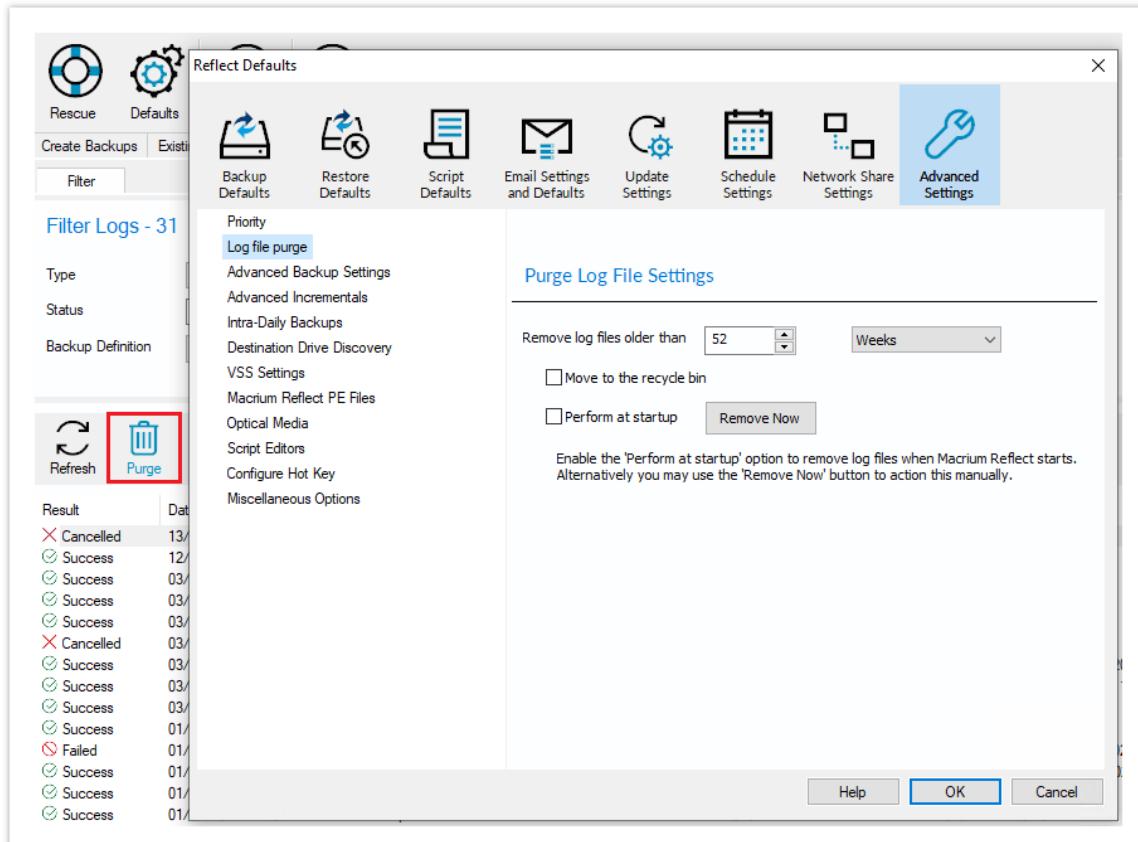
Once you have finished viewing the log, you can close the open log by selecting the X icon.

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You can purge your logs by selecting the **Purge** icon.

This will open the log file purge settings in the Reflect Defaults.



Removing your License key when Upgrading your PC

This article covers the procedure for removing a purchased license key from one computer so it can be transferred to another computer, such as when a computer is replaced due to upgrading your computer or so it can be restored to the same computer after a major upgrade.



Please note that a separate license key is required on each computer on which Macrium Reflect is installed. The transfer of a license key from one computer to another is only allowed for legitimate upgrade/replacement purposes.

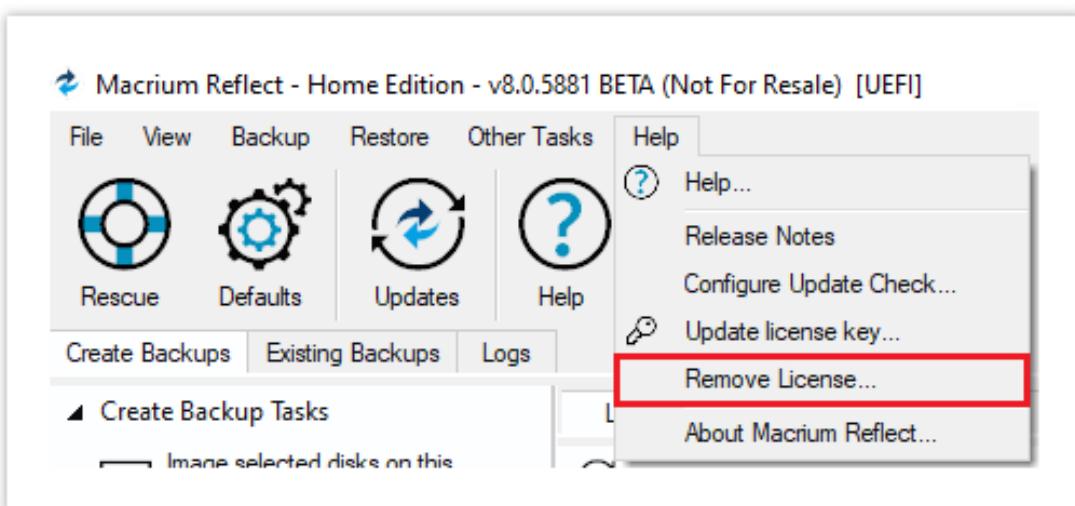
1. Make sure you have a record of your license key:

*Your license key was sent by e-mail when you originally purchased. Your license key can also be found in the **Help** menu of Macrium Reflect by selecting **About Macrium Reflect...***

Lost keys can also be retrieved here:<http://www.macrium.com/account/myorders.aspx>

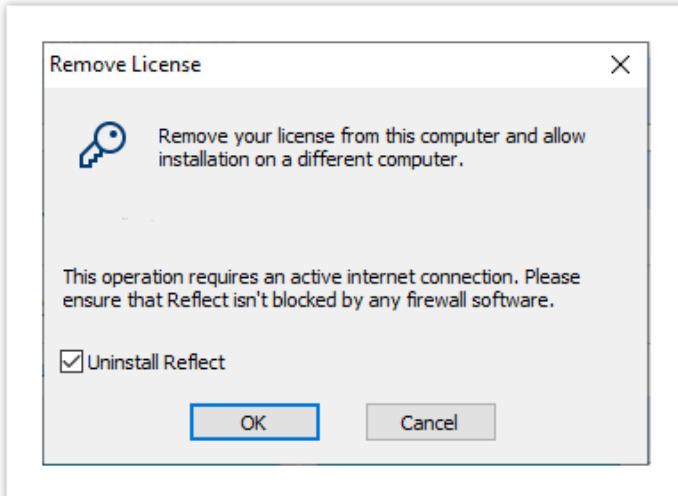
2. Remove your license key and uninstall Macrium Reflect:

*Open Macrium Reflect in your old computer and making sure it is connected to the Internet, then in the **Help** menu select **Remove License...***



The following dialog is displayed:

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*Ensure there is a tick against **Uninstall Reflect** and click **OK**.*

Macrium Reflect will uninstall and your license key will be removed making it available to be used on your replacement computer or original computer after a major upgrade.

More information:

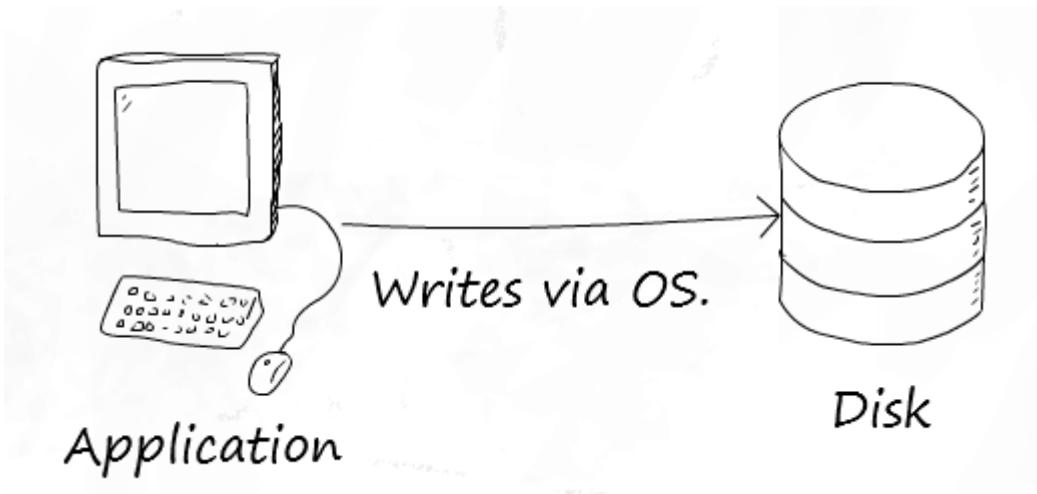
You can download installers and license keys by entering your email address here: <http://www.macrium.com/account/myorders.aspx>

You should create a new Windows PE rescue CD on your new hardware.

Backup Internals: What is VSS, how does it work and why do we use it?

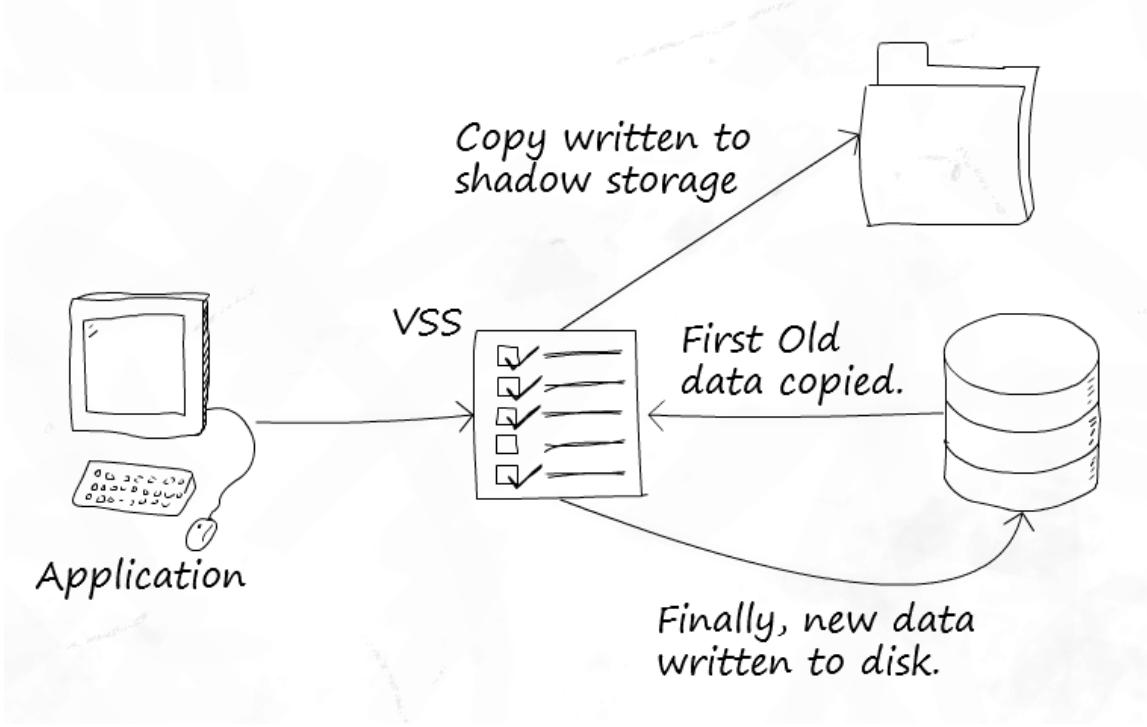
As happens sometimes, our more technically minded customers question a system that “just works”. We like these sort of customers, as they keep us on our toes. In this specific case, the question was **is it safe to continue using my computer during imaging** and the answer is yes, although the longer explanation is much more involved. After the ensuing discussion, one of our community members suggested we write this information up as a FAQ entry somewhere and internally we felt it was worth preserving the information from that thread, so this blog post is an extended, polished version of our notes there.

Reflect can take an image of a live system. How does this work?



A simple disk write

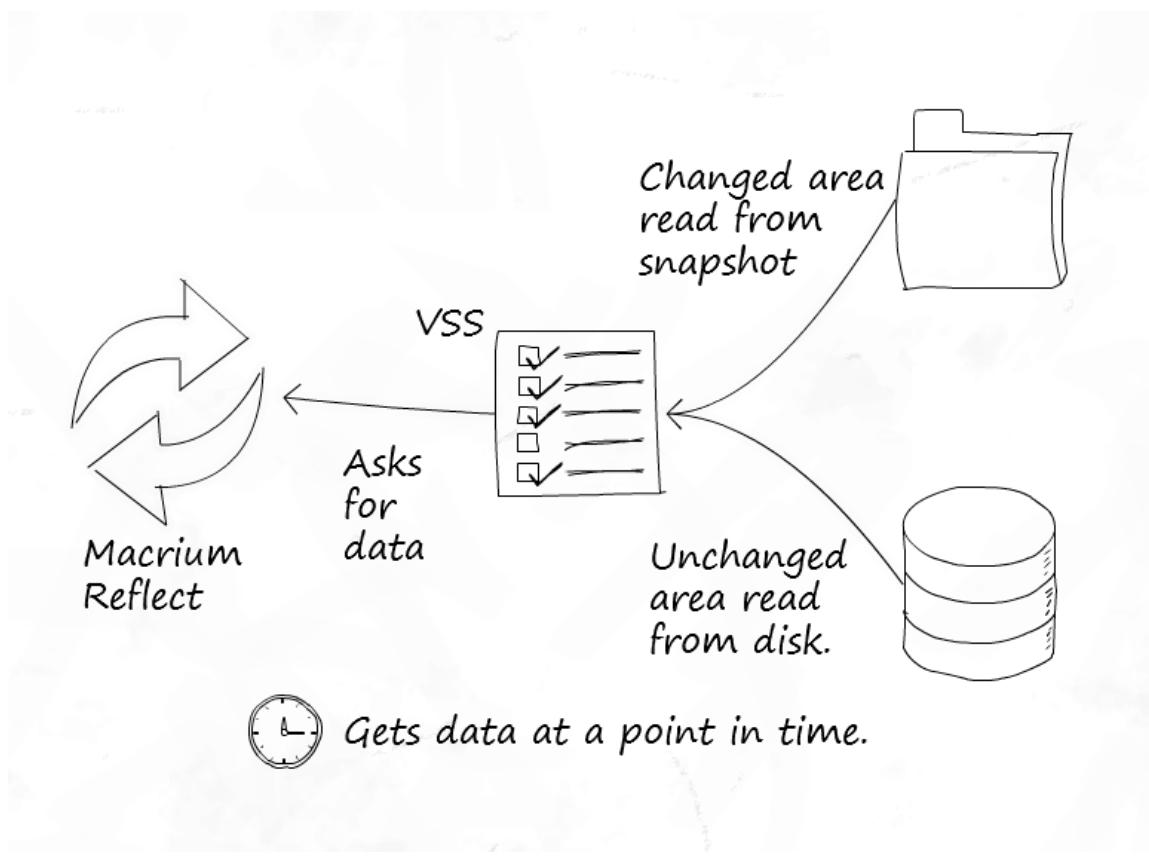
Internally Macrium Reflect relies on a Microsoft Windows component called VSS, which stands for Volume Shadow Storage. Microsoft's VSS operates by taking what is called a copy on write snapshot of your system. This allocates a small temporary storage space. Then, every time you write to a part of your disk, the information on the disk is first copied to the snapshot before allowing the write to take place.



VSS in use

This technique makes VSS quite efficient. A snapshot only contains as much data as has changed since the snapshot started – you do not need an entire copy of your disk. Also, writes are only affected for used space – free space does not need to copy anything, as there is no original to preserve.

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Reading data

However there is another side to this advantage. The more writes made after the snapshot springs into existence, the more VSS must store. So if you perform an excessive amount of disk activity during imaging, the snapshot storage space may become large. VSS imposes a cap on this space, and should a snapshot attempt to exceed it, VSS will stop its copy on write behaviour and delete the temporary storage.

Once the snapshot is finished with, the space can be freed up again – so the temporary storage space is only needed during use.

What determines where this storage space is?

There is no magic to this – VSS chooses sensible defaults based on your available drives. This configuration can of course be altered and Microsoft provide a tool for this called [VSSAdmin](#).

Is the data taken at a point in time really consistent?

This is a difficult question to which there is no straightforward answer. As you may have realized already, if a copy is in progress when the snapshot starts, only the completed part of the copy will be included in the snapshot. The rest of it will count as new writes and the old, inconsistent blocks will be copied to the snapshot!

To understand how VSS gets around this we need to understand a little more about VSS architecture so I'll introduce three terms:

- **Provider:** in VSS land, a provider provides the VSS service and is responsible for all the co-ordination elements. Essentially this is the “core” of VSS. Microsoft include a VSS Provider with Windows, and Reflect uses this. (Technically speaking, there are two components, the co-ordinator and the provider, however, for simplicity we have combined these for the purposes of explaining VSS.)

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- **Requester:** a requester is, as you might expect from the name, an application that requests a snapshot to be made. This request goes to the provider.
- **Writers:** these components provide a mechanism for applications to be alerted to the creation of a snapshot, so they can prepare their data for snapshotting. VSS providers can notify VSS writers that a snapshot has been created, and the VSS writer can then perform the appropriate action. Once the snapshot has been taken, the provider again notifies the writers, so they may let the applications resume.

VSS Writers are an important part of VSS for certain environments. Imagine you are running a heavily loaded database server in production, or a virtual machine cluster. The database server will have open and be manipulating its database files, processing transactions etc. while the VMs are continually performing disk operations for the virtualised OS. Taking a point-in-time snapshot might be fine but, due to the amount of IO, it is likely to catch one or more of these services off guard in an inconsistent state.

The role of writers is to inform these applications a snapshot is about to be created. The application can then perform any tidy up operations necessary to ensure what is on disk is consistent. The snapshot starts and the applications are then notified they can continue. Now the on disk state should be fine.

When do I need to check my applications are VSS aware? I.e. when do I need VSS writers?

You need VSS writers for applications that perform large amounts of IO and depend heavily on the state of the files they are writing if you wish to back them up. Virtual machine disk images are a perfect candidate for this – the running image could easily become inconsistent.

Most applications do not write to disk in quantities of data large enough to be a problem. Many applications from Microsoft are also VSS aware, which helps greatly.

What about current and previous snapshots?

VSS is smart enough to keep track of its temporary storage location, and will exclude anything in it, including the current temporary storage area and any persistent snapshots that have been previously created. So when the data is read by your backup software, you only get what you need.

When is VSS in use and when is it not with regards to taking a backup?

Now a question you may not have thought of – when is VSS in use? Well, VSS solves the problem of imaging a live system neatly, so whenever you image your system with Reflect you are probably using VSS.

There is one exception to this – we have a fall-back mechanism for live versions of 32-bit Windows client operating systems up to Windows 7 (so XP, Vista and 7) called pssnap.sys. Reflect can use this on these systems if VSS is unavailable. pssnap provides the same copy-on-write technique as VSS, but with fewer extra features (pssnap.sys is not a VSS provider and is independent from VSS). Why have both systems? Well, VSS is a core component of Windows and available on every edition of Windows greater than XP SP2. We know it will be there as Microsoft are committed to this feature and it makes sense to use it as it is highly reliable. Before VSS we had no such mechanism so we built our own. It is equally as reliable but we felt the feature additions of VSS and the support for writers for enterprise scenarios really meant VSS made sense.

However in the rescue environment we do not use, or need to use, either pssnap.sys or VSS. Why? Because the system is not in use so the data should be perfectly consistent at all times. Of course we may well end up including persistent snapshots if they exist because without VSS they are not excluded.

You keep saying VSS is a Windows feature, yet only Reflect uses it...

Actually, that's not true. Windows itself uses VSS for system restore points! These system restore points are the persistent snapshots that might exist in your shadow storage.

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That's it. If you'd like to read about VSS directly from Microsoft, you can read their article on [TechNet](#).

Macrium Rapid Delta Clone (RDC)

As with Rapid Delta Restore (RDR) the concept of RDR has been something that has been thought about for quite some time here at Macrium Software. We wanted to build a clone solution that would effectively and rapidly copy only the differences between the source and target file systems. The advantage of this is obvious, RDC offers similar a performance increase as an Incremental disk image offers over a Full image and enables regular clones to be a viable and fast DR solution.

How does it work?

The NTFS file system resident on the clone source is compared with file system on the target disk. The two file systems are first verified that they originated from the same format command and then the target NTFS file system structures are analyzed for differences. All the NTFS file system structures are copied to the target disk and any that do not exist or have been modified on the target disk cause the data records for each NTFS file or object to be copied as well. The result is an 'Incremental' clone applying only file system changes detected between the source and the target.



Note: RDC works with NTFS file systems only. All other file systems will perform a full clone



Note: RDC is not available when shrinking partitions during a clone.

Rapid Delta Restore - RDR

Macrium Rapid Delta Restore (RDR)

The concept of RDR has been something that has been thought about for quite some time here at Macrium Software. We were aware of competing technologies that offer fast restore capabilities but wanted to build something better...

Known state restore

This method performs a restore of an incremental image to a file system at a **known state**. The problem with this method is that the 'know state' must be prepared before hand and the target disk cannot be accessed before the final 'rapid' restore. This means that the target disk for the restore cannot be the original 'live' disk and a previous restore of the same backup set must have been performed beforehand and the disk taken offline. Not very flexible.

Snapshot restore

Another method is to rely on an open Microsoft Volume Shadow copy Service (VSS) snapshot and use this to restore back to the state when the snapshot was created. Very quick, but only allows restoration **back to the same disk and the image must have been created with VSS**. Again, not flexible enough for real world DR.

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Macrium RDR

Where Macrium RDR differs is that it isn't dependent on VSS and a delta restore can be performed to **any disk** that has a previous copy of the imaged file system, **no matter what its current state**. This means that you can restore quickly back to the original disk (similar to the Open Snapshot) method, **and** have the flexibility to restore to a different disk that contains the same file system on it in any state.

How does RDR work?

Unlike 'Known State' and 'Snapshot' restore, the only dependency for RDR is that the target file system contains a formatted NTFS file system that is the same file system as was originally imaged. When the restore starts the disk image is loaded, again this can be an image taken at any time, and the target NTFS file system structures are analyzed for differences. All the NTFS file system structures are restored to the target disk and any that do not exist or have been modified on the target disk cause the data records for each NTFS file or object to be restored as well. The result is an 'Incremental' restore applying only file system changes detected between the image and the target.



Note: RDR works with NTFS file systems only. All other file systems will perform a full restore



Note: RDR is not available when shrinking partitions during a restore.

Backup, imaging and cloning

Macrium Reflect creates File and Folder backups as well as disk images including cloning complete disks. The [Macrium Reflect Server Plus for Exchange and SQL](#) version adds MS Exchange and MS SQL Server backup capabilities to this.

A File and Folder backup is a useful way to backup your working files, personal files, and precious data. Unlike other backup solutions, Macrium Reflect can backup open and locked files by using Microsoft Volume Shadow Copy Service (VSS). You can backup your *Documents* folder and save the backup configuration as an XML file for easy re-running and scheduling.

A Disk Image stores the information required to completely restore disks (or their individual partitions) exactly as they were when the image was taken.

Cloning with Macrium Reflect creates an exact copy of partitions to a different drive. For example, Upgrading to a larger hard drive or moving from a large magnetic hard disk to a smaller and faster SSD. When you Clone a hard drive, you can boot from the target disk on the same system after cloning.



Important

Windows cannot boot from a USB-connected drive. This is a restriction imposed by Windows. If you clone your system disk to a USB-connected external drive then, to boot your clone, the physical disk must be removed from the USB caddy and attached internally.

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- Creating a backup image of your computer, drive or partitions
- Manually running a job from a configured XML backup definition
- How backup sets are created and maintained
- Backing up files and folders
- Cloning a disk
- Backing up Microsoft Exchange databases
- Backing up MS SQL Databases
- Creating a disk image of a single drive or partition
- Differential and incremental disk images
- Creating desktop shortcuts for full, incremental and differential backups
- Checking VSS events when backups fail
- Alternative Locations For Backups
- Advanced Options
- Verifying image and backup files
- How to backup Hyper-V Cluster Shared Volumes

Creating a backup image of your computer, drive or partitions

Using Microsoft Volume Shadow Copy Service (**VSS**) Macrium Reflect creates point-in-time persistent images of your system. In Addition to creating backups of all partitions required to backup and restore Windows, you can backup all or selected drives and partitions on the PC.

- Starting the Image Wizard
 - Setting the Image destination
 - Adding and Editing the Backup Plan
 - Displaying the Image settings
 - Saving the backup definition
 - Best practices for saving Macrium Reflect backup definition files
-

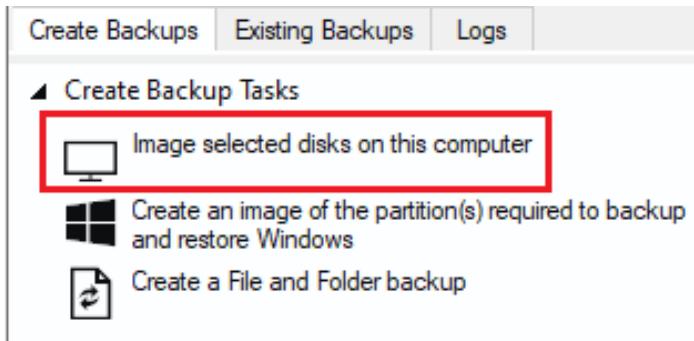
Starting the Image Wizard

The Image Wizard can be started in multiple ways...

1. By selecting **Image selected disks on this computer**.

Using this option will populate the Image Wizard with all selected disks and partitions in the application main window.

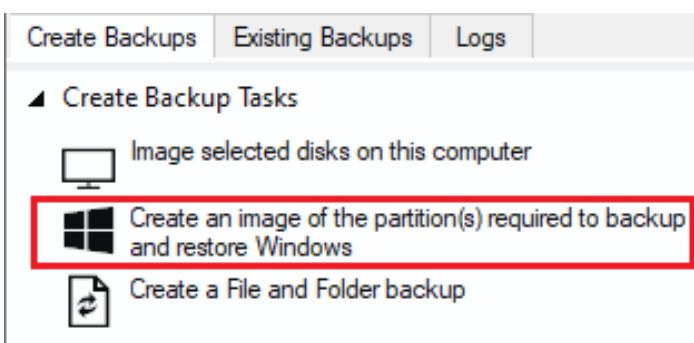
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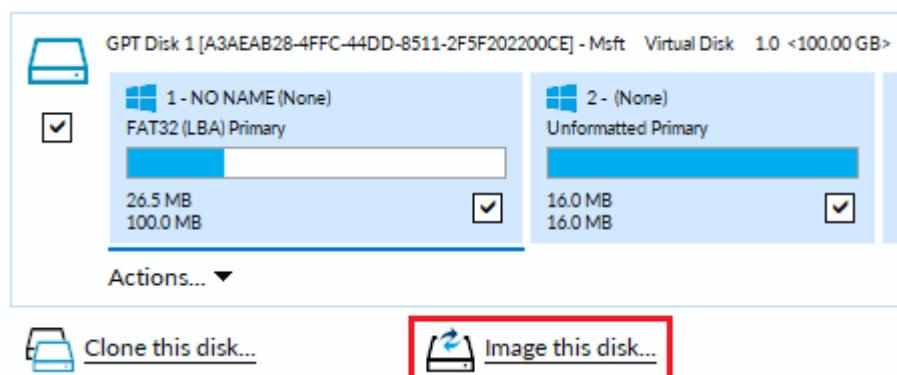
2. By selecting **Create an image of the partition(s) required to backup and restore Windows**.

Using this option will choose all the partitions required to boot Windows. This may include hidden system partitions that are essential for Windows to start and run.

See: [Windows Partitions](#)

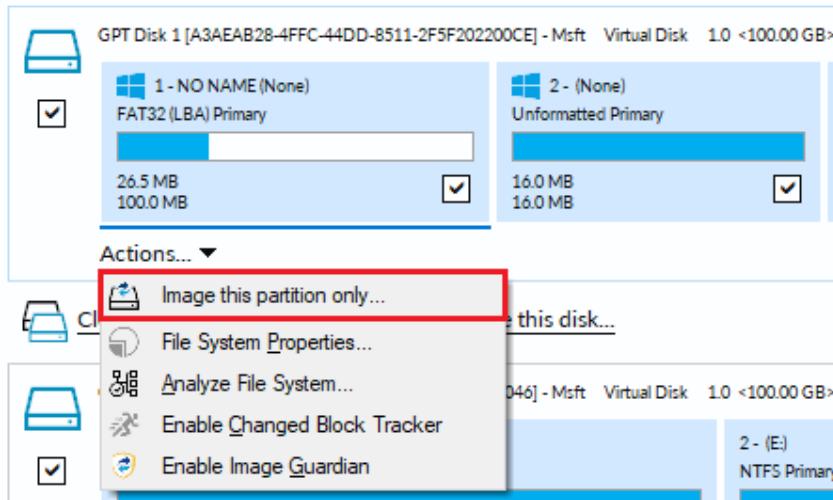


3. By Selecting a disk in the application main Window and click **Image this disk....**



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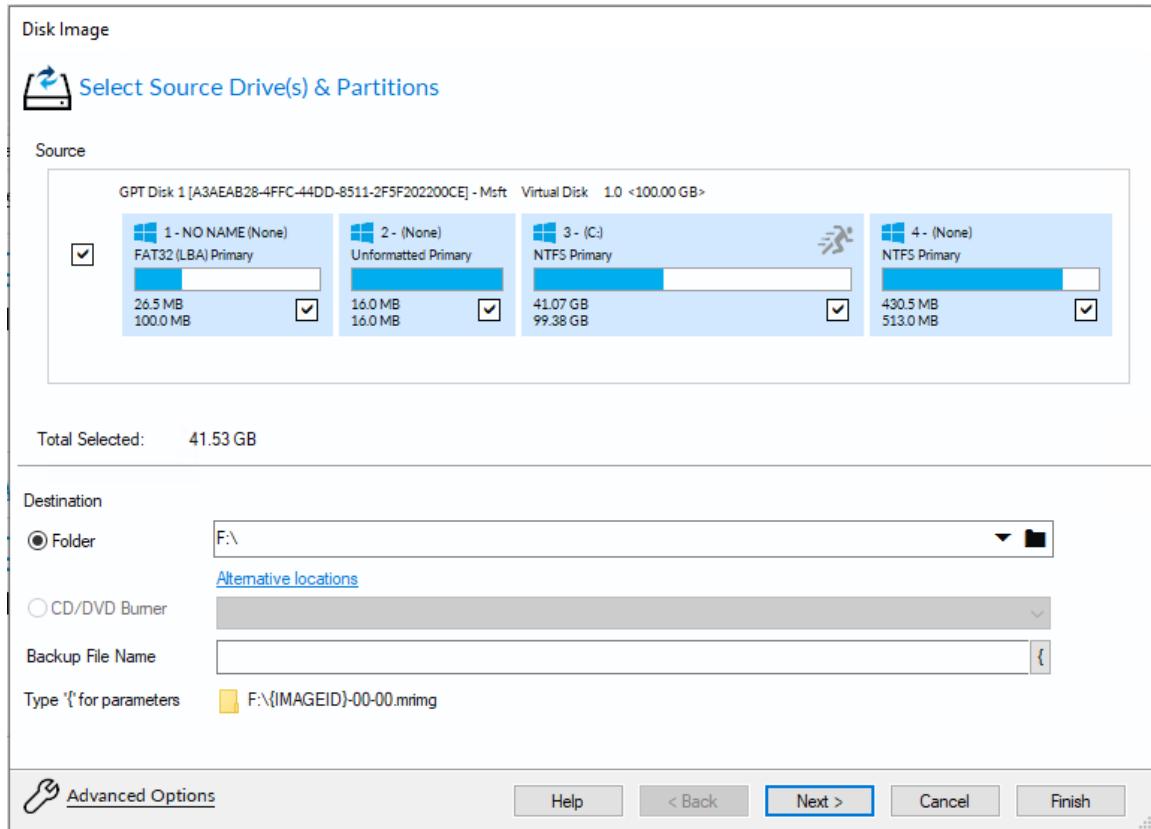
4. By Selecting a disk in the application main Window, click on a partition, then click **Actions** and select **Image this partition only...**



Setting the Image destination

The first page of the Image Wizard shows the selected disks and partitions to be included in your Image and allows you to choose a destination.

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In the **Destination** section, enter the target backup folder.

You can type the destination path or click the browse button to choose a folder. The destination path can be on a local drive or network share.

Alternative Locations can be used to provide backup rotations or as a fail-safe for temporary unavailability of the primary backup destination.

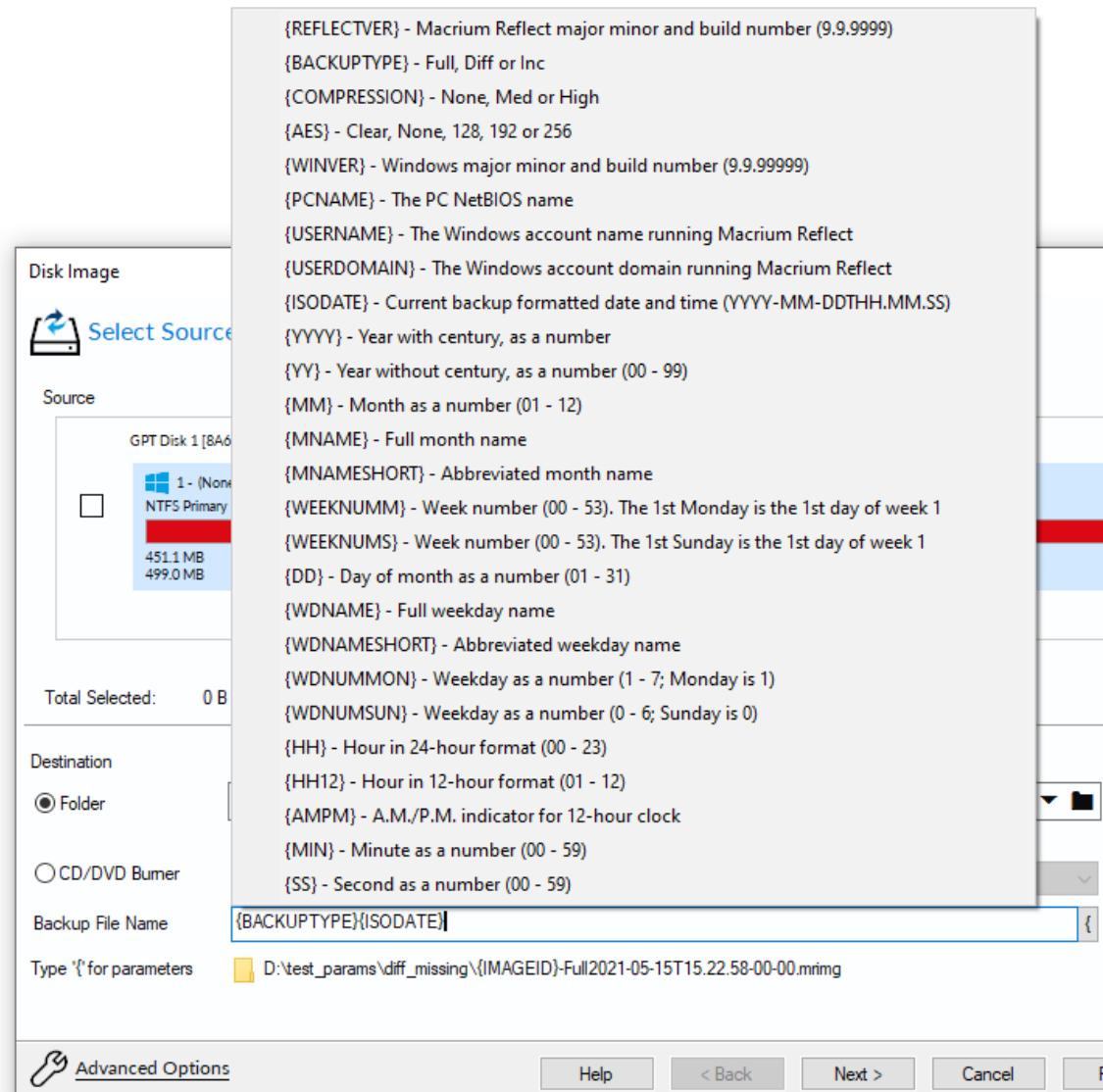


Note: You cannot enter a path that is located in any of the partitions included in the Image.

Run time parameters enable dynamic information to be included in backup file names at run time.

In the Image and File and Folder backup dialog simply **type '{'** or **press the '{' button** at the end of the file name edit field:

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The selected parameter from the pop-up menu will be inserted into the file name at the edit position.

All parameters are evaluated at run time, and an example of the output is shown in the formatted file name and path below the edit field.



Note: The File name 'Set prefix' (IMAGEID above) is evaluated based on the backup set and isn't selectable from the parameters list.



Note: The timestamp used for the time fields may differ by a few seconds to the backup time recorded for the backup. This is because the backup file name is created before the completion of the Volume Snapshot and the actual backup start time.

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Parameter	Description
{REFLECTVER}	Macrium Reflect major minor and build number (9.9.9999)
{BACKUPTYPE}	Full, Diff or Inc
{COMPRESSION}	None, Med or High
{AES}	Clear, None, 128, 192 or 256 Where 'Clear' is no password and 'None' is password with no AES
{WINVER}	Windows major minor and build number (9.9.99999)
{PCNAME}	The PC NetBIOS name
{USERNAME}	The Windows account name running Macrium Reflect
{USERDOMAIN}	The Windows account domain running Macrium Reflect
{ISODATE}	Current backup formatted date and time (YYYY-MM-DDTHH.MM.SS)
{YYYY}	Year with century, as a number
{YY}	Year without century, as a number (00 - 99)
{MM}	Month as a number (01 - 12)
{MNAME}	Full month name
{MAMESHORT}	Abbreviated month name
{WEEKNUMM}	Week number (00 - 53). The 1st Monday is the 1st day of week 1
{WEEKNUMS}	Week number (00 - 53). The 1st Sunday is the 1st day of week 1
{DD}	Day of month as a number (01 - 31)
{WDNAME}	Full weekday name
{WDNAMESHORT}	Abbreviated weekday name

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Parameter	Description
{WDNUMMON}	Weekday as a number (1 - 7; Monday is 1)
{WDNUMSUN}	Weekday as a number (0 - 6; Sunday is 0)
{HH}	Hour in 24-hour format (00 - 23)
{HH12}	Hour in 12-hour format (01 - 12)
{AMPM}	A.M./P.M. indicator for 12-hour clock
{MIN}	Minute as a number (00 - 59)
{SS}	Second as a number (00 - 59)

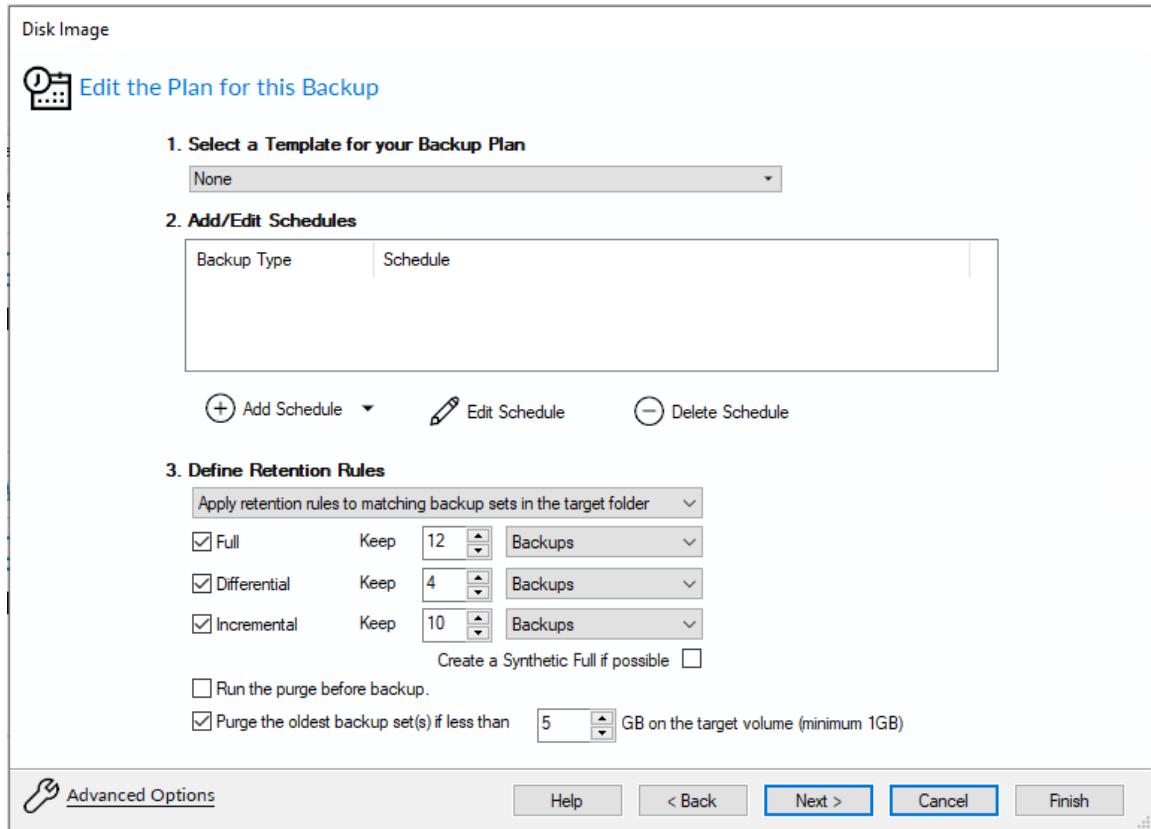
Please see [How backup sets are created and maintained](#) for more information on backup file naming.

Click **Next**. to edit the backup plan for this image or click **Finish** to save and/or run the Image now.

Adding and Editing the Backup Plan

The second page of the Image Wizard is where you create or edit your backup plan. This defines the backup schedules and retention rules for your backup.

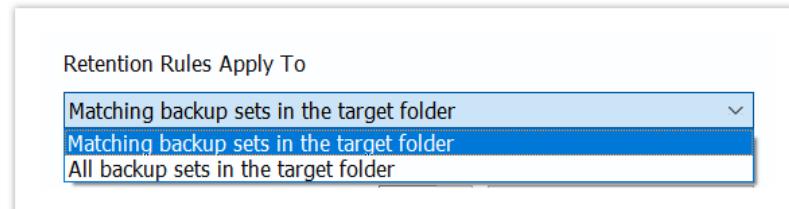
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Macrium Reflect retention rules provide a powerful and flexible way to manage the lifetime and storage space used by your backups.

Choose how backups are matched, and how retention rules are applied to the target folder

Retention rules are applied to the target folder of the backup by selecting one of two options:



Similar backup sets in the target folder.	Disk Images are purged if they contain exactly the same Partitions as the current Image. Partitions are identified using the unique Disk ID stored in sector 0 of the disk and the Partition sector offset . Note: For GPT disks the unique GPT disk GUID is used instead of the Disk ID. For File and Folder backups retention rules are applied according to the File and Folder ' Backup Set Matching ' selection.
All backup sets in the target folder.	All backup sets in the target folder of the same type (Disk Image or File and Folder) are purged according the retention rules.

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Select the age or number of backup types that you wish to keep

Retention Rules Apply To

Matching backup sets in the target folder

Full Keep 12 Backups

Differential Keep 4 Backups

Incremental Keep 10 Backups

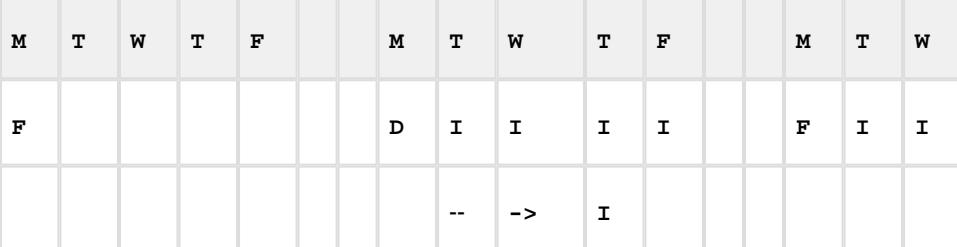
Create a Synthetic Full if possible

Purge before a backup

Purge oldest backup set(s) if less than GB on the target volume

Option	Description
Full	When deleting Full backups all linked incremental and Differential backups in the same backup chain (set) are also deleted. This operation will delete the entire backup set.
Differential	When deleting Differential backups all linked incremental backups in the same backup chain (set) are also deleted.
Incremental	When deleting Incremental backups the integrity of the backup set is maintained by ensuring that the chain is never broken. This is achieved by merging older Incremental backups when required. In the example below, before retention, there is 1 Full backup, 1 Differential backup and 6 Incremental backups . The retention rules are set to retain 4 incremental backups . After retention, the most recent 4 incremental backups are retained. Deleting the oldest 2 incrementals would cause the backup chain to be invalid as the oldest retained incremental requires the previous 2 incremental backups to complete the chain. To ensure backup integrity the 2 older incremental backups are consolidated with it to create a new incremental backup. F = Full D = Differential I = Incremental

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Option	Description
	
Create a Synthetic Full if possible	When purging Incremental backups, if the backup set only contains a Full backup followed by Incremental backups , then this option causes the Full backup to be 'rolled forward' to create a Synthetic Full backup . This is also known as Incremental Forever .
Run the purge before the backup	Select this option to run the retention rules before the current backup. Note: in Macrium Reflect v5 the current backup set wasn't included in the purge calculation when purging before the current backup. In v6 the current backup set IS included. This means that if you set the retention count to 1 Full backup then all of your backups will be deleted and a new Full backup created.
Delete oldest backup set (s) if less than n GB	Automatically remove the oldest backup set(s) in the target folder if the free space on the drive drops below the GB threshold. Note: The free space threshold is actioned dynamically. If the free space available drops below the threshold then the running backup is temporarily paused while older backup sets are purged.

Click **Next** to view a summary of all settings for this image or click **Finish** to save and/or run the Image now.

Displaying the Image settings

The final page of the Image Wizard displays all settings used for creating this image.

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Disk Image

Imaging Summary

Auto Verify:	N
Verify File System:	Y
Maximum File Size:	Automatic
Compression:	Medium
Password:	N
Intelligent Copy:	Y
Power Saving:	N
Email On Success:	N
Email On Warning:	N
Email On Failure:	N
Total Selected:	41.55 GB
Current Time:	13/05/2021 14:48:53

Schedules

None

Retention Rules

Rules will be applied to all matching backup sets in the destination folder

Full:	Retain 12 full images Linked incremental and differential images will also be deleted
Differential:	Retain 4 differential images Linked incremental images will also be deleted
Incremental:	Retain 10 incremental images The oldest incremental images may be consolidated

Purge will be run after the image.

 [Advanced Options](#)

Help < Back Next > Cancel Finish

Click **Finish** to Run and/or save your Image definition.

Saving the backup definition

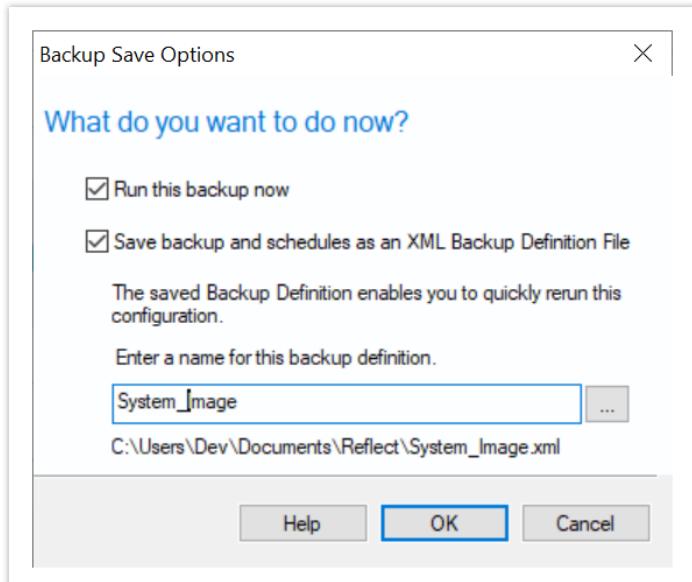
You are now given the opportunity to save the backup options.

The backup Save Options Dialog enables you to save your backup options as a re-usable XML definition file.



This is essential for many operations in Reflect including Scheduling and creating Incremental and Differential backups

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Option	Description
Run this backup now	Create a 'Full' backup now using the backup definition
Save to an XML file	Saving your definition enables you to: <ul style="list-style-type: none">• Re-run the same backup without stepping through the wizard• Run Incremental and Differential backups• Schedule your backups• Create a Desktop shortcut for running with one click
Name for this backup definition	Enter a meaningful name for this definition
	Choose a folder to save the XML definition to. Always save to a local folder. It isn't necessary to save the definition to the same folder as your backup target



Note: Always save your definition to a local drive and never to a password-protected network share.

See also: [Manually running a job from a configured XML backup definition](#)

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Best practices for saving Macrium Reflect backup definition files

Regardless of your PC environment, leaving your backup definition files in an insecure location is bad practice. The effort required to ensure your files are secure is minimal and doesn't impede day to day usage of Macrium Reflect.

What's the problem?

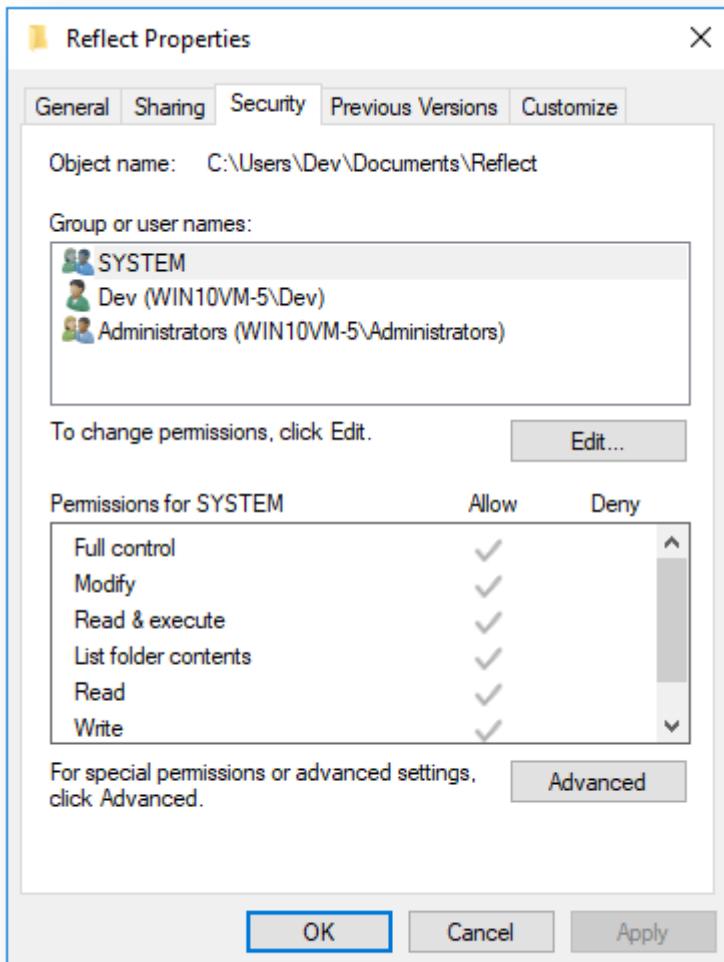
Backup definition (.xml) files are used to initiate backups either interactively by using Macrium Reflect directly, or as scheduled tasks using the Windows Tasks Scheduler. If you save your backup definitions to a publicly accessible folder then these can be edited by standard users and could potentially compromise your system. In addition, it's also possible to create batch files, either MS-DOS, PowerShell or VBScript, to automatically run during your backups as described [here](#). A restricted user with bad intentions could easily create a batch file to run with elevated privileges when a scheduled or interactive backup runs.

The default, and recommended, location for your backup definitions is folder '**C:\users\<USER NAME>\documents\reflect**'. When running Reflect for the first time this location is created and defaulted when saving. See [Backup Save Options](#) for more information on how to save your definitions.

This folder is automatically restricted for standard users and can only be accessed by Administrators and the local SYSTEM account.

To see assigned NTFS permissions **right click on any folder, select 'Properties' and click the 'Security' tab:**

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In the above example only SYSTEM, Dev (the Macrium Reflect user) and the Administrators group can access files contained in the folder. Standard users are denied access and cannot modify or create files.

We strongly recommend that, if not using the default location, you ensure that NTFS permissions are used to prevent unauthorised modification and creation of files in your backup definition folders.

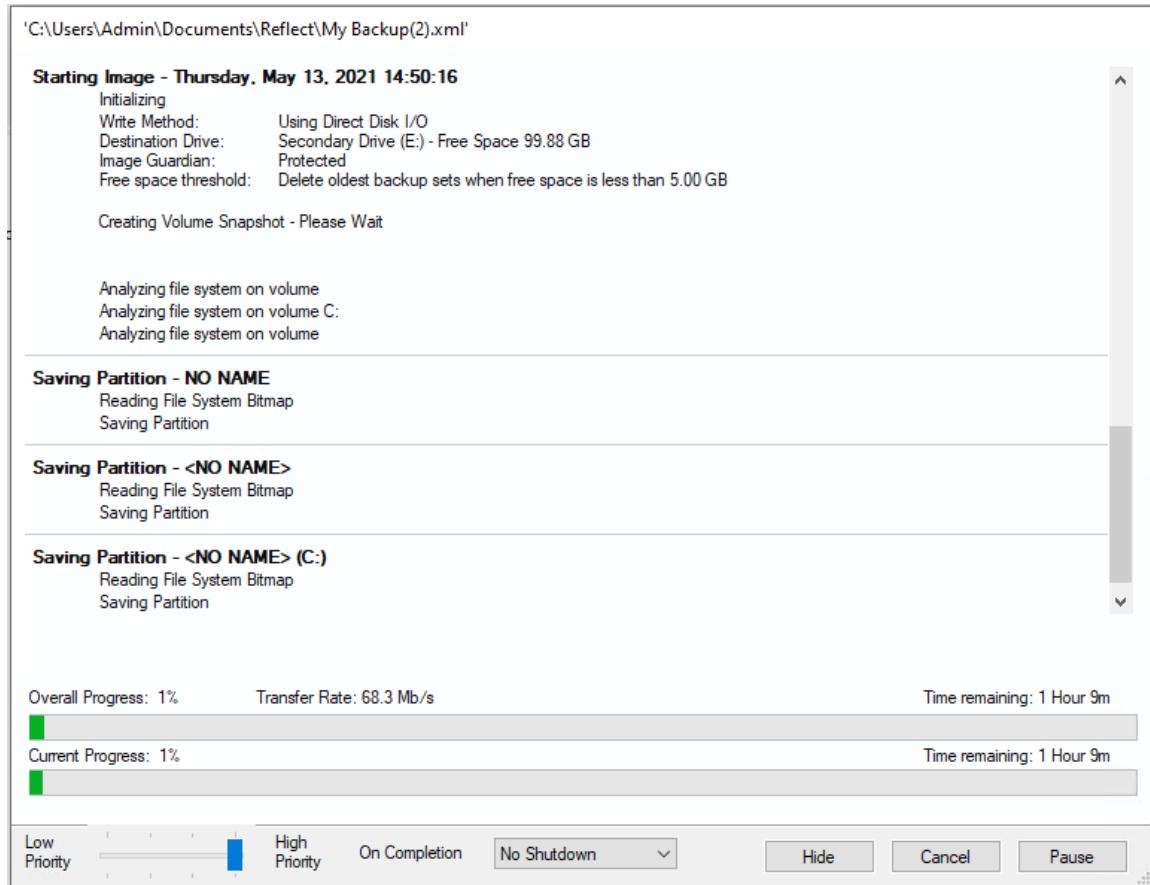
For more information on setting NTFS permissions for folders and files please see [Microsoft TechNet - How IT works NTFS Permissions](#)



Note: A popular misconception is that backup definition files should be saved to the same folder as your backup files. **This is incorrect.** Backup definitions are only required to create backups and have no other purpose. They are not required for restore.

If you want to run the backup at this point, select **Run this backup now** and click **OK**.

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Windows Partitions

The screenshot shows the 'Create Backup Tasks' dialog in Macrium Reflect. The tasks listed are:

- Image selected disks on this computer
- Create an image of the partition(s) required to backup and restore Windows** (this task is highlighted with a red box)
- Create a File and Folder backup

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UEFI booting systems with GPT style disks

Introduced with Windows 8.0 and a few Windows 7 systems, GPT disks are the replacement for the legacy MBR disk format. GPT disks can have up to 128 partitions and have a maximum size of 9.4 ZB (9.4×10^{21} bytes)

https://en.wikipedia.org/wiki/GUID_Partition_Table

Partition	Unique Identifier	Description
Windows Recovery	de94bba4-06d1-4d40-a16a-bfd50179d6ac	There may be more than one Recovery Partitions: Windows RE Tools - Provides the 'Startup Repair' options for Windows recovery. Recovery Image - There may also be an additional manufacturer system recovery partition.
EFI System partition (ESP)	c12a7328-f81f-11d2-ba4b-00a0c93ec93b	Always formatted FAT32 and between 200 and 300 MB in size, this partition contains the boot loader that runs when the system starts. The critical files in here are the Boot Configuration Data (BCD) and the EFI micro-code.
Microsoft Reserved Partition (MSR)	e3c9e316-0b5c-4db8-817d-f92df00215ae	Usually 128 MB in size, this unformatted partition is reserved for MS data structures including the Logical Disk Manager (LDM) for dynamic disks. Every GPT disk initialized by Windows includes this partition.
Operating System (Windows C:)	ebd0a0a2-b9e5-4433-87c0-68b6b72699c7	Always formatted using NTFS, this partition contains the full Windows Operating System and is loaded using the BCD in the ESP,



Note: The Microsoft Reserved Partition (MSR) is not shown in the Windows Disk Management Console

Surface Pro 3 running Windows 10

Legacy MBR booting systems

MBR systems support a maximum disk size of 2TB and up to four primary partitions. In modern PC's this format has been superseded by the more flexible GPT disk format.

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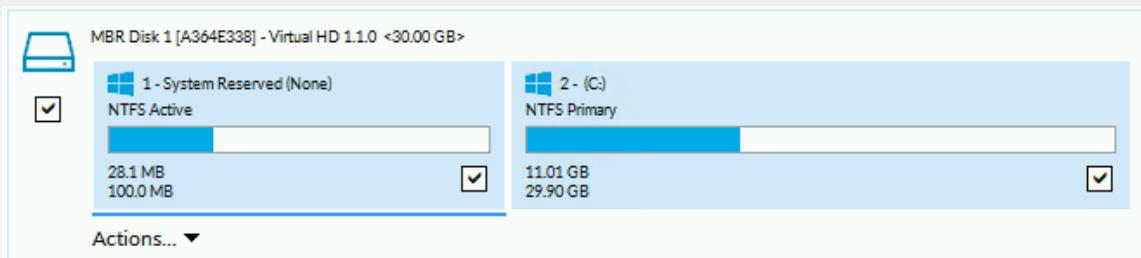
https://en.wikipedia.org/wiki/Master_boot_record

Partition	Description
Microsoft Reserved Partition (MSR)	For MBR disks, Windows 7 onwards, this is the 'Active' partition and contains the Boot Configuration Data (BCD). This partition provides the second stage for the MBR boot process after the MBR boot code. Windows XP and Vista do not use this partition.
Operating System (Windows C:)	This partition contains the full Windows Operating System. For Windows XP & Vista this is the 'Active' partition and is the only partition required to boot and start Windows.
WinRE Tools Partition	Windows 10 includes this small partition, usually located immediately after the Windows partition, to provide the 'Startup Repair' options for Windows recovery and to store the WinRE image file.

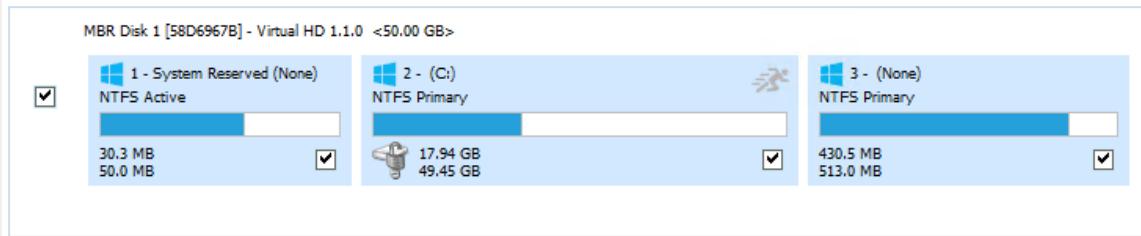


Note: MBR systems may also contain proprietary system recovery partitions, however, there are no unique identifiers for these partitions and they are not automatically included.

Windows 7 MBR System



Windows 10 MBR System

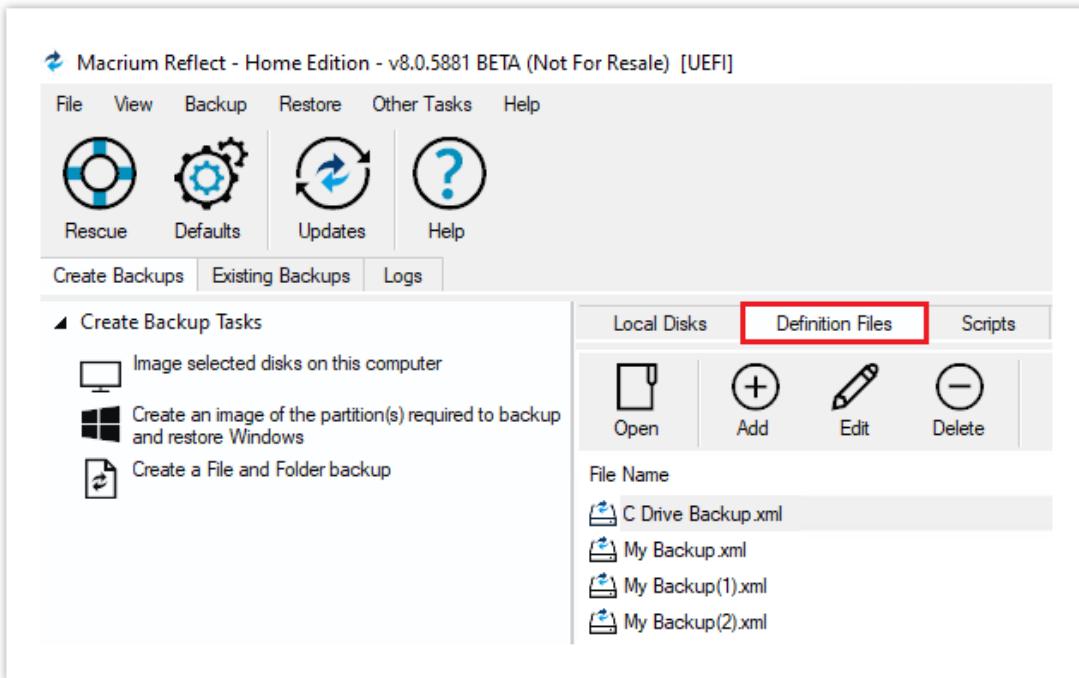


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Manually running a job from a configured XML backup definition

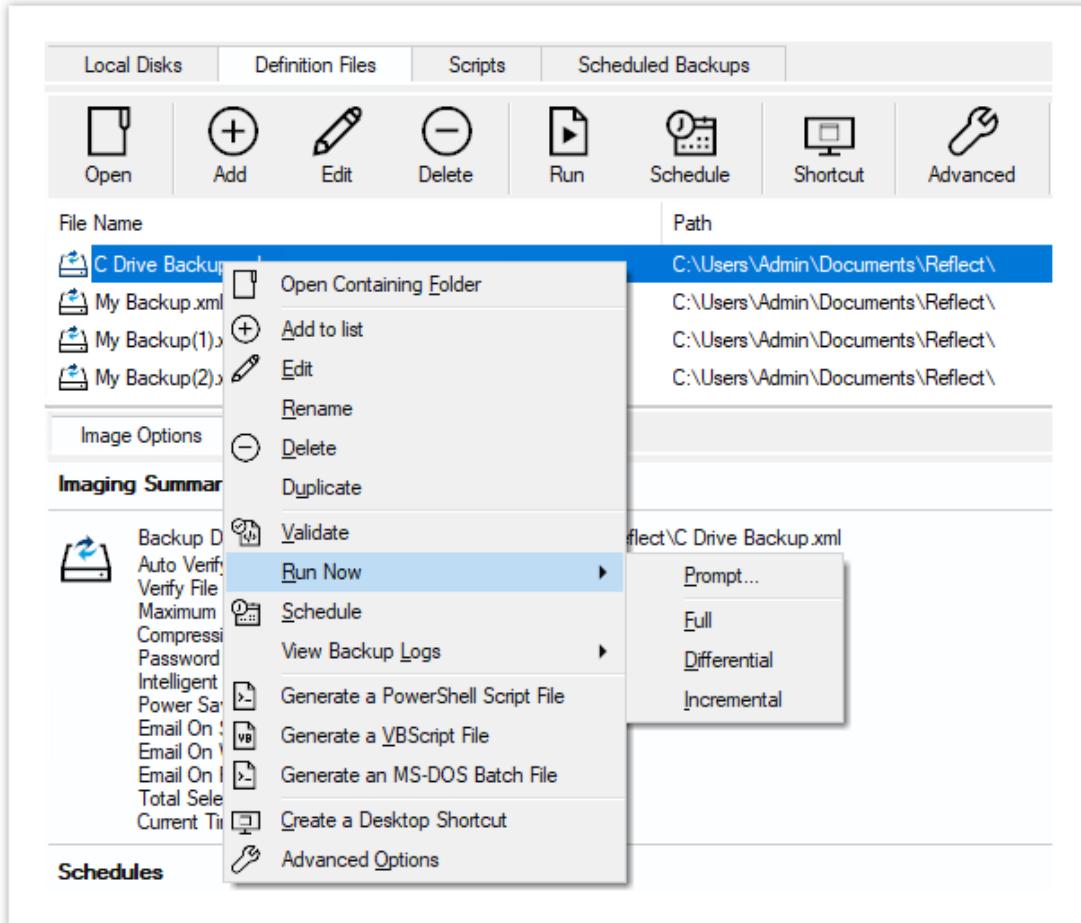
Macrium Reflect saves backup configurations using XML. Using an XML definition you can schedule a backup, generate a VBScript file for complex scenarios or simply create a desktop shortcut so you can instantly run your backup by clicking the shortcut icon.

1. Select **Definition Files**, to view your saved XML backup configurations.



2. Right-click on the XML file to view options including; **Run Now**, **Schedule**, or **Create a Desktop Shortcut**.

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How backup sets are created and maintained

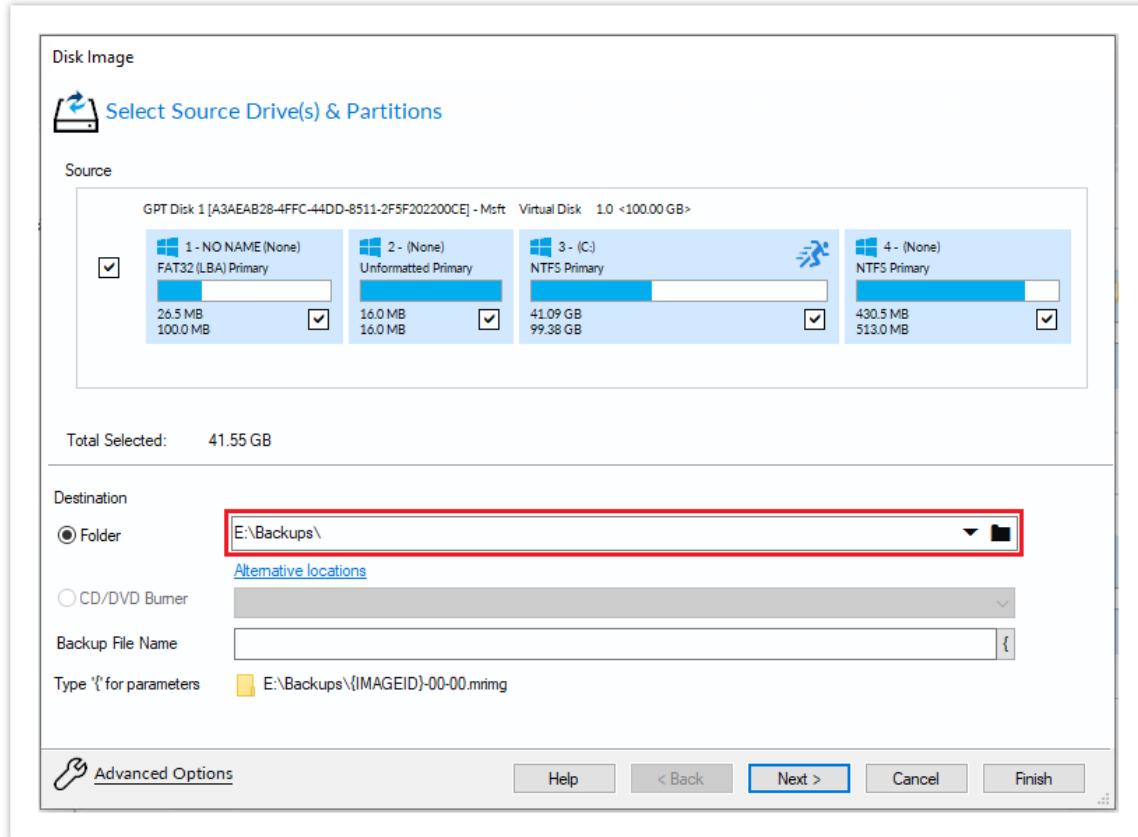
This article explains how Full, Incremental, and Differential images and backups are saved to the target folder specified in your backup definition file. Also, which backup set is chosen when you run a Differential or Incremental.

For information on how to create Incremental or Differential backups please see here: [Differential and incremental disk images](#)

How do I specify the backup target folder?

For disk images this is specified on the first page of the backup wizard:

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Similarly, for File and Folder backups, this is also on the first page of the backup wizard.

What is a backup set?

Backups are grouped into '**Sets**'. A backup set contains first a **Full backup** and subsequent **linked Incremental and Differential backups**. This is sometimes referred to as a **Backup Chain**. You can see the links by looking at the default file name which is a unique backup set identifier, followed by a number pair:

Name	Date modified	Type	Size	Backup Comment	Backup Method
MacriumBackup	01/05/2021 09:49	File folder			
0F1605B697787977-00-00	30/04/2021 14:10	Disk Partition image	9,750,075 KB		Full
5D7EE1AC6372E102-00-00	30/04/2021 18:52	File and folder backu...	704 KB		Full
A1A611C627D5BC2A-00-00	30/04/2021 13:13	Disk Partition image	442,076 KB		Full
A1A611C627D5BC2A-01-01	30/04/2021 13:13	Disk Partition image	4,140 KB		Incremental
A1A611C627D5BC2A-02-02	30/04/2021 19:29	Disk Partition image	4,223 KB	Backup of SSD	Incremental
A1A611C627D5BC2A-03-03	01/05/2021 10:14	Disk Partition image	8,818 KB		Incremental
A1A611C627D5BC2A-04-04	01/05/2021 10:15	Disk Partition image	4,140 KB		Incremental
A1A611C627D5BC2A-05-05	01/05/2021 10:15	Disk Partition image	4,140 KB		Incremental
A1A611C627D5BC2A-06-06	01/05/2021 10:15	Disk Partition image	4,141 KB		Incremental

The above folder contents show (marked in red) a single backup set **{A1A611C627D5BC2A}** which

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contains a full image and 4 increments. The end of the image file contains a number pair? '**xx-yy.mrimg**'

'**xx**' is the increment number.

00 - Full image

01 - first incremental/differential

02 - Second incremental/differential

'**yy**' is the file number and is always sequential. **00, 01, 02, 03...** . This will be different from the increment number only if files have been split. This can happen if files larger than 4GB are saved to a FAT32 file system or you are saving an image to multiple DVDs.

So the first file for a full image always ends with '**00-00.mrimg**'.

Note: The Image ID, file, and increment numbers are also stored as data inside the files. **Renaming a file does not affect the integrity of the set, Macrium Reflect's ability to append to the set, or restoration of the files.**

How is a set chosen when an Incremental or Differential backup is run?

Each backup set is grouped by similar backup types. This means that a single set will only consist of images of ***exactly the same partitions** or a File and Folder backups of **exactly the same selection criteria**.

Note: A change in partition layout will cause a new backup set to be created even if the drive letters are consistent. The partitions must have the same disk offset and length and must be from the same disk, i.e, the disk must have the same Disk ID.

e.g, If you run an Incremental image of **only drive 'C'** and the target folder contains 4 image files:

6698CD700DF88DF4-00-00.mrimg Drives: **C, D, E** Created **1st Jan 2015**

430D57E2CEEA8552-00-00.mrimg Drive: **F** Created **2st Dec 2014**

1EB1112ABA7C3898-00-00.mrimg Drive: **C:** Created **1st Nov 2014**

D407A9E1BF98D822-00-00.mrimg Drive: **C:** Created **1st Oct 2014**

Then the newly created image file will be **1EB1112ABA7C3898-01-01.mrimg**. This is because file **1EB1112ABA7C3898-00-00.mrimg** is the most recent full image in the target folder that contains exactly the same partitions as the current Incremental image. The next Incremental (or Differential) image would be **1EB1112ABA7C3898-02-02.mrimg** and so on...

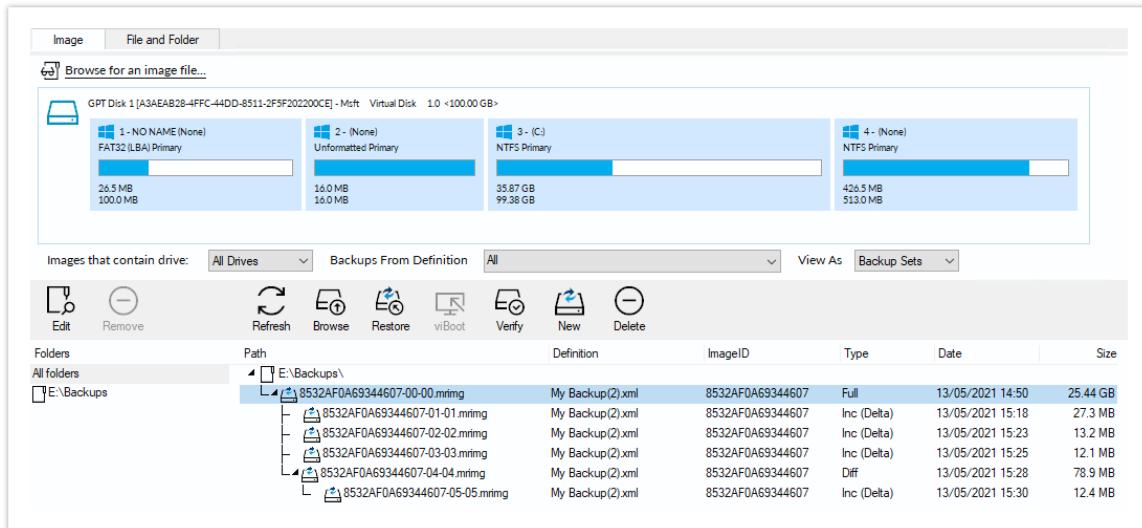
Note: If there was no existing backup set that contained only drive 'C:' then a new backup set (full) would be created.

Doesn't this get confusing if multiple backup types are saved to the same folder?

Not if you use the '**Existing Backups**' tab in Macrium Reflect to view your images to mount and/or restore. The Restore Tab can be restricted to show only images that contain a particular drive and also be sorted by date. So, if you want to restore drive 'C' as it was last week then you can easily find it. In fact, Backup Sets are an abstraction that you don't need to worry about when restoring data, they are only relevant to optimizing backup speed and

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storage space.



Note: If you want to organize your backup sets so they are easier to find in Windows Explorer then we recommend that you save different backup types to different folders. e.g.

D:\Backups\Images of C

D:\Backups\Images of D

D:\Backups\Images of Disk 1

Additional Information

A differential backup saves **only the changes** made since the **last full** backup of the **same type** found in the target folder for the backup.

An incremental backup saves **only the changes** made since the **last** backup of the **same type** found in the target folder for the backup.

See also:

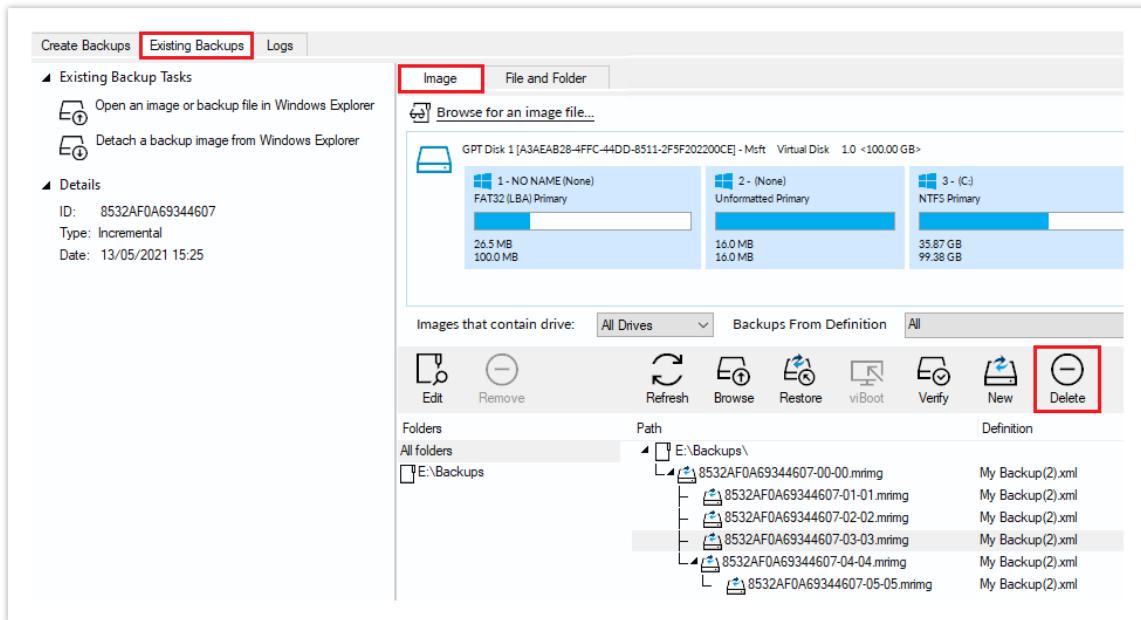
- How to delete backup files

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How to delete backup files

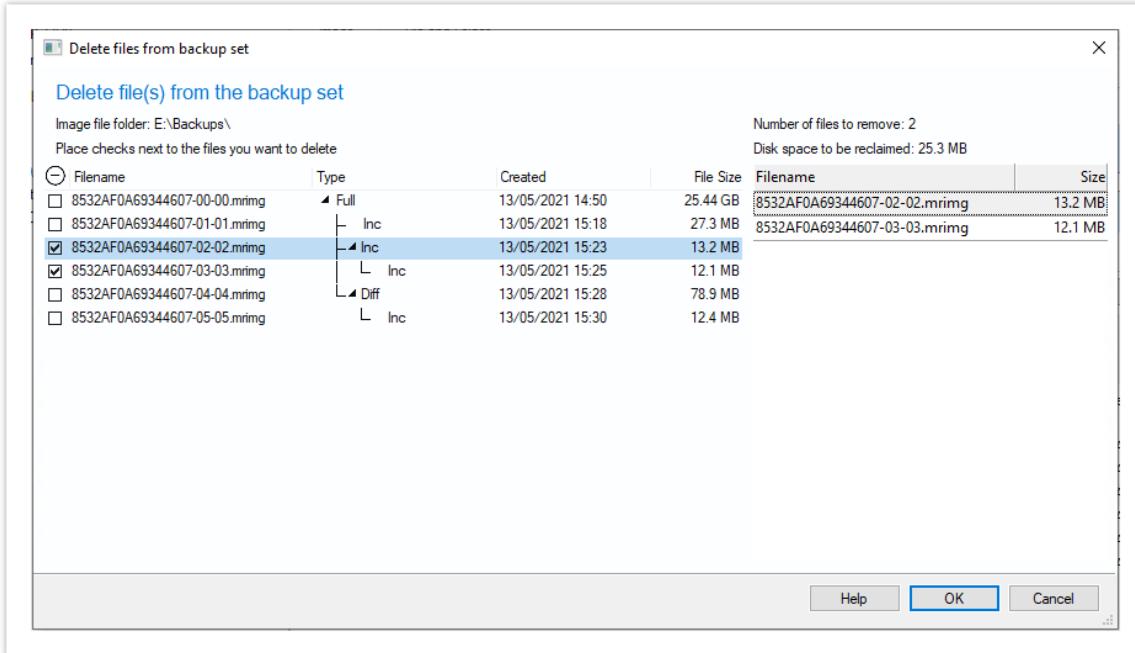
If you create only Full images or Full File and Folder backups then you can safely delete your .mrimg or .mrbak files using Windows Explorer. However, if you create Differential and/or Incremental backup files then we suggest that you use the functionality built into Reflect to avoid breaking backup chains. For more information please see [How backup sets are created and maintained](#).

Select the **Existing Backups** tab, select either **Image** or **File and Folder**, select the file you want to delete, and click the **Delete** icon.



This opens the **Delete file(s) from the backup set** dialog to safely delete backup files:

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Along with the select file, any dependant files will automatically be included for deletion. In the above example Incremental image '8532AF0A69344607-03-03.mrimg' was also selected because it is dependant on the previous incremental 8532AF0A69344607-02-02.mrimg.

Backing up files and folders

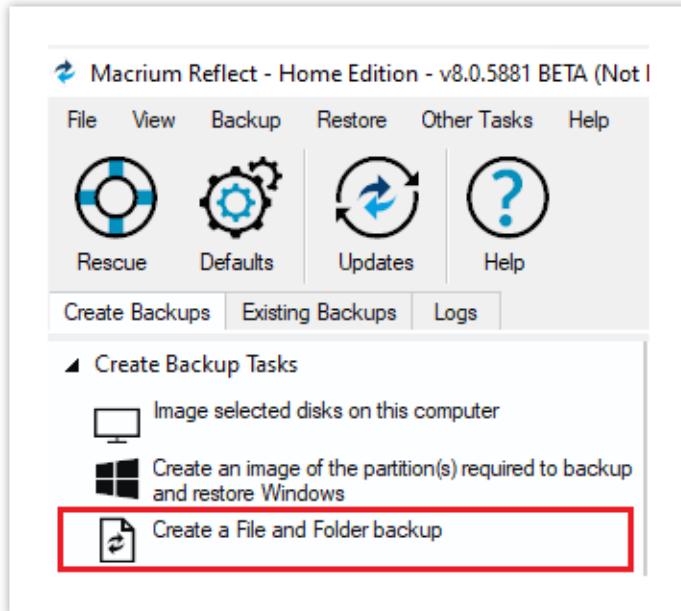
A file and folder backup is a useful way to backup your working files, personal files, and precious data. Unlike other backup solutions, Macrium Reflect can backup open and locked files by using Microsoft Volume Shadow Copy Service (VSS). You can backup your Documents folder and save the backup as an XML file for easy re-running and scheduling.



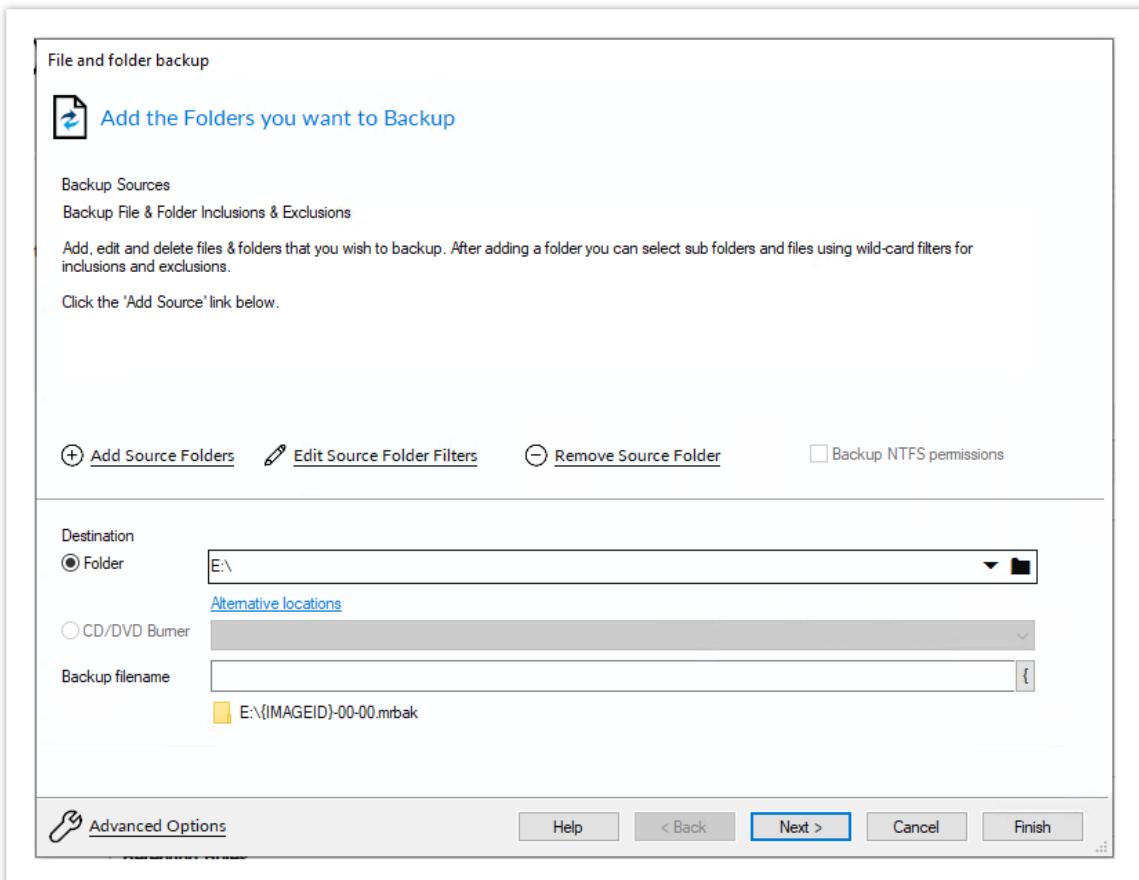
To backup your Windows operating system, do not use a file and folder backup, use an image backup, see [Creating a backup of your computer](#). A file and folder backup is not suitable for restoring your Windows operating system.

1. From the **Create Backup Tasks** taskbar, select **Create a File and Folder backup** to start the backup wizard.

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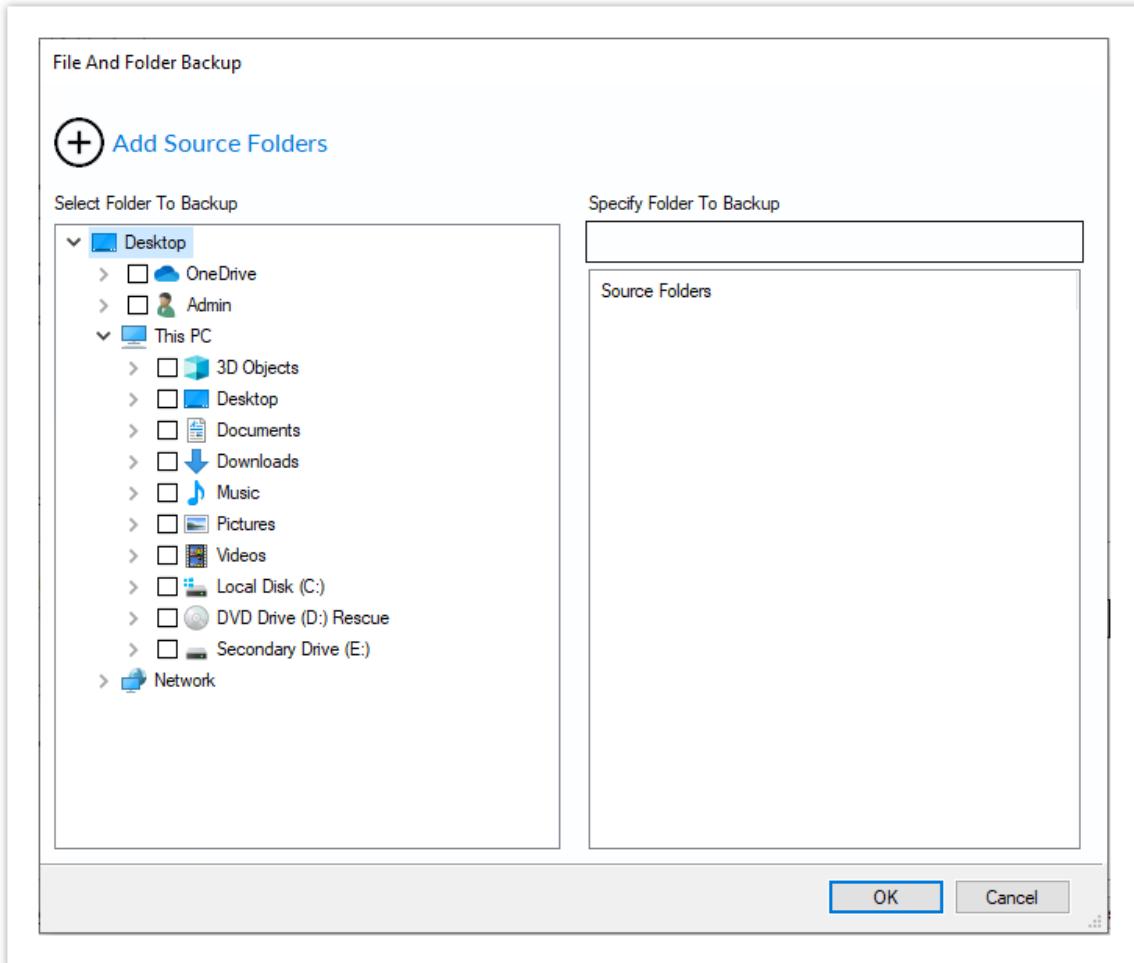


2. Select Add Source Folders.



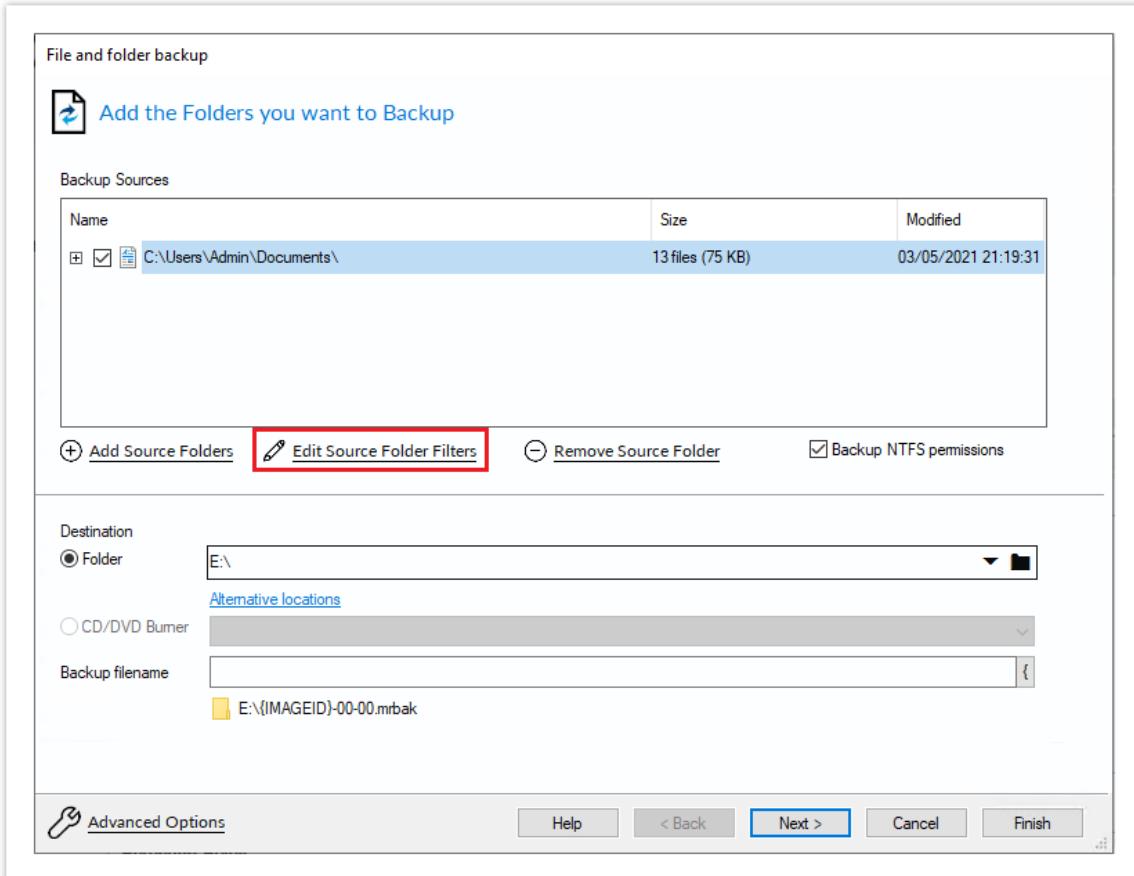
The **Add Souce Folders** dialog appears.

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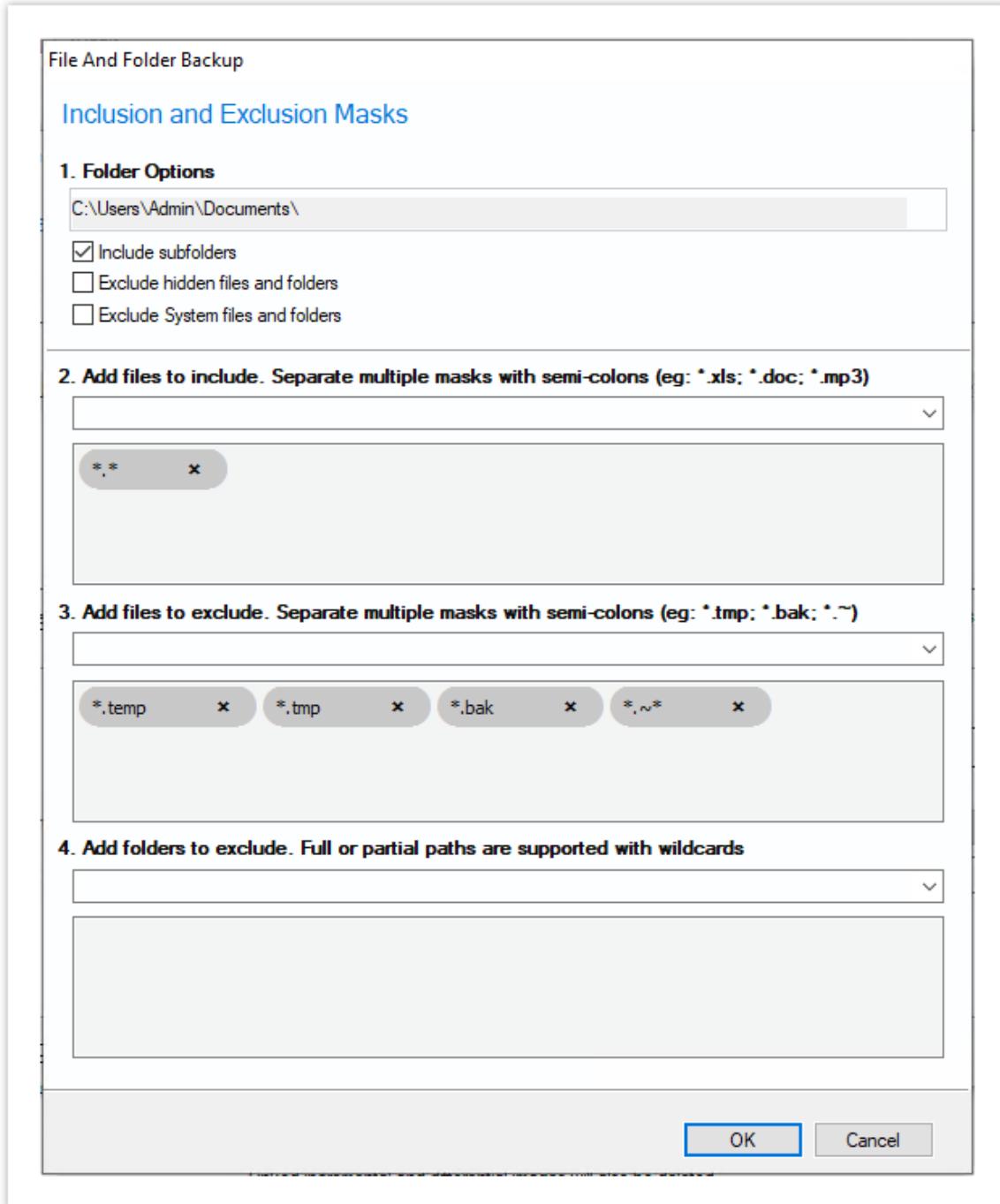
Select the folder you want to backup, or the folder containing the files you want to backup.

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Select the Edit Souce Folder Folders icon to change the filters that will be applied to the selected folder,

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Several different masks and wildcards can be specified to include specific files within the given directory or exclude other files.

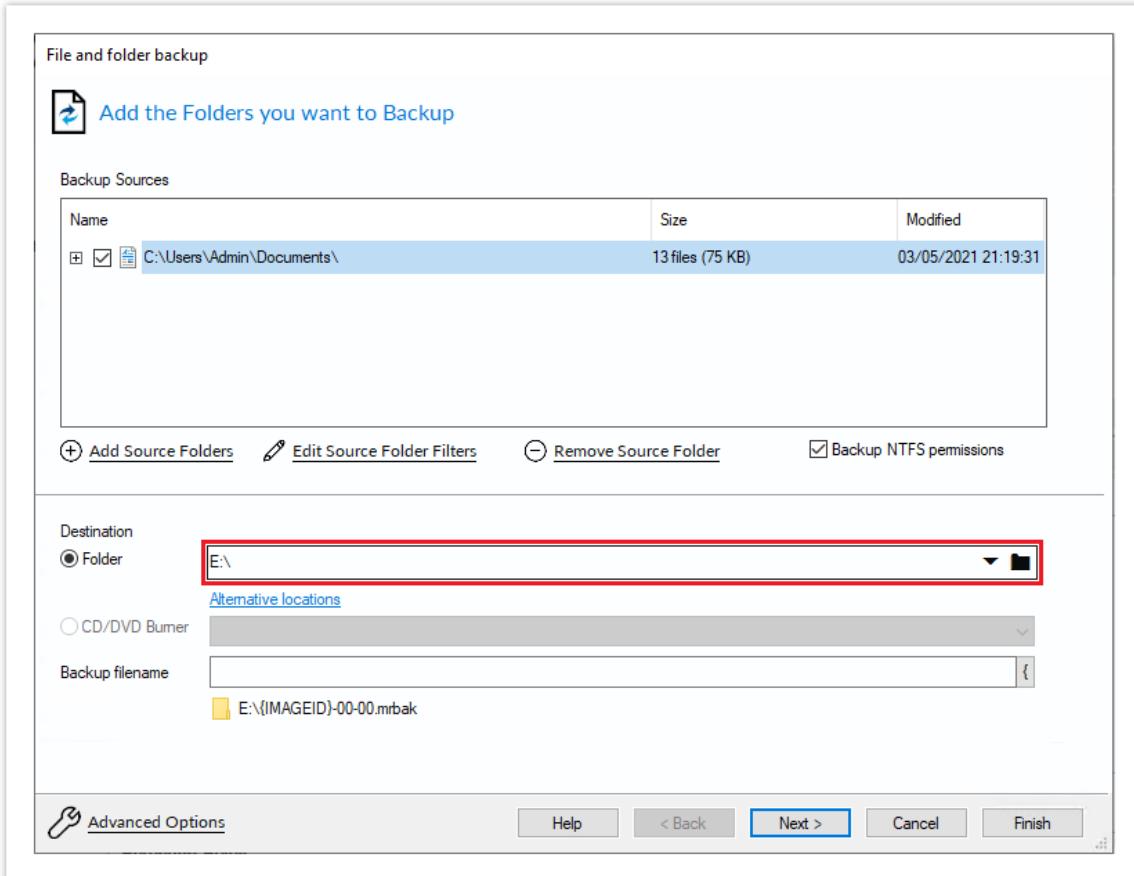
Option	Description
Include subfolders	Recurse all folders below the backup folder using the specified filters
	Do not backup files or folders that have the Hidden attribute

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Option	Description
Exclude hidden files and folders	
Exclude system files and folders	Do not backup files or folders that have the System attribute
Add files to include	Add a semi-colon separated list of file name filters to include in the backup. Use the asterisk * character as a wild card. For example: *.doc; *data*; *.xls
Add files to exclude	Add a semi-colon separated list of file name filters to exclude from the backup. Use the asterisk * character as a wild card. Note: Exclude filters take precedence over include filters
Add any folders to exclude	Add a semi-colon separated list of folder name filters to exclude from the backup. Use the asterisk * character as a wild card. Filter names can be full path and/or folder names. For example: *temp* will exclude all folders with the letters 'temp' anywhere in the folder name \data\temp* will exclude all paths where the folder name begins with 'temp' that has a parent folder named 'data'

3. Click **OK**
4. Repeat to add further individual directories if necessary.
5. In the **Destination** section, specify where you want the backup to be made.

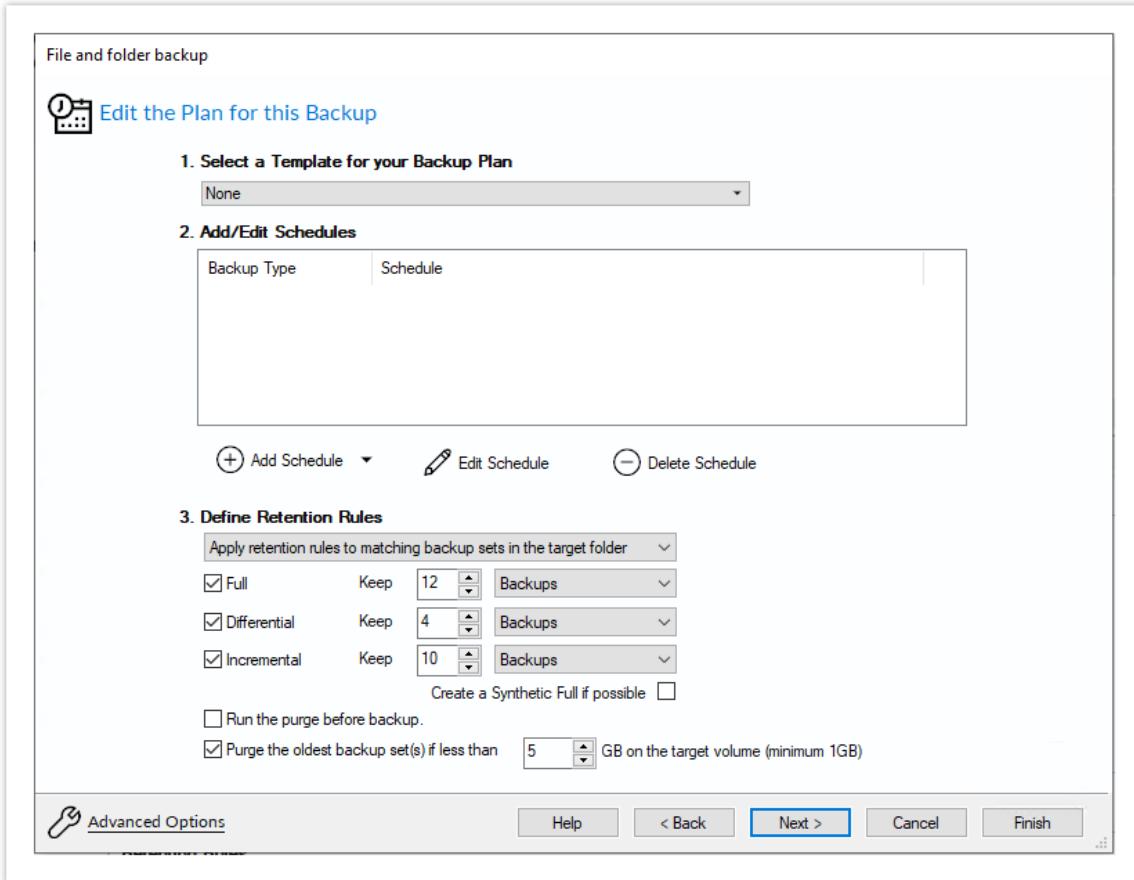
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Alternative Locations can be used to provide backup rotations or as a fail-safe for temporary unavailability of the primary backup destination.

6. When you have finished adding folders and making all necessary changes, click **Next**.
7. The Backup Plan Page is shown:

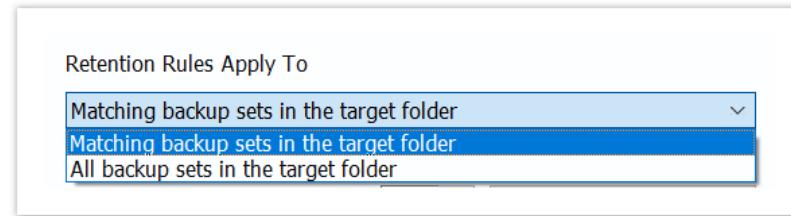
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Macrium Reflect retention rules provide a powerful and flexible way to manage the lifetime and storage space used by your backups.

Choose how backups are matched, and how retention rules are applied to the target folder

Retention rules are applied to the target folder of the backup by selecting one of two options:



Similar backup sets in the target folder.	<p>Disk Images are purged if they contain exactly the same Partitions as the current Image. Partitions are identified using the unique Disk ID stored in sector 0 of the disk and the Partition sector offset. Note: For GPT disks the unique GPT disk GUID is used instead of the Disk ID</p> <p>For File and Folder backups retention rules are applied according to the File and Folder 'Backup Set Matching' selection.</p>
	All backup sets in the target folder of the same type (Disk Image or File and Folder) are purged according the retention rules.

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All backup sets in the target folder.

Select the age or number of backup types that you wish to keep

Retention Rules Apply To

Matching backup sets in the target folder

Full Keep 12 Backups

Differential Keep 4 Backups

Incremental Keep 10 Backups

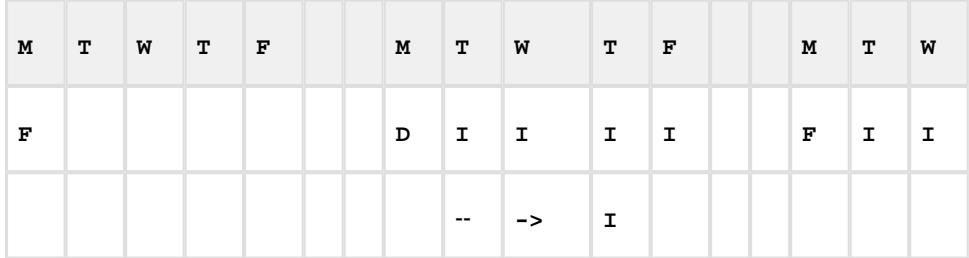
Create a Synthetic Full if possible

Purge before a backup

Purge oldest backup set(s) if less than GB on the target volume

Option	Description
Full	When deleting Full backups all linked incremental and Differential backups in the same backup chain (set) are also deleted. This operation will delete the entire backup set.
Differential	When deleting Differential backups all linked incremental backups in the same backup chain (set) are also deleted.
Incremental	When deleting Incremental backups the integrity of the backup set is maintained by ensuring that the chain is never broken. This is achieved by merging older Incremental backups when required. In the example below, before retention, there is 1 Full backup , 1 Differential backup and 6 Incremental backups. The retention rules are set to retain 4 incremental backups. After retention, the most recent 4 incremental backups are retained. Deleting the oldest 2

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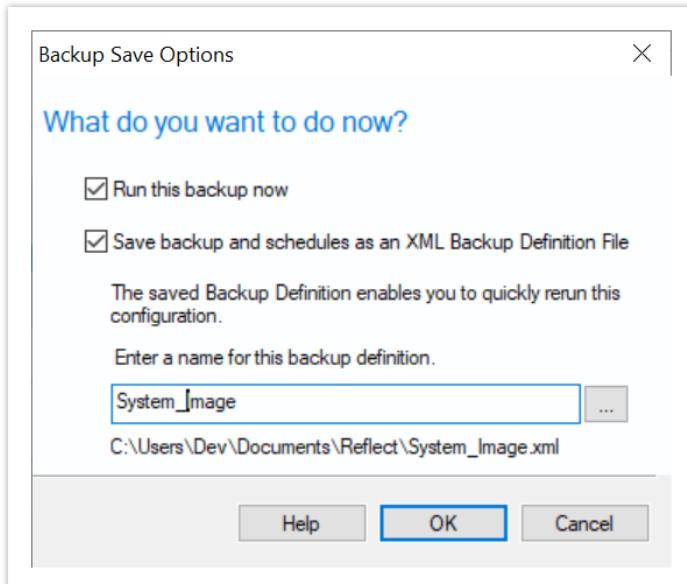
Option	Description
	<p>incrementals would cause the backup chain to be invalid as the oldest retained incremental requires the previous 2 incremental backups to complete the chain. To ensure backup integrity the 2 older incremental backups are consolidated with it to create a new incremental backup.</p> <p>F = Full D = Differential I = Incremental</p> 
Create a Synthetic Full if possible	<p>When purging Incremental backups, if the backup set only contains a Full backup followed by Incremental backups, then this option causes the Full backup to be 'rolled forward' to create a Synthetic Full backup. This is also known as Incremental Forever.</p>
Run the purge before the backup	<p>Select this option to run the retention rules before the current backup.</p> <p>Note: in Macrium Reflect v5 the current backup set wasn't included in the purge calculation when purging before the current backup. In v6 the current backup set IS included. This means that if you set the retention count to 1 Full backup then all of your backups will be deleted and a new Full backup created.</p>
Delete oldest backup set (s) if less than n GB	<p>Automatically remove the oldest backup set(s) in the target folder if the free space on the drive drops below the GB threshold.</p> <p>Note: The free space threshold is actioned dynamically. If the free space available drops below the threshold then the running backup is temporarily paused while older backup sets are purged.</p>

8. The summary screen gives the details of what is being backed up. Click **Finish**.
9. You are now given the opportunity to save the backup options.

The backup Save Options Dialog enables you to save your backup options as a re-usable XML definition file.

 This is essential for many operations in Reflect including Scheduling and creating Incremental and Differential backups

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Option	Description
Run this backup now	Create a ' Full ' backup now using the backup definition
Save to an XML file	Saving your definition enables you to: <ul style="list-style-type: none">• Re-run the same backup without stepping through the wizard• Run Incremental and Differential backups• Schedule your backups• Create a Desktop shortcut for running with one click
Name for this backup definition	Enter a meaningful name for this definition
	Choose a folder to save the XML definition to. Always save to a local folder. It isn't necessary to save the definition to the same folder as your backup target <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;">i Note: Always save your definition to a local drive and never to a password-protected network share.</div>

See also: [Manually running a job from a configured XML backup definition](#)

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Best practices for saving Macrium Reflect backup definition files

Regardless of your PC environment, leaving your backup definition files in an insecure location is bad practice. The effort required to ensure your files are secure is minimal and doesn't impede day to day usage of Macrium Reflect.

What's the problem?

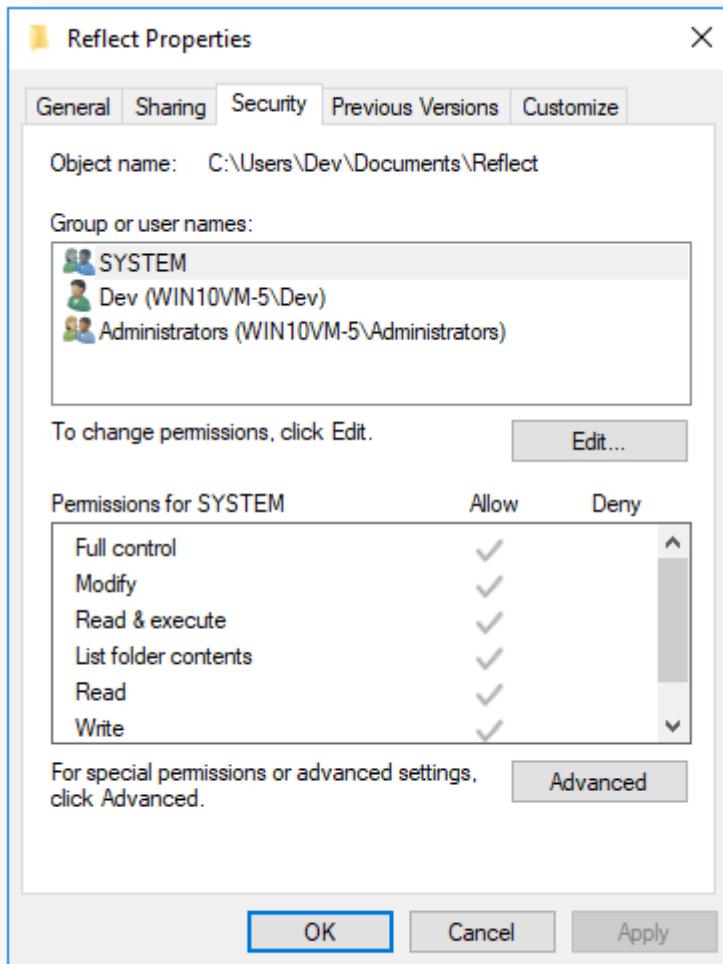
Backup definition (.xml) files are used to initiate backups either interactively by using Macrium Reflect directly, or as scheduled tasks using the Windows Tasks Scheduler. If you save your backup definitions to a publicly accessible folder then these can be edited by standard users and could potentially compromise your system. In addition, it's also possible to create batch files, either MS-DOS, PowerShell or VBScript, to automatically run during your backups as described [here](#). A restricted user with bad intentions could easily create a batch file to run with elevated privileges when a scheduled or interactive backup runs.

The default, and recommended, location for your backup definitions is folder '**C:\users\<USER NAME>\documents\reflect**'. When running Reflect for the first time this location is created and defaulted when saving. See [Backup Save Options](#) for more information on how to save your definitions.

This folder is automatically restricted for standard users and can only be accessed by Administrators and the local SYSTEM account.

To see assigned NTFS permissions **right click on any folder, select 'Properties' and click the 'Security' tab:**

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In the above example only SYSTEM, Dev (the Macrium Reflect user) and the Administrators group can access files contained in the folder. Standard users are denied access and cannot modify or create files.

We strongly recommend that, if not using the default location, you ensure that NTFS permissions are used to prevent unauthorised modification and creation of files in your backup definition folders.

For more information on setting NTFS permissions for folders and files please see [Microsoft TechNet - How IT works NTFS Permissions](#)



Note: A popular misconception is that backup definition files should be saved to the same folder as your backup files. **This is incorrect.** Backup definitions are only required to create backups and have no other purpose. They are not required for restore.

If you want to run the backup at this point, select **Run this backup now** and click **OK**.

Cloning a disk

It is possible to clone an entire hard drive or specific partitions on a hard drive. This is useful if you are upgrading to a larger hard drive. With Macrium Reflect you can boot the target disk on the same system after cloning. Cloning your hard drive creates a bootable new hard drive with the state of your computer at the time you undertook the clone. You can clone to a hard drive installed in your computer or to a hard drive installed in a USB Drive Caddy.

i Important

Windows cannot boot from a USB-connected drive. This is a restriction imposed by Microsoft. If you clone your system disk to a USB-connected external drive then, to boot your clone, the physical disk must be removed from the USB caddy and attached internally.

Deleting and re-configuring existing partitions or configuring new partitions is possible with Macrium Reflect, so you don't need to do this prior to cloning.

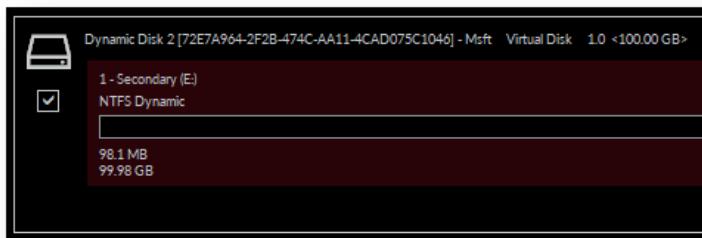
Show important information about MS Dynamic Volumes...



A **Dynamic volume** is a logical abstraction of the underlying physical disk and maybe striped or extended over multiple physical disks. Because of this, **Dynamic volume file systems are copied** not disk partitions.

For more information see

If your source disk contains Dynamic Volume(s) then the background color will change and the link will show 'Copy Dynamic Volumes...':



[Copy dynamic volumes...](#)

In the Clone Wizard:

- The **partition selection checkboxes** and **Copy selected partitions link** will not be available. Therefore, **Dynamic Volumes must be dragged and dropped** to the destination.
- To copy source Dynamic Volume(s) to destination Dynamic Volume(s) you must prepare the target as Dynamic and format the destination volume(s) in advance of the clone operation. This can be achieved using the Windows Disk Management Console to convert one or more physical disks to Dynamic.

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- A destination Dynamic Volume cannot be resized so the **Cloned partition properties link will not be available** if the destination is Dynamic.
- To convert Dynamic Volume(s) to standard partitions, select an unformatted or an MBR/GPT basic disk as the destination and use Drag and Drop to copy the source volumes. After the clone operation, you can leave the disk as a 'Basic' disk or convert it to Dynamic using the Windows Disk Management Console.

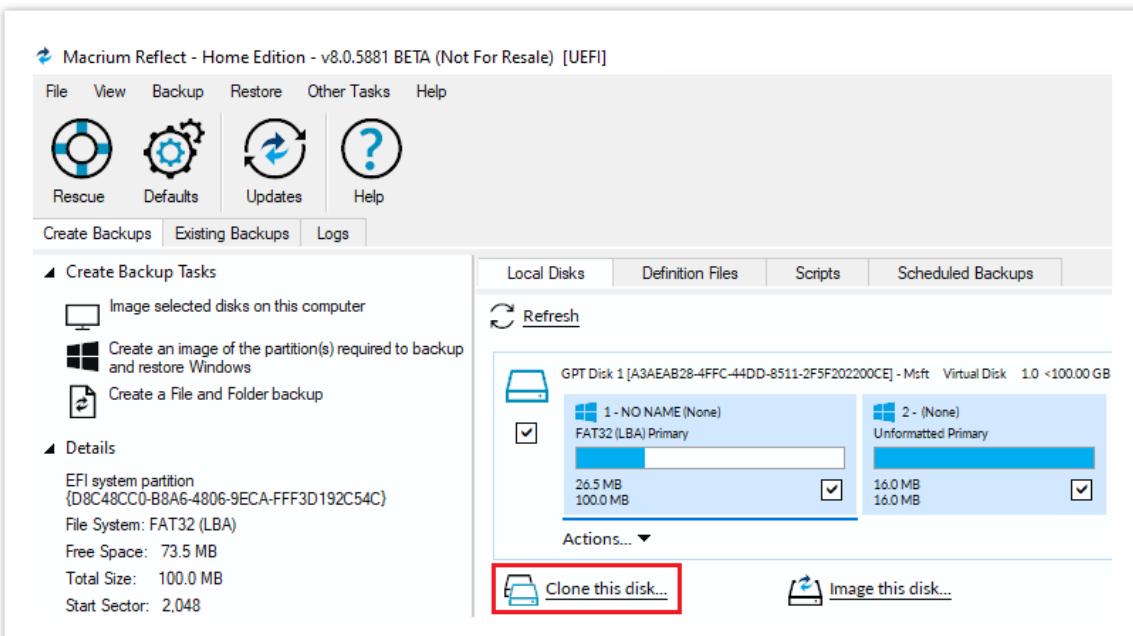
See also: [Bare metal restore of a Dynamic disk system](#)



Macrium reflect v8 adds additional partiton resizing and automation options when cloning and restoring.

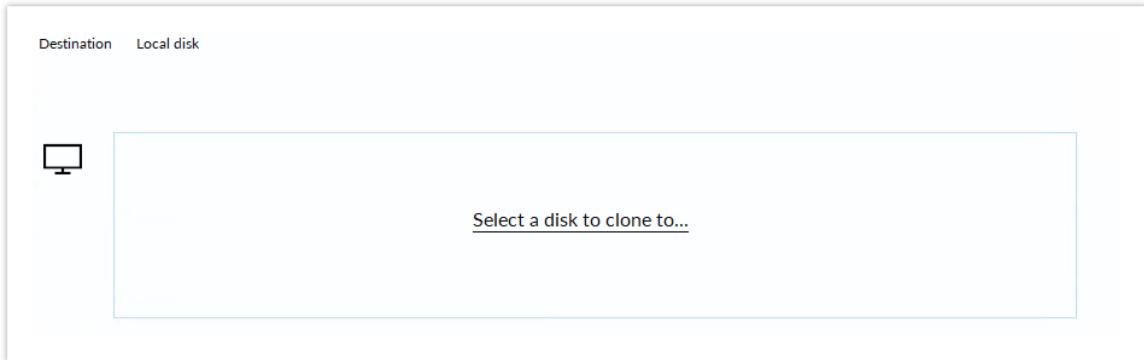
For more complex scenarios where partitions are resized and moved on different disk sizes, please see [Restore and Clone Partition Layout](#)

1. Select the disk to clone from in the main application window and click **Clone this disk...**



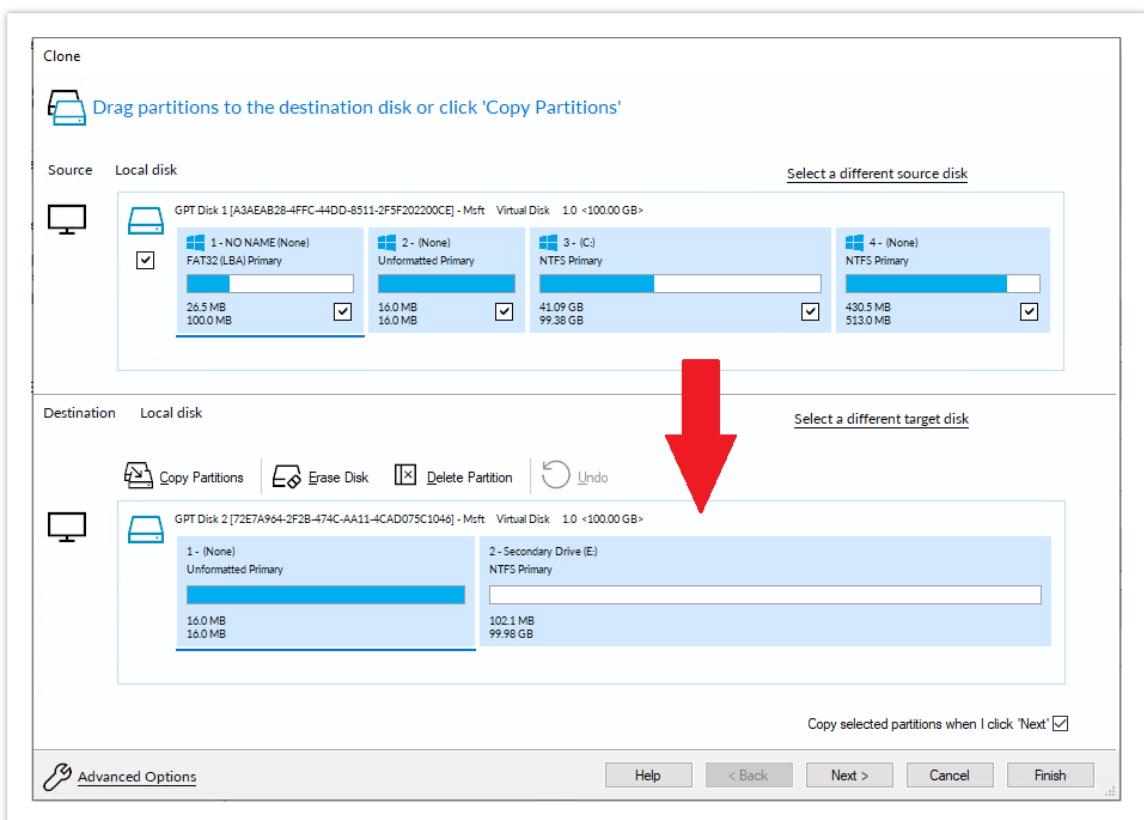
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2. In the wizard that opens Click **Select a disk to clone to...**



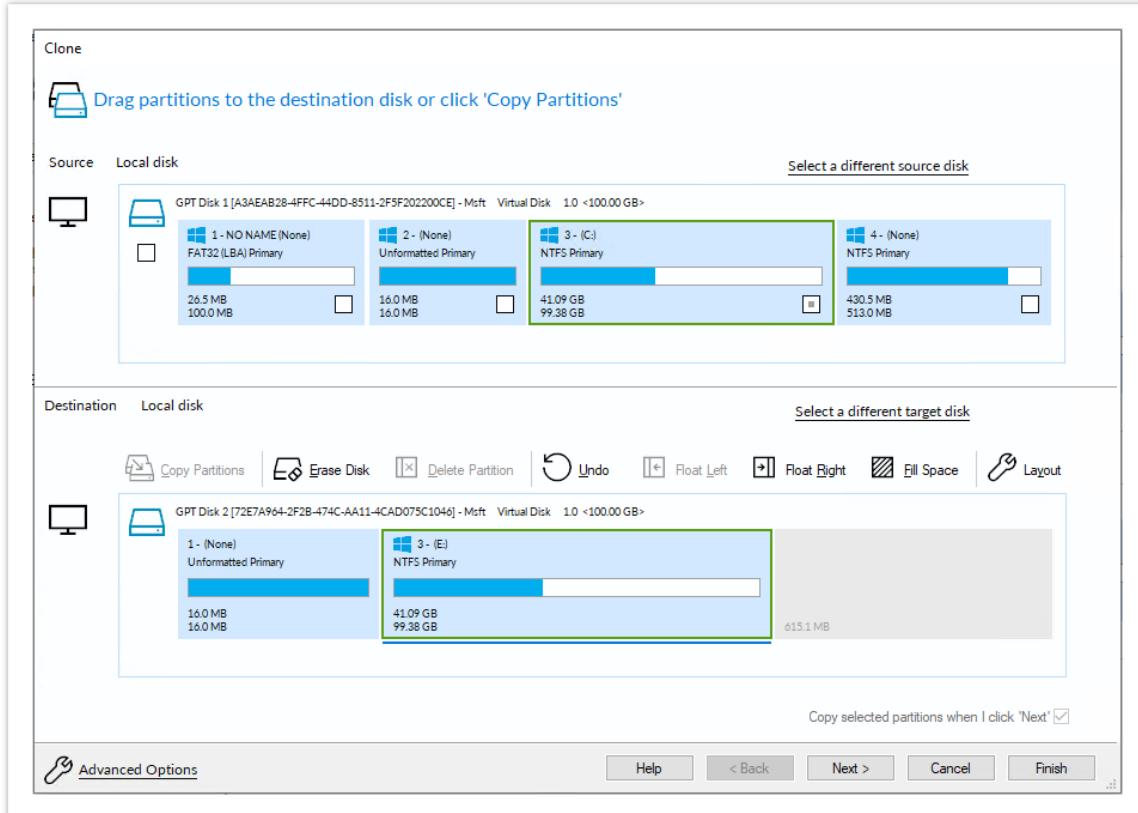
3. Select the clone target disk. In this case, there is only one disk available.
4. If you do not want to modify the order or size of partitions of the clone, **click Next**. This is the default behavior.

Alternatively, drag the partitions you want to clone, the red arrow below shows this.



Becomes

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In this example, there is 650MB of free space after the copied partition. You can modify the size of each partition to fit the new disk if required.

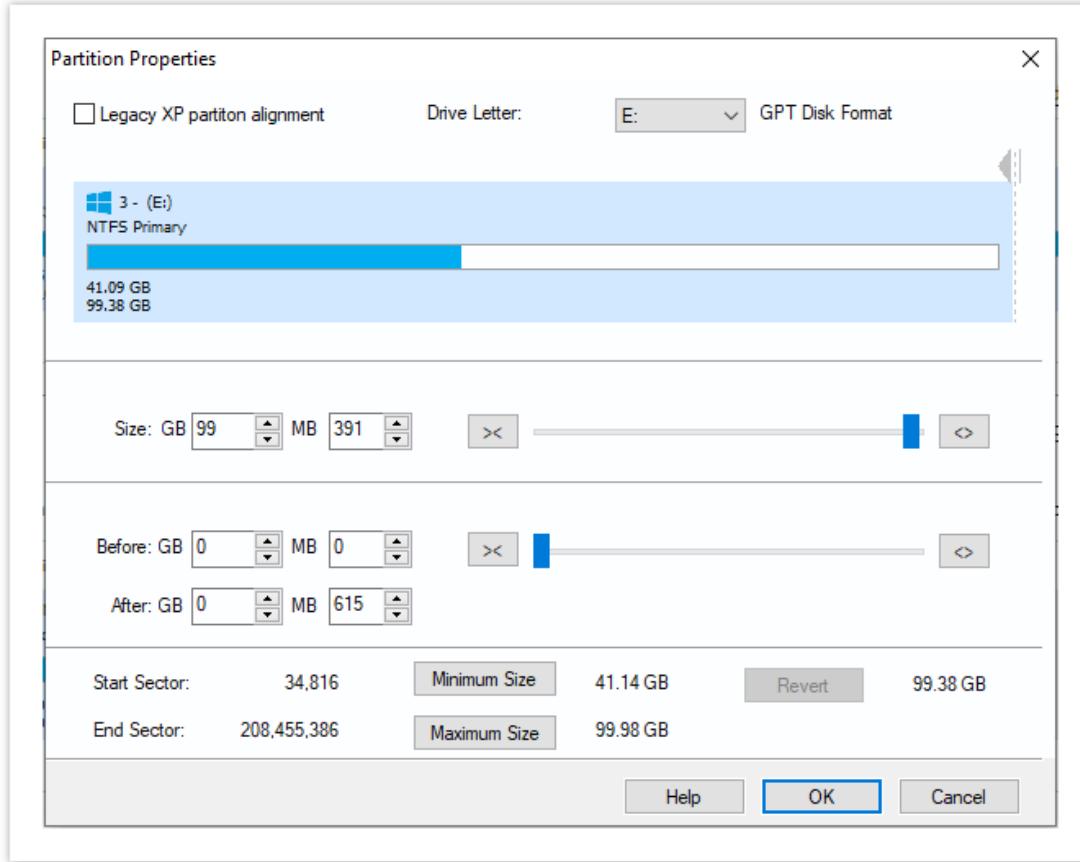
i You can delete partitions on the target disk by selecting and clicking '**Delete existing partitions**'..

5. To extend the partition to make use of the remaining space on the destination, click **Fill Space**.

You can open the more detailed **Partition Properties** dialogue by selecting a partition on the destination then clicking **Layout**. Using the Partition Properties dialogue you can:

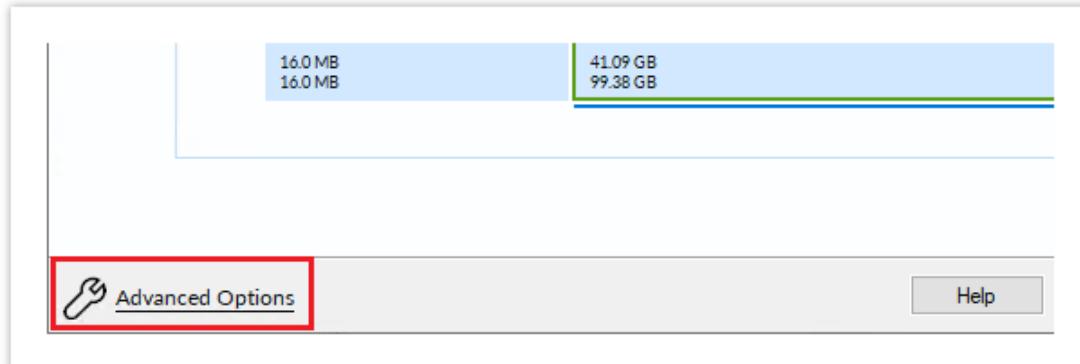
- Set the partition size precisely using the **Partition Size** entry box.
- Resize the partition automatically by clicking **Maximum size** or **Minimum size**. You can set the partition back to the original size by clicking **Revert**.

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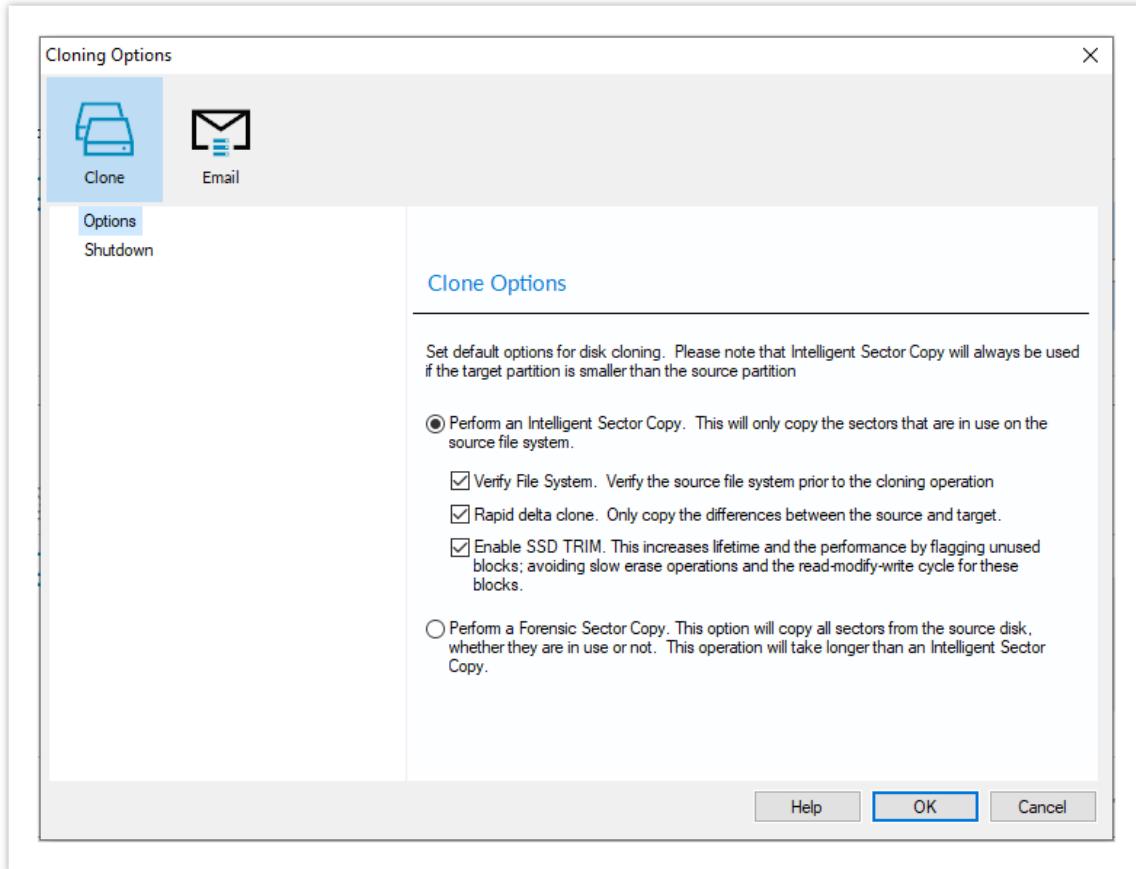


6. Click **OK**.

7. If required, click **Advanced Options** to change settings for this clone:



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Option	Description
Intelligent sector copy	Copy only file system sectors/clusters that are in use. This reduces the time to create the clone as unused file system clusters are not copied.
Verify File System	Verifying the file system prior to cloning ensures that there are no file system errors transferred to the clone. <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;">i Please note that this may take several minutes to complete</div>
Rapid Delta Clone	Copy only file system differences between the clone source and target. This increases cloning speed dramatically. Show more information on RDC...

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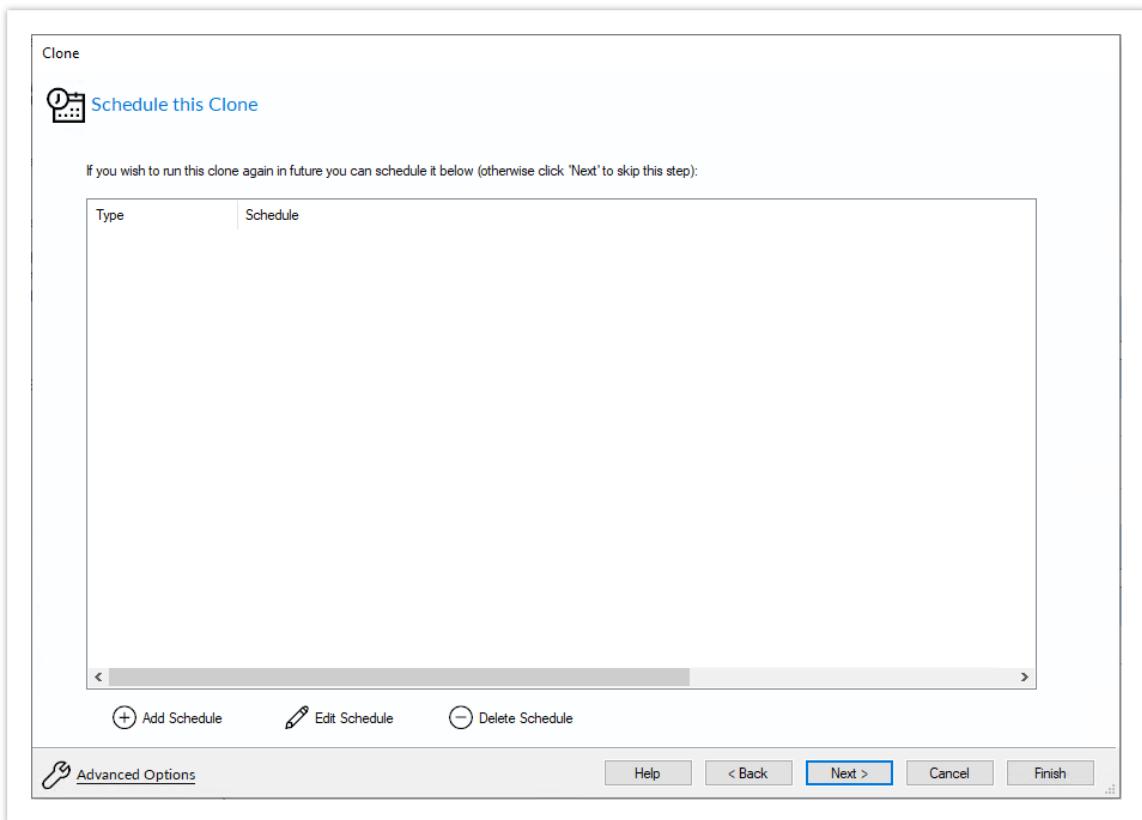
Option	Description
	<p>As with Rapid Delta Restore (RDR) the concept of RDR has been something that has been thought about for quite some time here at Macrium Software. We wanted to build a clone solution that would effectively and rapidly copy only the differences between the source and target file systems. The advantage of this is obvious, RDC offers similar a performance increase as an Incremental disk image offers over a Full image and enables regular clones to be a viable and fast DR solution.</p> <p>How does it work?</p> <p>The NTFS file system resident on the clone source is compared with file system on the target disk. The two file systems are first verified that they originated from the same format command and then the target NTFS file system structures are analyzed for differences. All the NTFS file system structures are copied to the target disk and any that do not exist or have been modified on the target disk cause the data records for each NTFS file or object to be copied as well. The result is an 'Incremental' clone applying only file system changes detected between the source and the target.</p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p>i Note: RDC works with NTFS file systems only. All other file systems will perform a full clone</p> </div> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p>i Note: RDC is not available when shrinking partitions during a clone.</p> </div>
Enable SSD TRIM	<p>Enable SSD TRIM on the clone target to optimize the disk.</p> <p>Show more information on SSD TRIM...</p> <p>This features provides automated SSD optimization resulting enhanced SSD performance and longevity. Writing to an unused block is much quicker than an in-use block as it avoids both the slow erase operation and the read-modify-write cycle. This results an increase of both the lifetime and the performance of the device. It is effective for all windows operating systems, even those that support SSD trim natively as the file system driver can only TRIM blocks on de-allocation; it cannot TRIM blocks written by another process. It is also effective for USB attached SSDs.</p>
Forensic Sector Copy	<p>Copy every sector from the source to the target disk partition.</p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p>i Please note that this option is only necessary if you want to copy unused file system space and will significantly increase the time to complete the clone.</p> </div>

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Option	Description
Shutdown	Set power saving options after a clone task.
Email Success	Set recipient, subject, body, and attachments should this clone succeed.
Email Failure	Set recipient, subject, body, and attachments should this clone fail

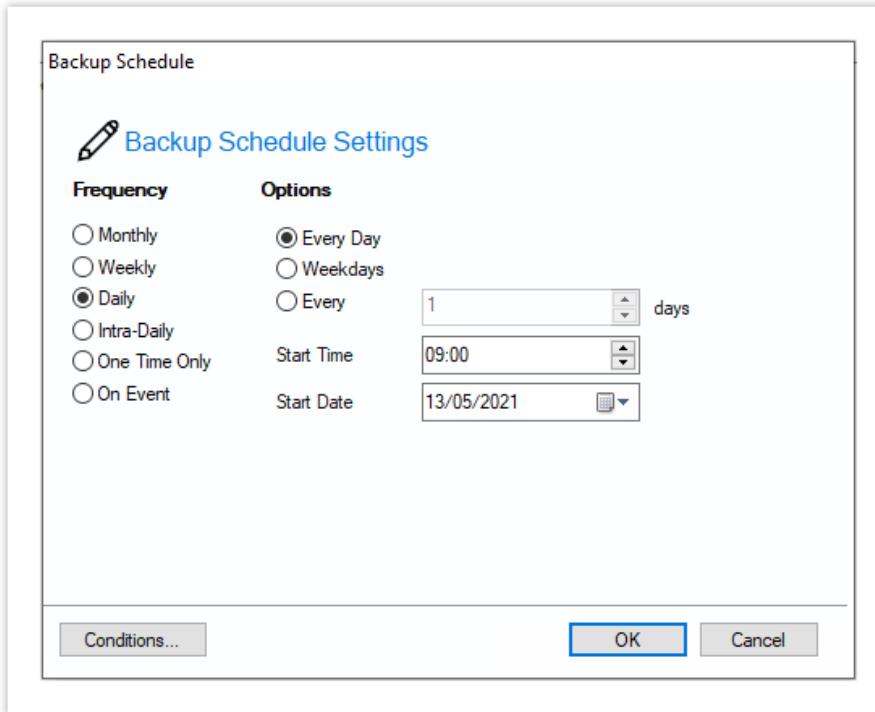
8. Click **Next**.

The options to **Add Schedule**, **Edit Schedule**, or **Delete Schedule** is displayed.



Click **Add Schedule** to optionally schedule your clone

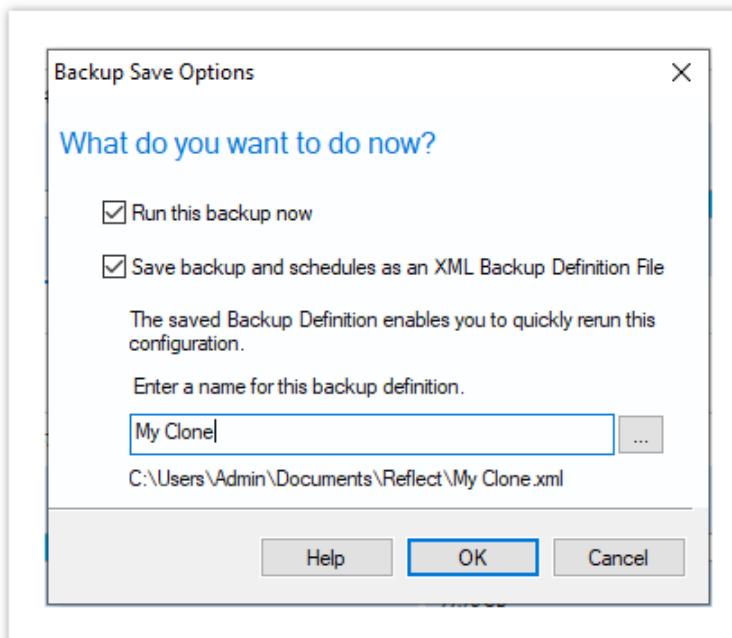
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Make any required changes and click **Next**.

For more information see [Scheduling backups](#).

9. Review the settings and click **Finish**.
10. Verify the settings in **Backup Save Options** and if appropriate, click **OK**.



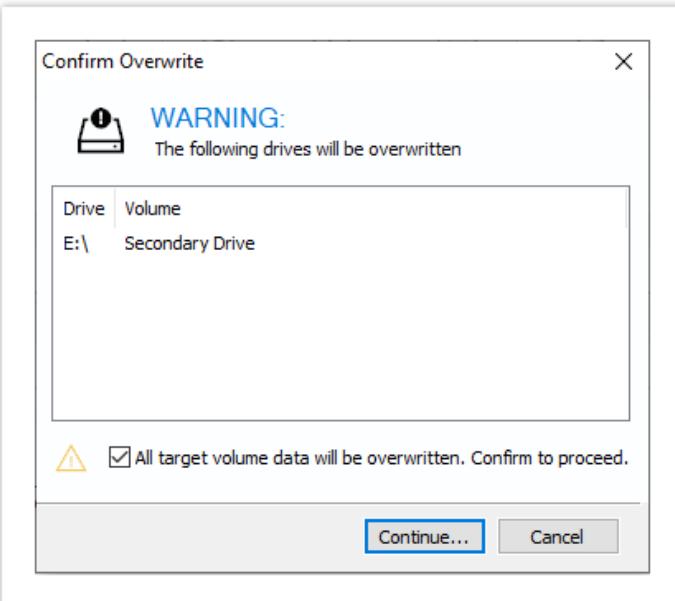
Note: Saving a backup definition enables you to run your Clone at any time with a single click



Note: You must save your backup definition if you have created Clone schedules. Your schedules cannot run if this step is missed.

If you want to run the Clone at this point, select **Run this backup now** and click **OK**.

11. A Warning box appears, if appropriate click **Continue**.



Important

The target disk for the clone operation will be overwritten. This is unrecoverable, so please ensure that the target disk contains no valid data.

12. The clone operation now starts.

① Incompatible Disk Selected

If you receive the error message 'Incompatible Disk Selected' when cloning then please see this article for more information: [.Incompatible Disk Selected](#)

Creating a clone video

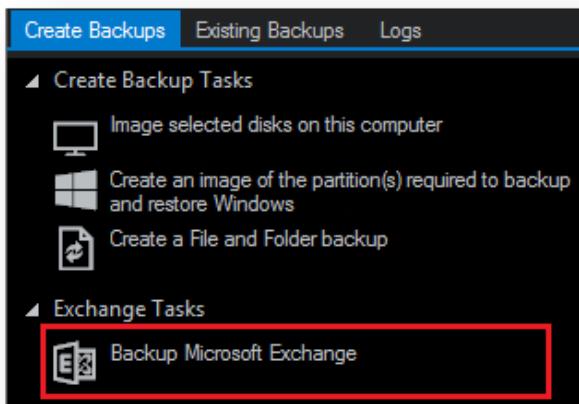
Backing up Microsoft Exchange databases

With Macrium Reflect Server Plus you can choose which databases to backup on the local Microsoft Exchange Server.

Note: Remote backups are not possible.

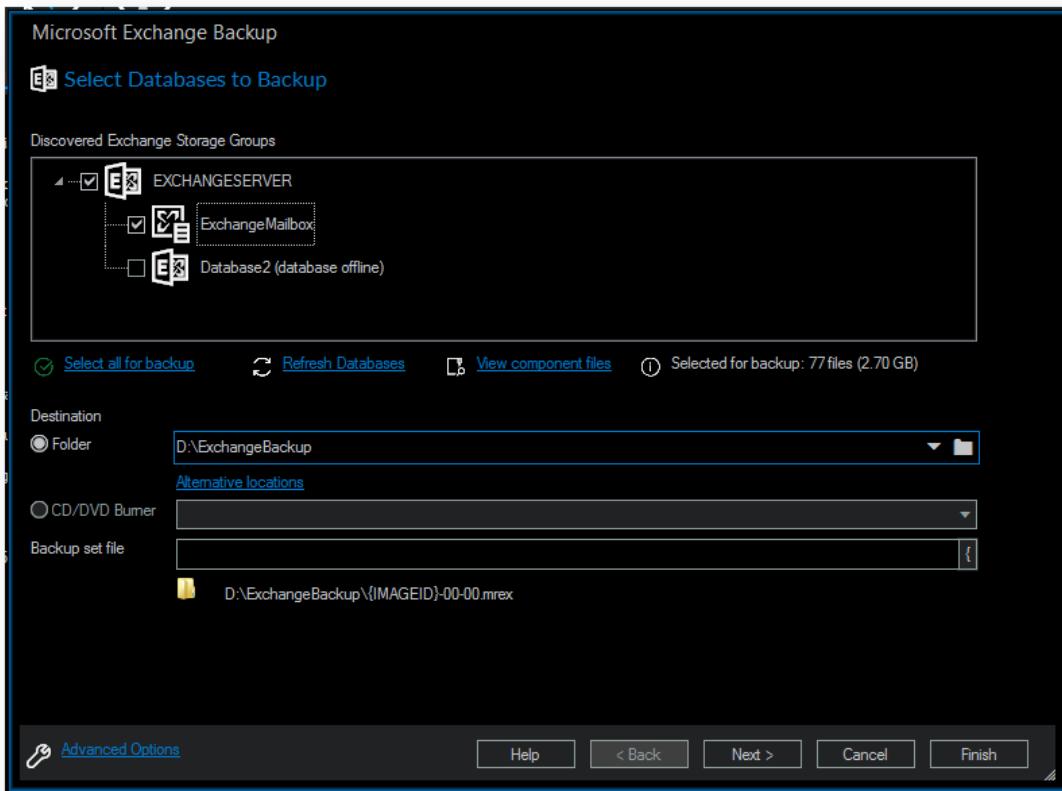
Before you begin: Macrium Reflect requires the Microsoft Exchange Information Store service to be installed and running in order for successful database backup to function.

1. On the main Backup interface, click **Backup Microsoft Exchange**.



The Microsoft Exchange Backup wizard appears. A Microsoft Exchange 2010 example is shown below:

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2. Select the items you want to backup:

- For Microsoft Exchange 2010 and later, select individual databases to backup.
- For Microsoft Exchange 2007 and earlier, select storage groups to backup, this includes all the databases in the selected storage group.

Caution

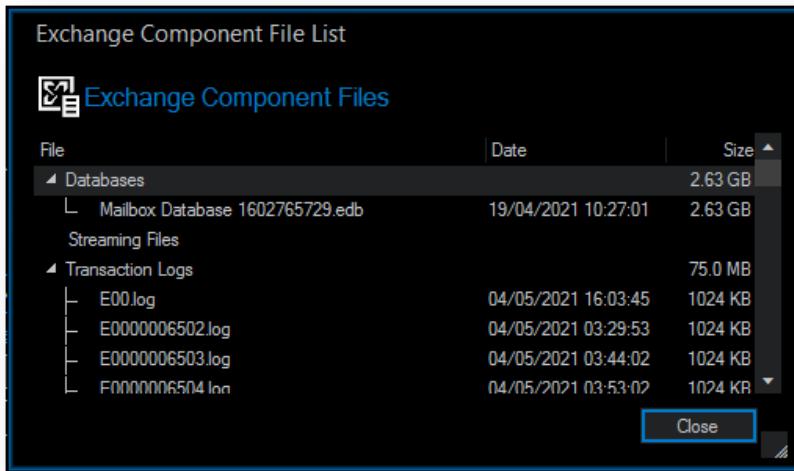
Unmounted Exchange databases are shown in the Microsoft Exchange Backup Wizard and can be selected for backup. However, VSS will not include unmounted databases in the snapshot and *the Exchange backup will fail*. To include these databases in the backup, either ensure the databases are mounted at point of backup or use established recovery mechanisms to bring the affected databases into a clean, shutdown state.

Alternative Locations can be used to provide backup rotations or as a fail safe for temporary unavailability of the primary backup destination.

3. Optionally, click **View component files** to see the list of files that make up the currently selected items.

The **Exchange Component File List** appears. Files are grouped according to type and show last date modified along with file size. Each category of file shows the total size. Groups of files can be expanded /collapsed by clicking the plus/minus button to the left of the file type name.

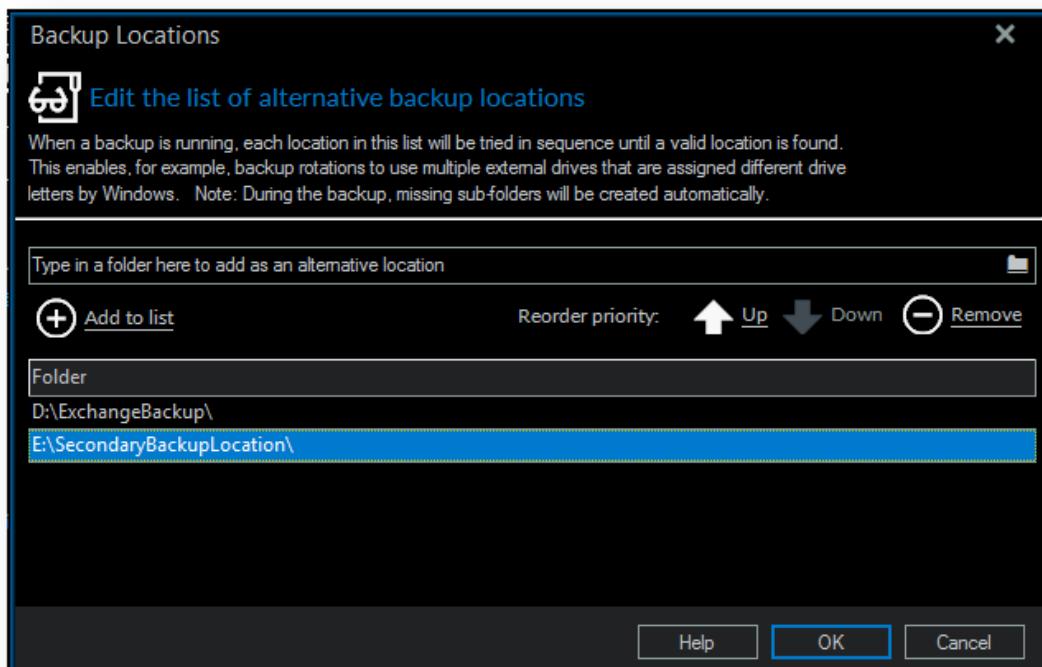
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4. Enter the **Destination Folder** for the backup.

Note: MS Exchange backups cannot be stored on optical media.

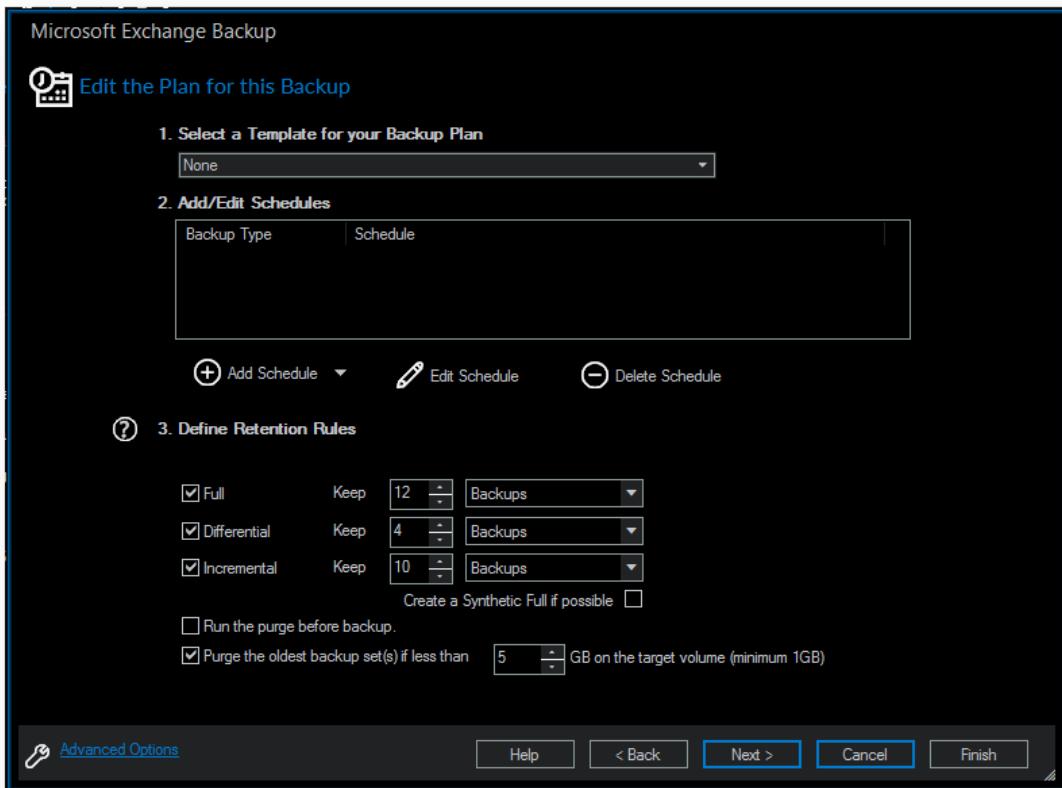
5. If the primary target location is not available, click **Alternative Locations** to add the relevant folder.



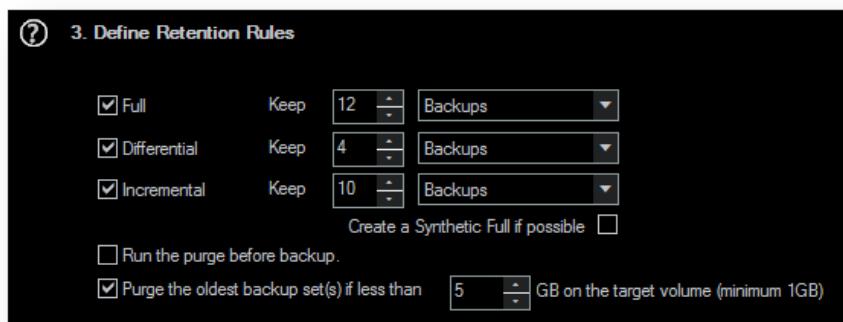
6. Click **Next** to proceed.

7. If desired, edit the plan for the backup. For more information see [Scheduling backups](#).

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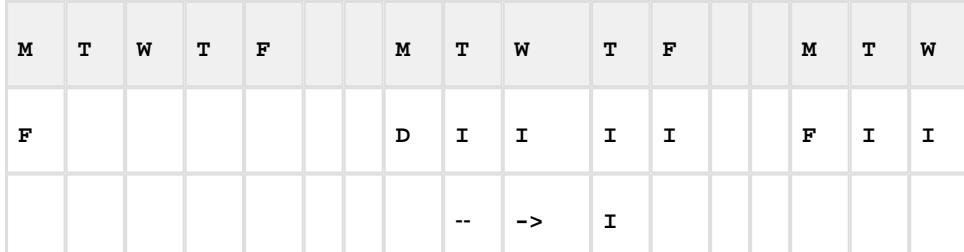


Select the age or number of backup types that you wish to keep



Option	Description
Full	When deleting Full backups all linked Incremental and Differential backups in the same backup chain (set) are also deleted. This operation will delete the entire backup set.
Differential	When deleting Differential backups all linked Incremental backups in the same backup chain (set) are also deleted.

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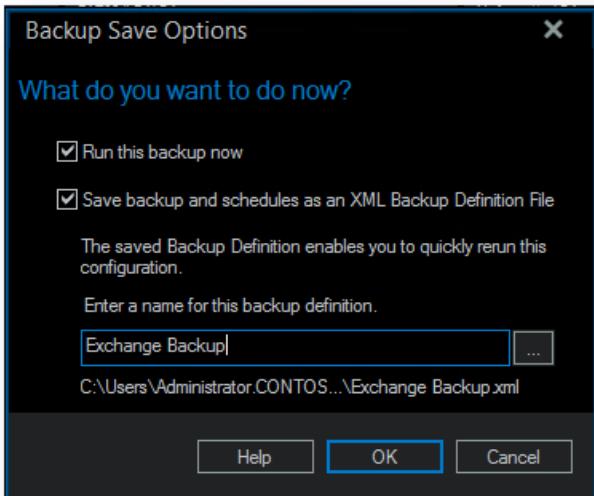
Option	Description
Incremental	<p>When deleting Incremental backups the integrity of the backup set is maintained by ensuring that the chain is never broken. This is achieved by merging older Incremental backups when required.</p> <p>In the example below, before retention, there is 1 Full backup, 1 Differential backup, and 6 Incremental backups. The retention rules are set to retain 4 Incremental backups. After retention, the most recent 4 Incremental backups are retained. Deleting the oldest 2 Incrementals would cause the backup chain to be invalid as the oldest retained incremental requires the previous 2 Incremental backups to complete the chain. To ensure backup integrity the 2 older Incremental backups are consolidated with it to create a new Incremental backup.</p> <p>F = Full D = Differential I = Incremental</p> 
Create a Synthetic Full if possible	<p>When purging Incremental backups, if the backup set only contains a Full backup followed by Incremental backups, then this option causes the Full backup to be 'rolled forward' to create a Synthetic Full backup. This is also known as Incremental Forever.</p>
Run the purge before the backup	<p>Select this option to run the retention rules before the current backup.</p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p>Note: in Macrium Reflect v5 the current backup set wasn't included in the purge calculation when purging before the current backup. In v6 the current backup set IS included. This means that if you set the retention count to 1 Full backup then all of your backups will be deleted and a new Full backup created.</p> </div>
Delete oldest backup set(s) if less than n GB	<p>Automatically remove the oldest backup set(s) in the target folder if the free space on the drive drops below the GB threshold.</p>

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8. Review the summary of the backup.

9. Click **Finish**.

Backup Save Options is shown.



Note: Saving a backup definition enables you to run your backup Image at any time with a single click



Note: You must save your backup definition if you have created backup schedules. Your schedules cannot run if this step is missed.

If you want to run the backup at this point, select **Run this backup now** and click **OK**.

Backing up MS SQL Databases

Error: RuntimeException occurred while performing an XHTML storage transformation (java.lang.String cannot be cast to com.atlassian.confluence.content.render.xhtml.model.resource.identifiers.ResourceIdentifier)

Creating a disk image of a single drive or partition

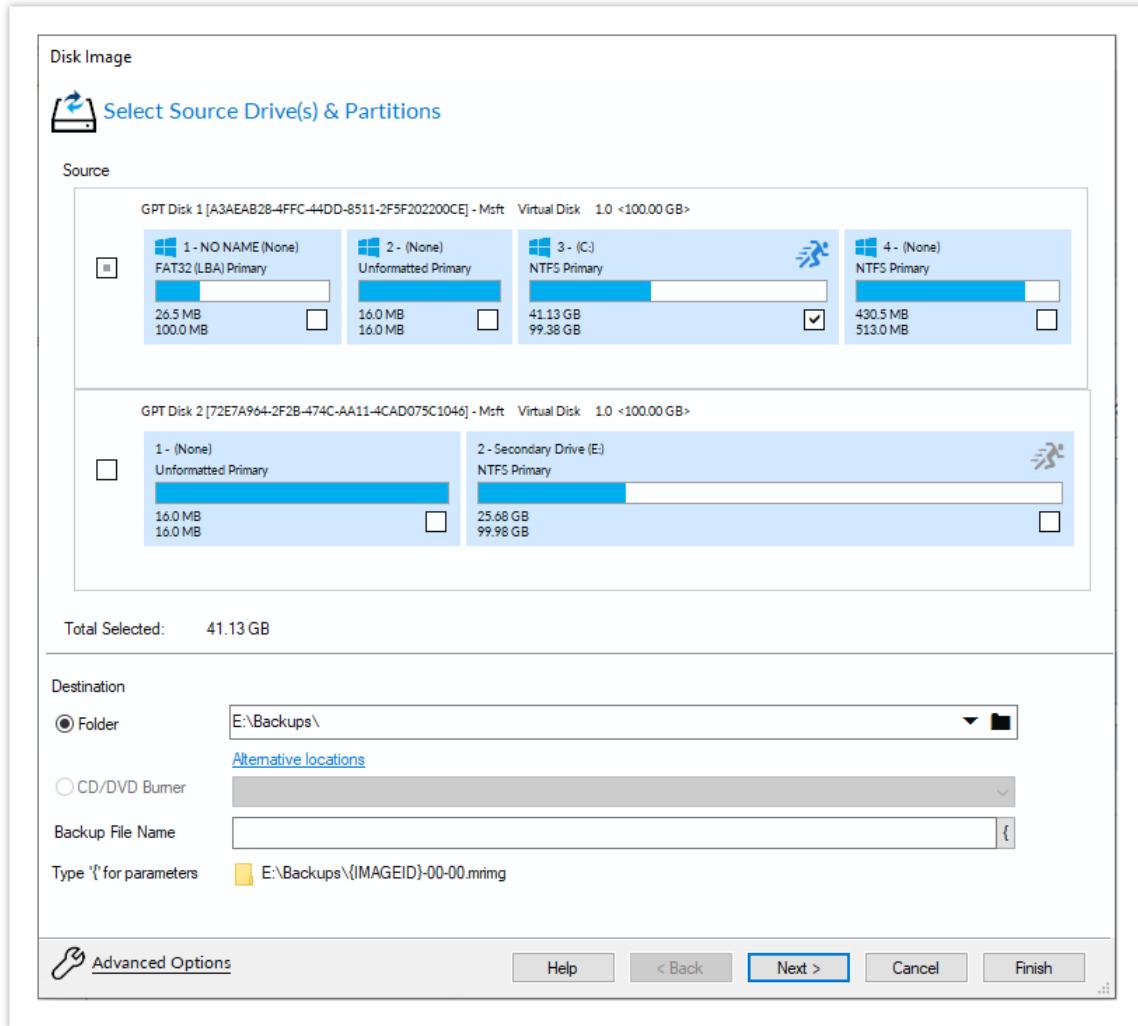
Using Microsoft Volume Shadow Copy Service (VSS) Macrium Reflect creates persistent images of your system.

1. Select **Image selected disks on this computer**.



2. The wizard starts. All partitions are displayed, select the required drives or partitions.

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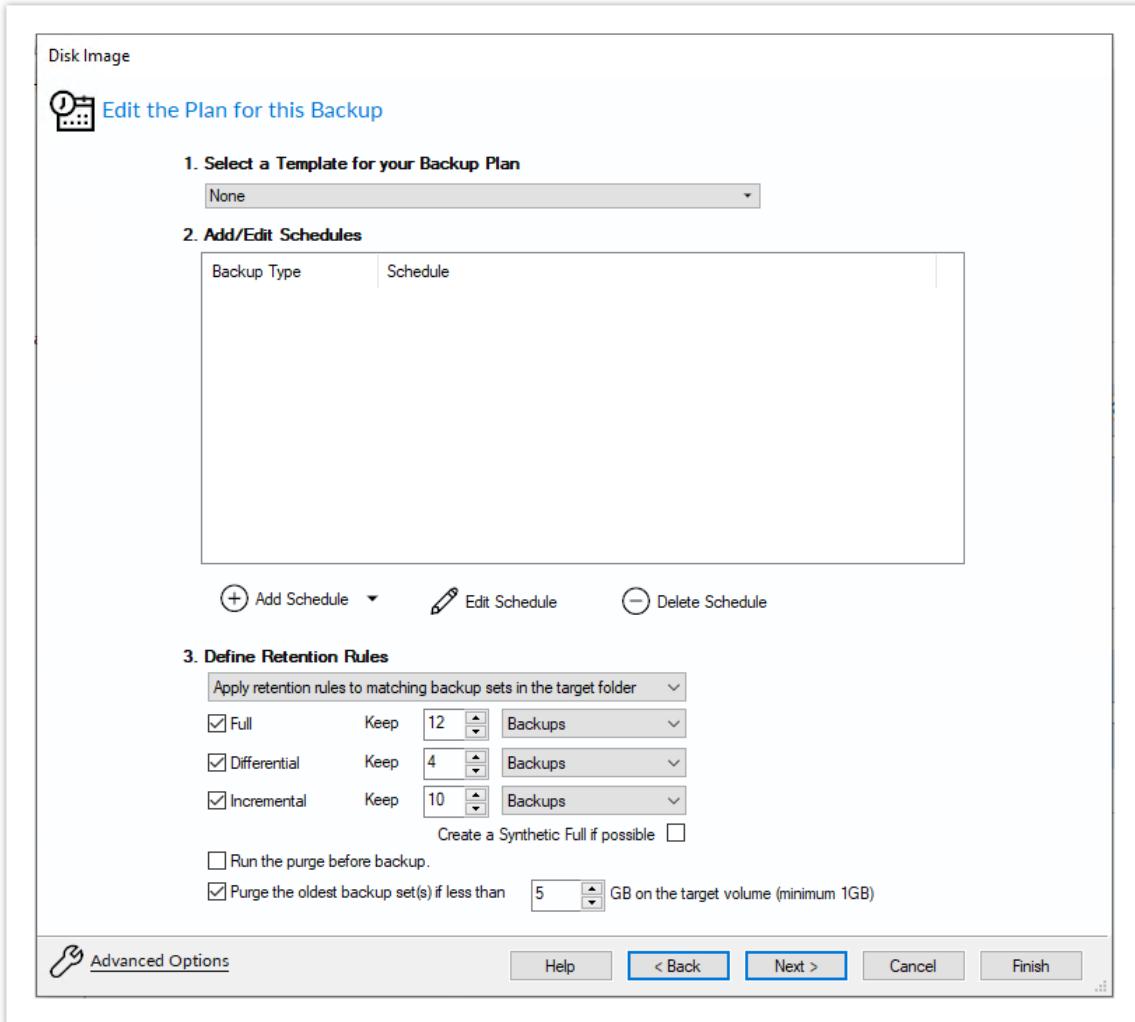
3. In the **Destination** section, select where to write the resultant image.

In this example, 'E drive' is used.

4. Click **Next**.

5. If desired, edit the plan for the backup by making the necessary selections.

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For more information on editing the backup plan and advanced options see [Scheduling backups](#).

6. Click **Next**.
7. A summary screen displays detailing the settings used for this image.

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The screenshot shows the 'Disk Image' configuration window in Macrium Reflect. The 'Imaging Summary' section displays various settings: Auto Verify (N), Verify File System (Y), Maximum File Size (Automatic), Compression (Medium), Password (N), Intelligent Copy (Y), Power Saving (N), Email On Success (N), Email On Warning (N), Email On Failure (N), Total Selected (41.13 GB), and Current Time (13/05/2021 16:49:30). The 'Schedules' section indicates 'None'. The 'Retention Rules' section specifies rules for Full, Differential, and Incremental backups. The 'Destination' section shows the file name as E:\Backups\{IMAGEID}-00-00.mrimg. The 'Operation 1 of 1' section details the target as Hard Disk 1, Drive Letter C, File System NTFS, and Format (v). At the bottom, there are 'Advanced Options' and 'Finish' buttons.

8. Click **Finish**.

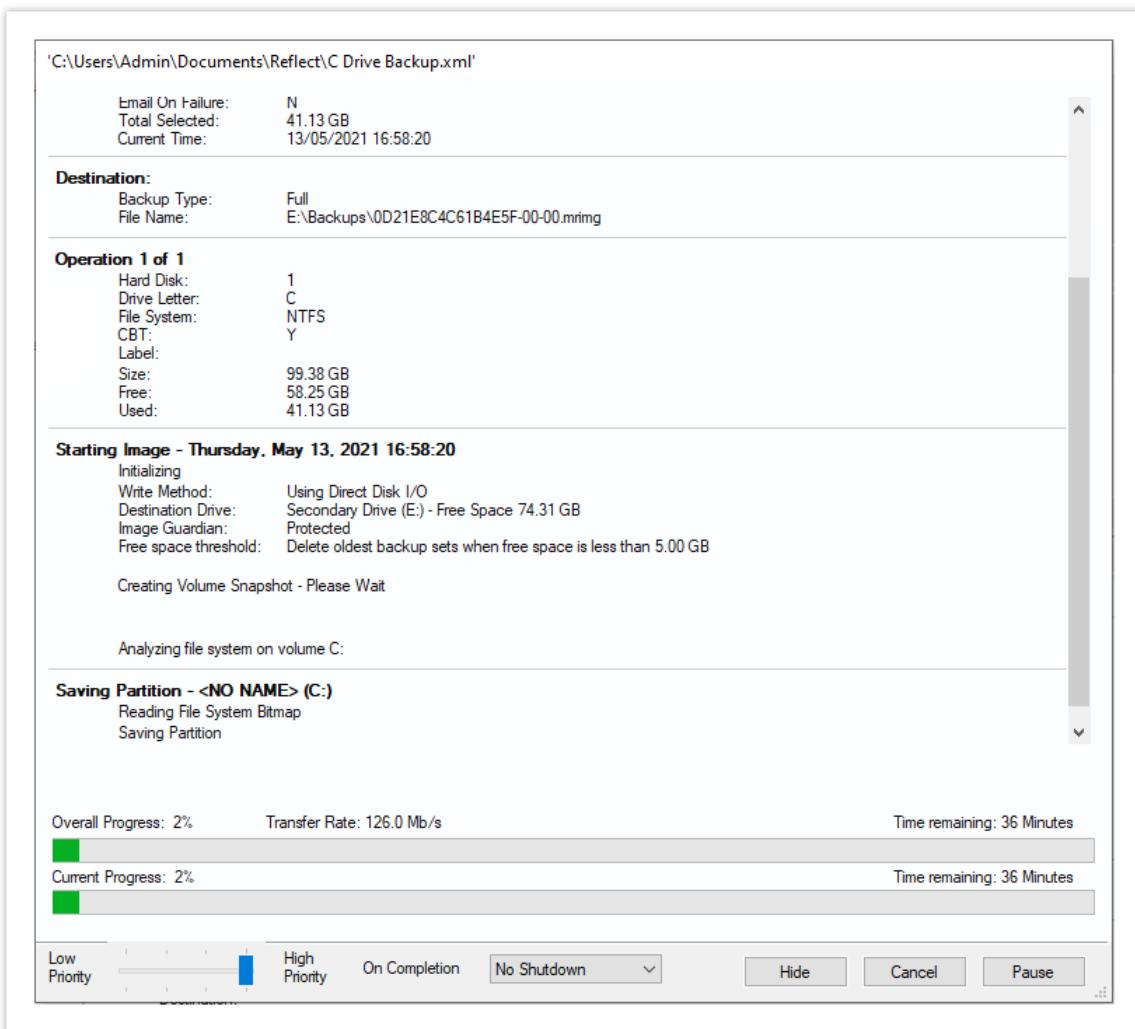
You are now given the opportunity to save the backup options.

The 'Backup Save Options' dialog box is displayed. It asks 'What do you want to do now?' with two checked options: 'Run this backup now' and 'Save backup and schedules as an XML Backup Definition File'. A note states that the saved Backup Definition enables quick rerun. An input field shows 'C Drive Backup' with a browse button (...). The path C:\Users\Admin\Documents\Reflect\C Drive Backup.xml is shown below. At the bottom are 'Help', 'OK' (highlighted in blue), and 'Cancel' buttons.

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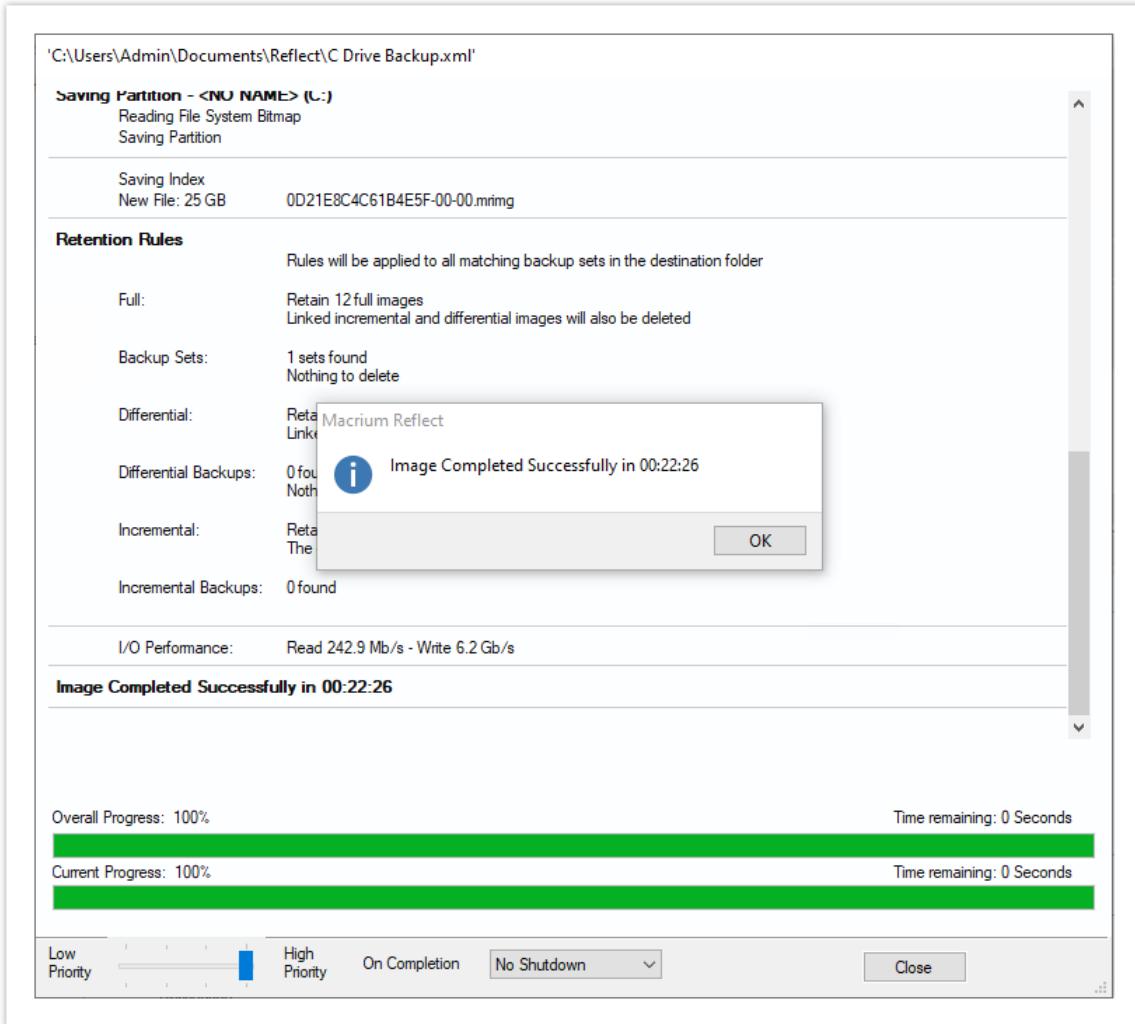
9. If you want to run the backup at this point, click **OK**.

The selected partitions are backed up to the chosen location.



10. When the image has completed, click **Close** to shut down the message box.

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11. Click **Close** to close the backup window.

See also: [Windows Partitions](#)

Differential and incremental disk images

The entire contents of the imaged file system are stored in a Full image file. This is a reliable way of backing up your PC, however, repeating the process is slow and subsequent images can fill your backup media very quickly.

After you have created an initial Full image, you can create Differential and Incremental images. These are both quicker to execute than Full images and create much smaller image files.

Note: With the Free Edition of Macrium Reflect you can only make Full and Differential images of your disks and partitions.

- Differential Images
- Incremental Images
- Maintaining backup sets

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- Selecting an Incremental or Differential backup
- Alternative method using an existing backup

Differential Images

A Differential image stores the changes that have been made to the imaged file system since the last Full image. Subsequent Differentials can be taken, but only one Differential and the Full are required in order to fully restore the system.

This is quicker than creating a Full image, however the longer the time between the Full and the Differential, the larger the Differential image file is and the longer it takes to create.

Advantages of Differential images:

- Differential images created after the initial full Image are very quick because only file system changes since the full backup are saved.
- The amount of disk space used by differential images is significantly less than that of full images.
- Only two image files are required to restore the system.

Disadvantages of Differential images:

- As the time since the last Full image was taken increases, the size of the Differential grows as does the time it takes to create the Differential image.
- In order to reduce this time, it is necessary to perform a Full image occasionally to reduce the size of the subsequent Differential images.

Incremental Images

The main difference with Incremental images is that they only store file system changes since the last image, either Full, Differential, or Incremental. The resultant backup set, therefore, consists of a full image and a number of Incremental images which must all be present in order to restore the system correctly.

Advantage of Incremental images:

- Incremental images have the same advantages as Differential images, but since they only store the changes that were made since the last Full **or** Incremental. They are always small and very quick to make, especially if done frequently.

Disadvantage of Incremental images:

- All files must be present in the image set. If any intermediate Incremental images are missing, it is not possible to restore the system to the latest backup.

Maintaining backup sets

Maintaining backup sets can seem an onerous task, however, Macrium Reflect takes care of all the hard work for you. With Macrium Reflect you can schedule Incremental or Differential backups automatically. It is as simple as selecting the image you wish to restore and Macrium Reflect automatically selects the required files in the image set as part of the restore process. The same is true for exploring an image. If you choose to explore an Incremental image in an explorer window, Macrium Reflect reconstructs all the files that have been backed up to that time.

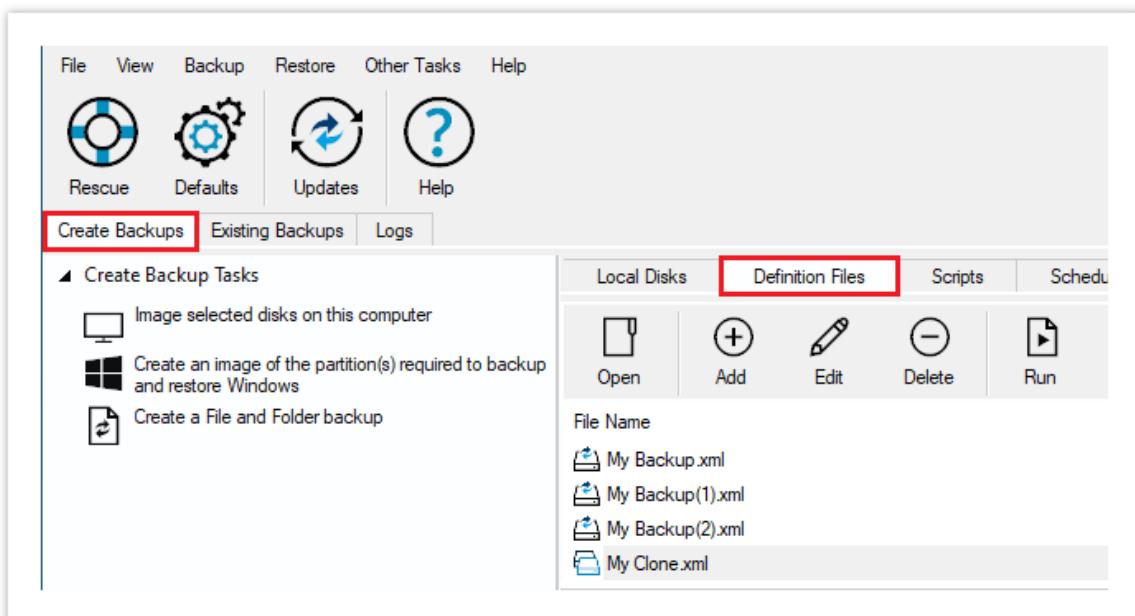
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Macrium Reflect also includes functionality to automatically delete expired image sets. For example, if you take a Full image every month and then Incremental images every day, you can configure Reflect to keep two full image sets (the equivalent of two months of backups) and delete any older files. As a result, your backup media does not become full of obsolete image files.

Selecting an Incremental or Differential backup

The process for creating a Differential or Incremental backup is the same. Both save changes since the Full backup if this is the only backup made so far.

1. To initiate an Incremental or Differential backup, select **Backup Definitions Files**.



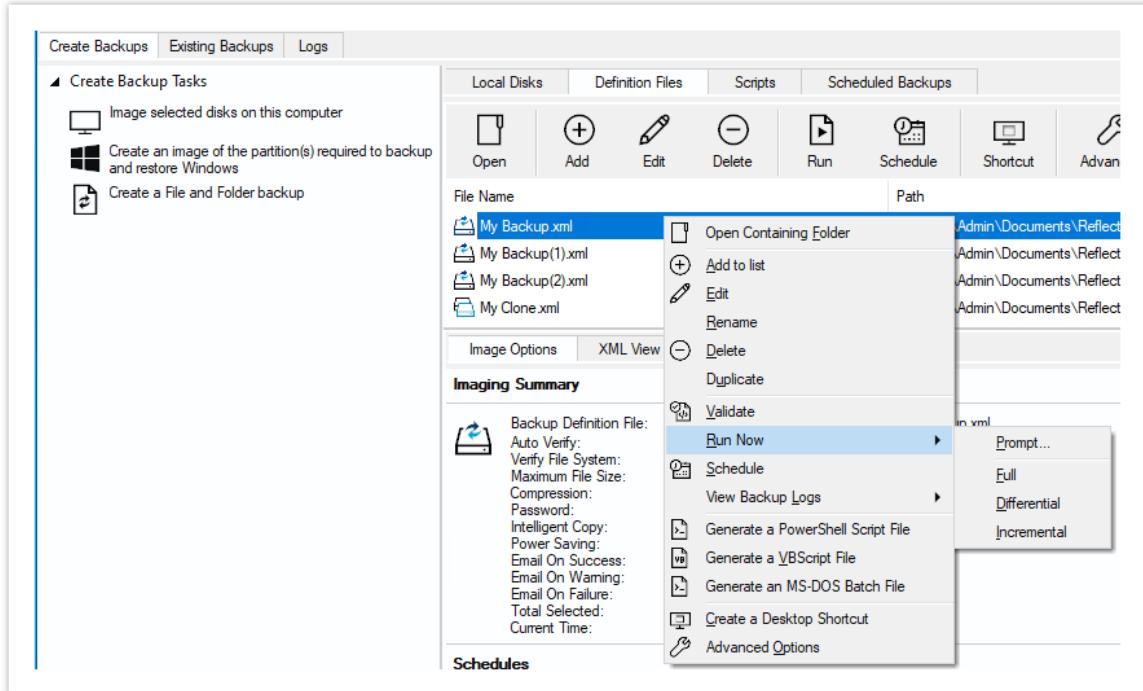
In this instance, there is one saved XML definitions file *MyBackup.xml*/ which contains the configuration required to back up the C drive.

2. Right-click **MyBackup.xml** and select **Run Now**.

You are presented with a number of options.

3. Select **Full**, **Incremental**, or **Differential** to automatically execute that particular backup. If unsure which you want to run, click **Prompt**.

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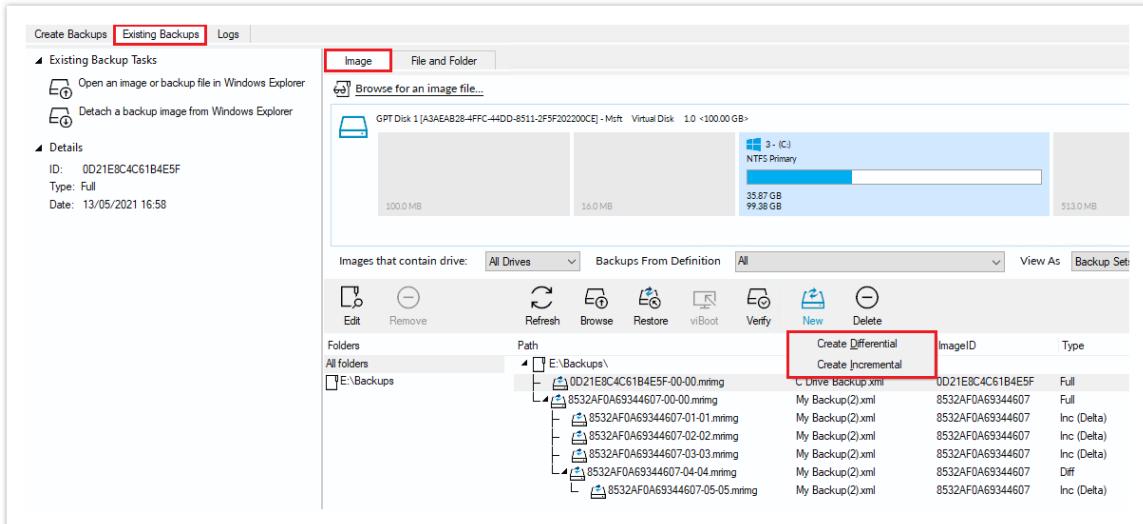


4. Click **Finish**.
 5. When the Image is complete close the dialog.
-

Alternative method using an existing backup

1. Click the **Existing Backups** tab
2. Select either **Image** or **File and Folder**.
This presents a list of image or file and folder backup files.
3. Select the file that you want to create an incremental or differential from.
4. Select the **NEW** icon, and choose **Create Differential** or **Create Incremental**

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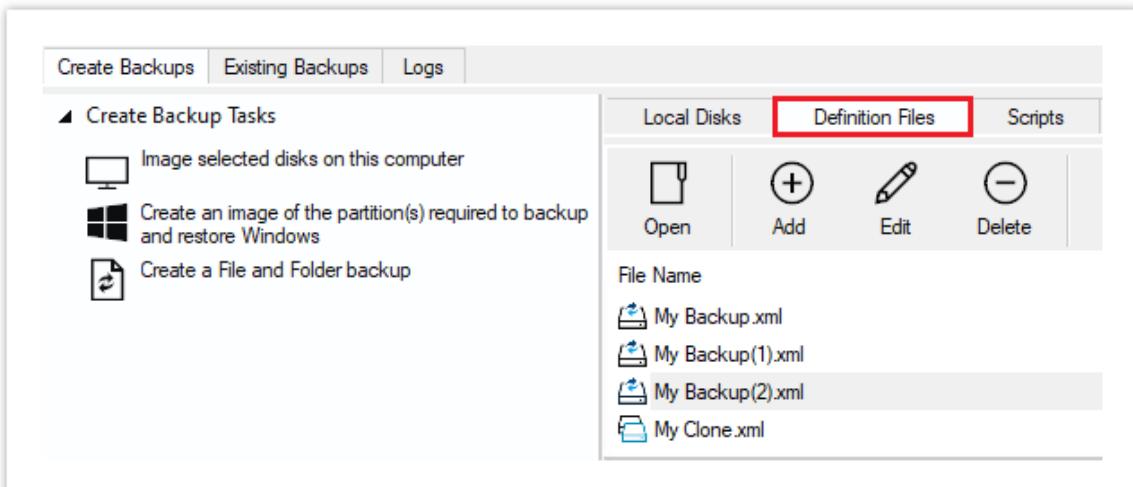
Creating desktop shortcuts for full, incremental and differential backups



Creating Desktop Shortcuts for your backups enables quick and easy execution without the need to start Macrium Reflect or choose the backup type (Full, Diff, or Inc).

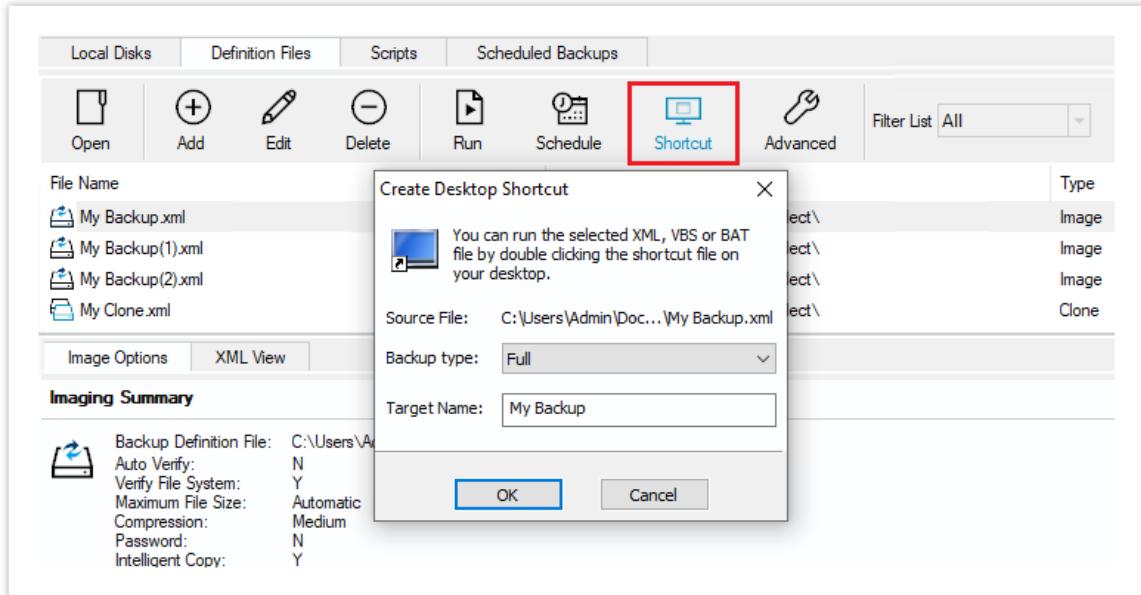
Pre-requisite: To create a desktop shortcut for your definitions files you must already have a backup definition file. If required, follow the instructions in [Creating a backup image of your computer, drive or partitions](#).

1. Select the **Definition Files** tab.



2. Select the **backup definition file** and click the **Create Desktop Shortcut** button on the Backup Definition File View toolbar.

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3. Select the Backup Type and enter the shortcut name that appears on the Desktop.



For easy reference to the backup type, you could add a **Full**, **Diff** or **Inc** suffix to the shortcut name.

4. Click **OK**.

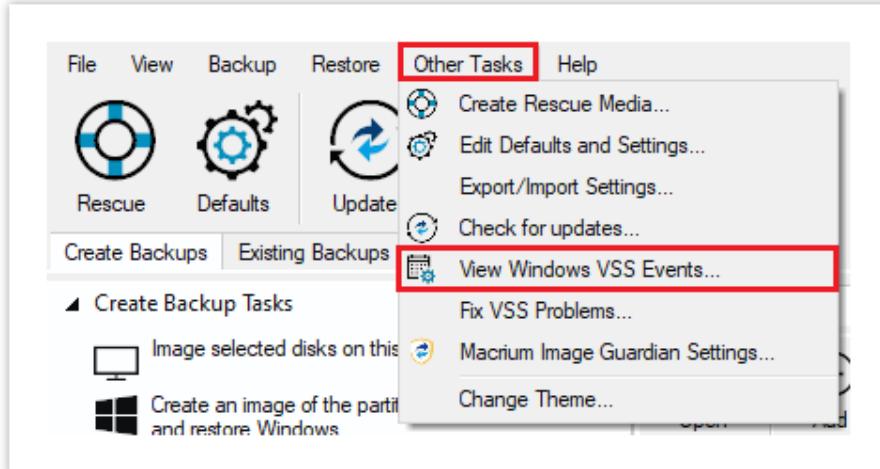
Checking VSS events when backups fail

Macrium uses Volume Shadow Copy Service (VSS) to create its images and backups and windows keeps a log of VSS events. These events can give you information, useful if you are experiencing problems, such as backup failures.

View events to check what has occurred as follows.

1. From the toolbar click **Other Tasks**.
2. Click **View Windows VSS Events**.

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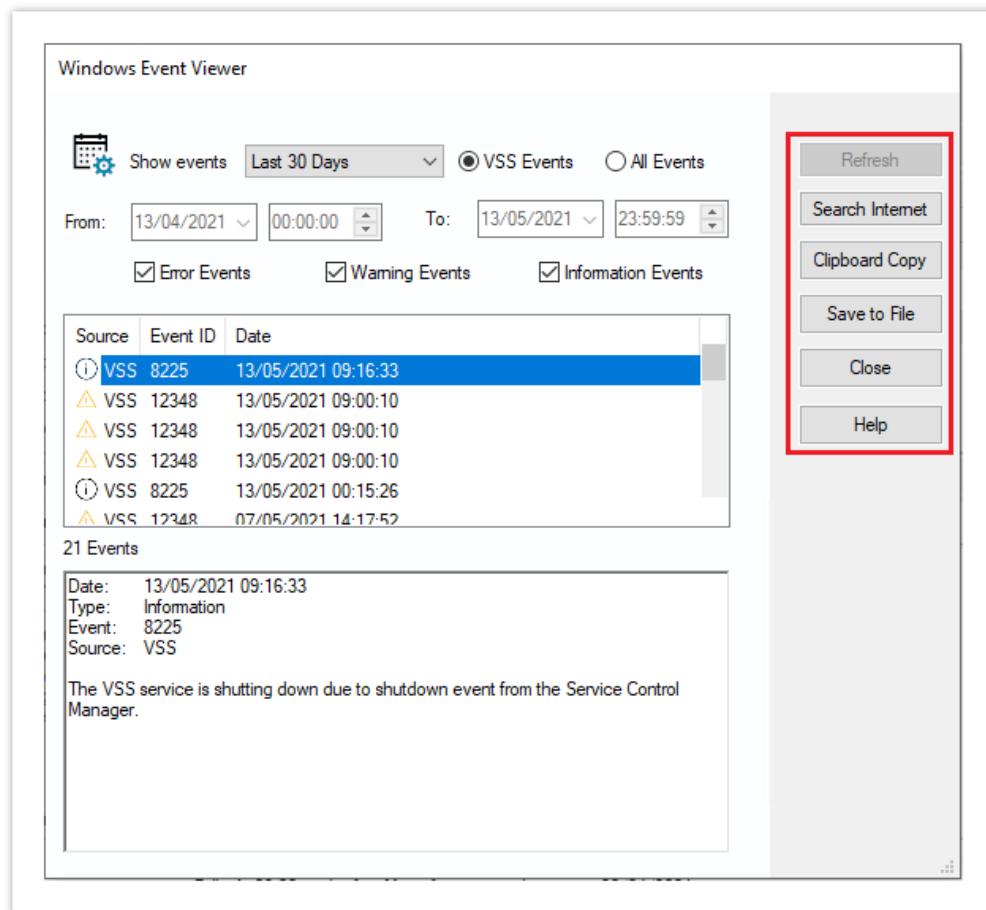
3. Select the parameters for your event search.
4. The viewer updates automatically displaying relevant information.

A screenshot of the Windows Event Viewer. The title bar says 'Windows Event Viewer'. The top navigation bar includes 'Show events' (with a calendar icon), 'Last 30 Days' (dropdown), '(VSS Events)' (radio button selected), '(All Events)' (radio button), and 'Refresh' (button). Below the navigation are date/time filters: 'From: 13/04/2021 00:00:00' and 'To: 13/05/2021 23:59:59'. There are also checkboxes for 'Error Events', 'Warning Events', and 'Information Events', all of which are checked. The main pane displays a table of events with columns 'Source', 'Event ID', and 'Date'. One event is selected: '(VSS) 8225 13/05/2021 09:16:33'. The details pane below shows event details: Date: 13/05/2021 09:16:33, Type: Information, Event: 8225, Source: VSS. It also contains a message: 'The VSS service is shutting down due to shutdown event from the Service Control Manager.' To the right of the main pane is a vertical toolbar with buttons: 'Search Internet', 'Clipboard Copy', 'Save to File', 'Close', and 'Help'.

5. If required, select an event and choose to:
 - a. Search Internet. This will open your default browser with search terms configured for the selected Windows error event.
 - b. Clipboard Copy. Useful for pasting into an email if you are contacting support.

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c. Save to File.



6. When you have finished reviewing events, click **Close**.

Alternative Locations For Backups

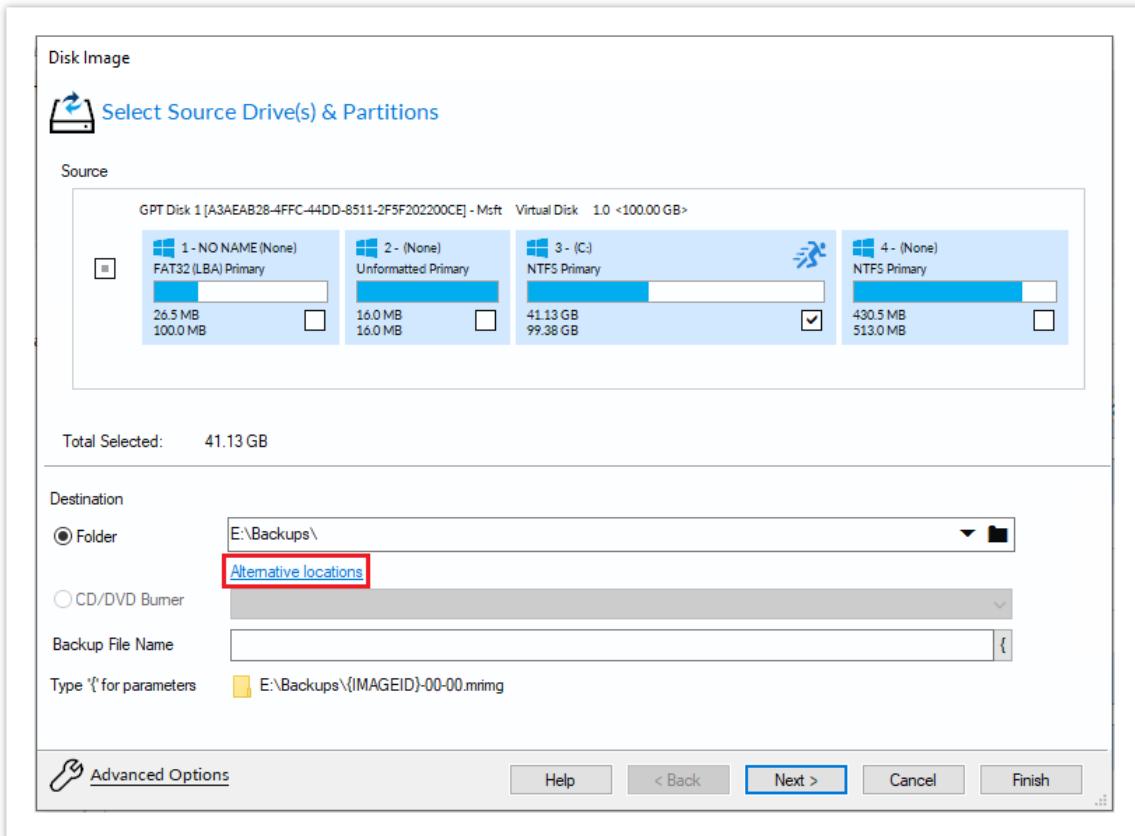
All backup wizards in Macrium Reflect allow you to select **Alternative Locations** to use for the backup destination. Should the primary backup location not be available, each location will be checked in sequence until an available one is found.



Alternative locations can also be used to provide backup rotations, for example, keeping an offsite backup, or as a fail safe for temporary unavailability of the primary backup destination.

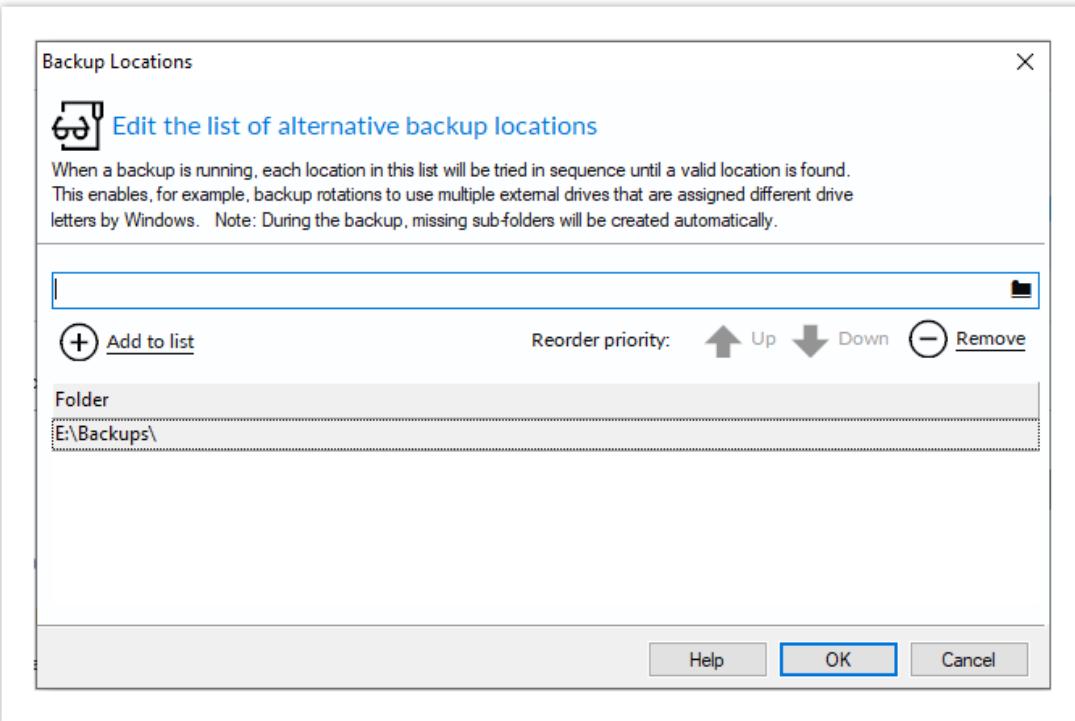
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1. Click Alternative Locations

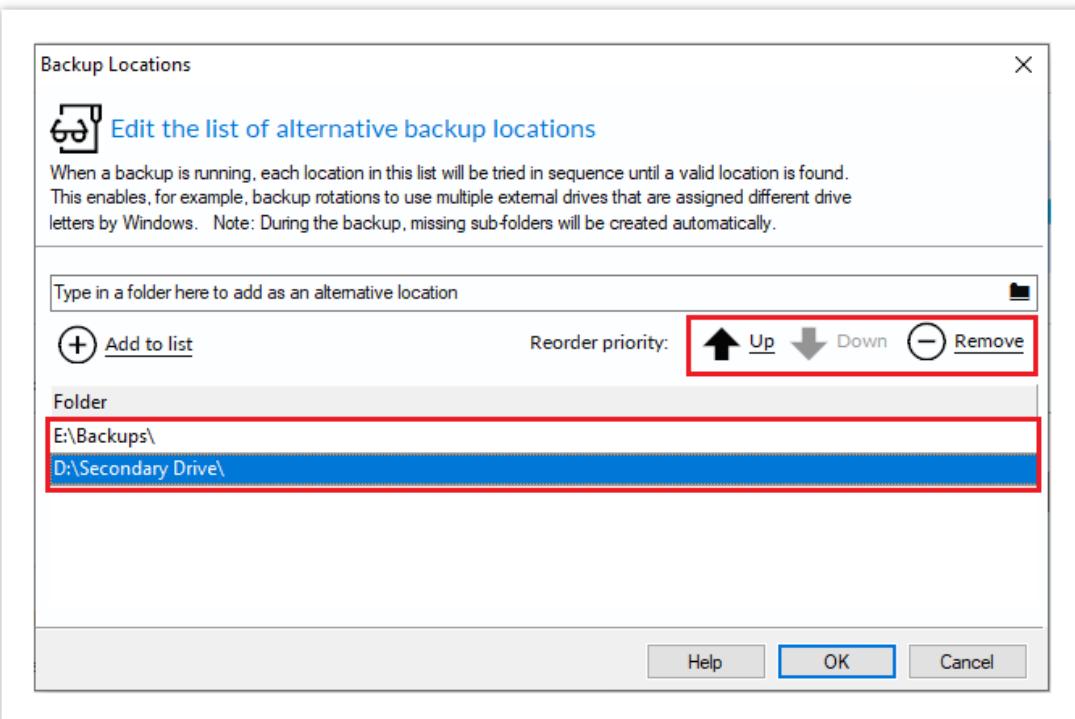


2. The Backup Locations dialog is shown.

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3. Select a folder and click **Add to list**
4. Repeat for each folder to be used as an alternative location
5. Change the order of locations by selecting a folder in the list and click **Up** or **Down**



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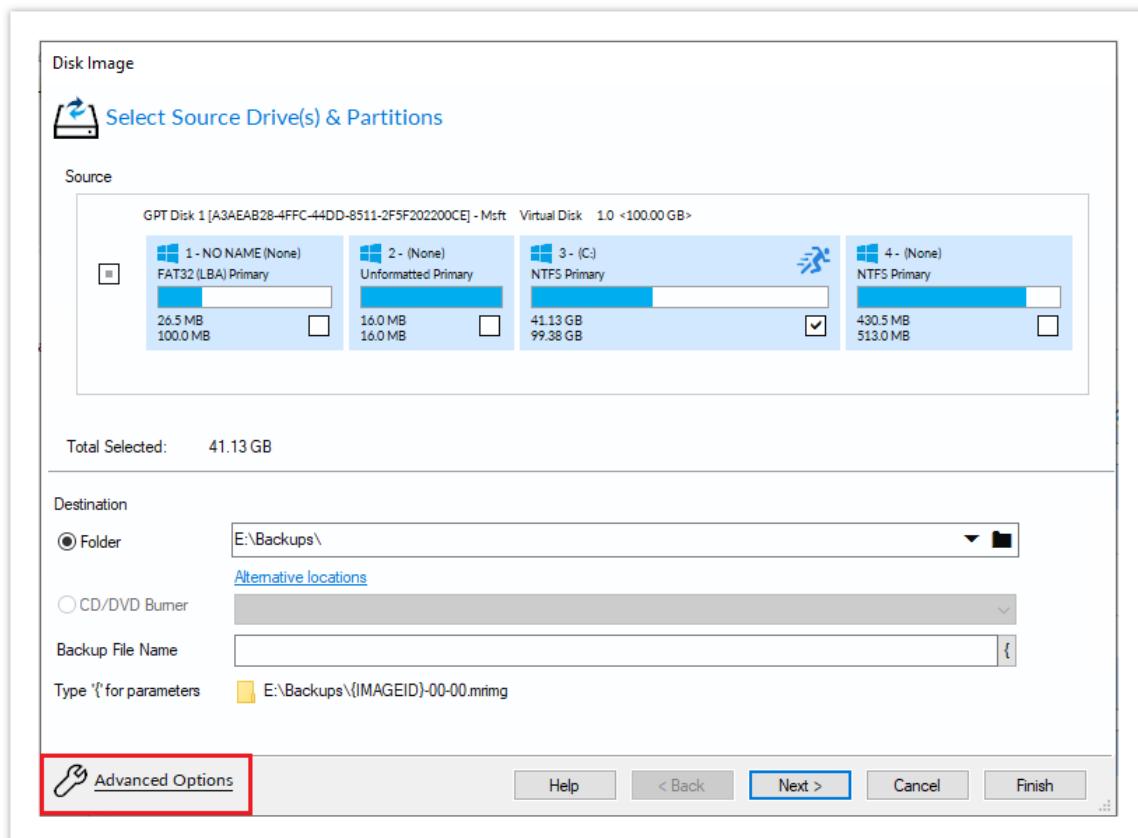
6. Remove a folder by selecting it and clicking **Remove**

7. Click **OK** when done

Advanced Options

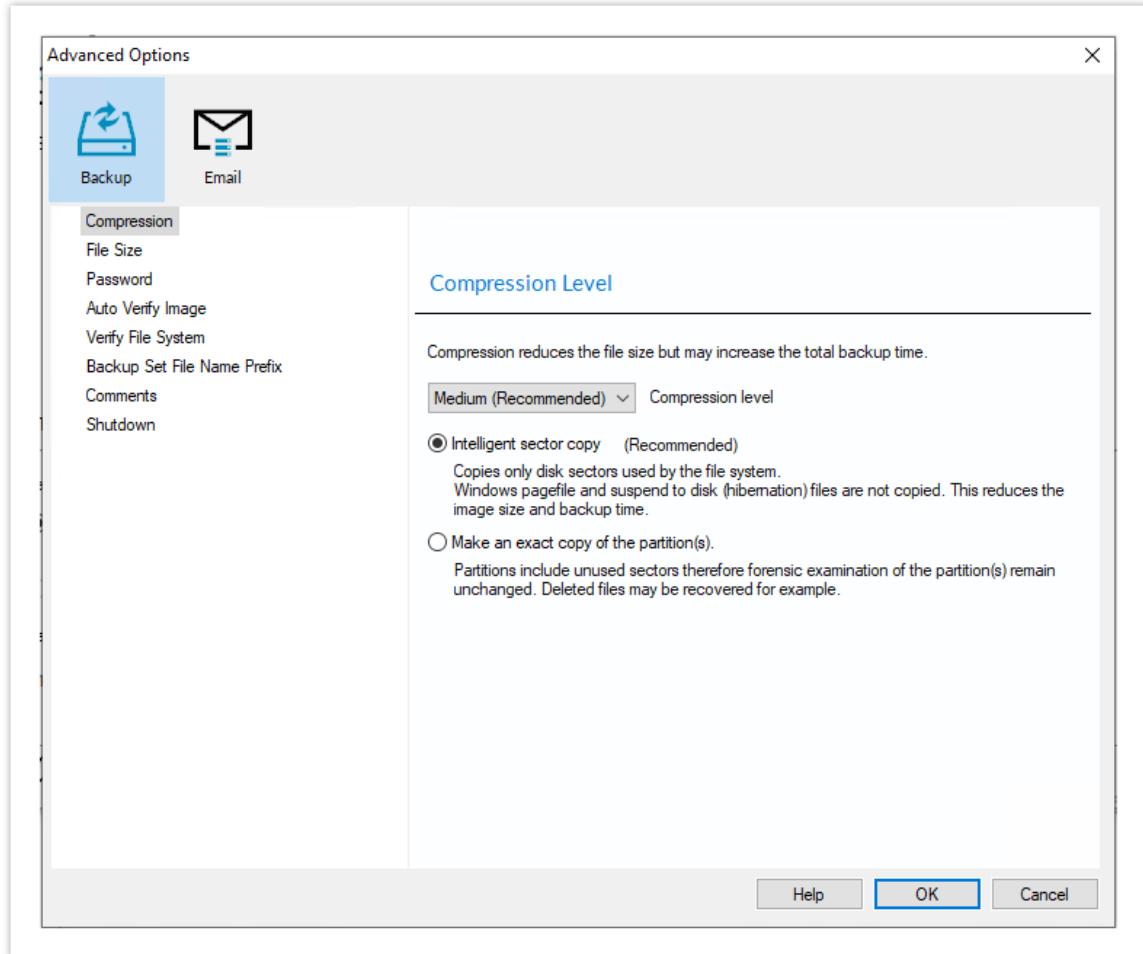
Advanced Options

All forms of backup in Macrium Reflect have advanced options, accessed by clicking the Advanced Options link. All backup wizards have this link which can always be located in the lower left hand corner of each wizard. Cloning, too, is a form of backup and this also has advanced options, accessed in the same way.



Below is the Image backup advanced options as an example:

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Common Advanced Options - Available to all backup types except Cloning

Option	Description
Compression	Set the desired compression on the resulting backup file. Choose between None, Medium, or High.
Intelligent sector copy	Copy only file system sectors/clusters that are in use. This reduces the size of the disk image file as unused file system clusters are not copied.
Make an exact copy	Copy every sector/cluster used by the partition. This will also copy unused space and will make the image file significantly larger than ' Intelligent sector copy '.
File Size	Set maximum file size that will be created for the backup file, these are also known as file splits. Choose between Automatic or fixed size in either Megabytes or Gigabytes.
Password	Add password protection to the resulting backup files. Choose between standard, medium, and high encryption. Each increasing level of encryption will require a stronger password.

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Option	Description
Auto Verify	Automatically verify the resulting backup file. This will add more time to the backup process but confirms if the resulting backup can be restored.
Verify File System	Verify the integrity of the file system being backed up.
Backup Set File Name Prefix	Prefix the backup file name with the backup set Image ID.
Comments	Add a free form text comment to the backup.
Shutdown	Once the backup has complete you can choose to shut down the computer, choose between Shutdown, Hibernate or Suspend.
Email Success	Set recipient, subject, body, and attachments should this backup succeed.
Email Failure	Set recipient, subject, body, and attachments should this backup fail.

Cloning Advanced Options

Option	Description
Intelligent Copy	Clone only sectors in use from the source disk. Further to this option: <ul style="list-style-type: none"> • Verify File System. Ensure the source file system is valid before cloning. • Rapid Delta Clone. Only clone differences in the source and target disks since the previous clone was made. • Enable SSD Trim. Ensure target SSD partitions are trimmed prior to a clone.
Forensic Copy	Clone all sectors from the source disk.
Shutdown	Set power saving options after a clone task.
Email Success	Set recipient, subject, body, and attachments should this clone succeed.

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Option	Description
Email Failure	Set recipient, subject, body, and attachments should this clone fail.

File & Folder Backup Advanced Options

Option	Description
Reparse Points	For both system and user reparse points, select to either follow or do not follow. An example reparse point is the folder "Documents and Settings" which when followed points (or expands) to a number of other folders. If followed then all folders the reparse point "contains" will be included in the backup.
Backup Set Matching	Choose between Similar, Strict or All.

Verifying image and backup files

Backup verification checks the entire contents of backup files against MD5 message digests (Hashes) created from the source data when the backup was created. For more information on the verification process see: [Understanding Image Verification Failures](#)

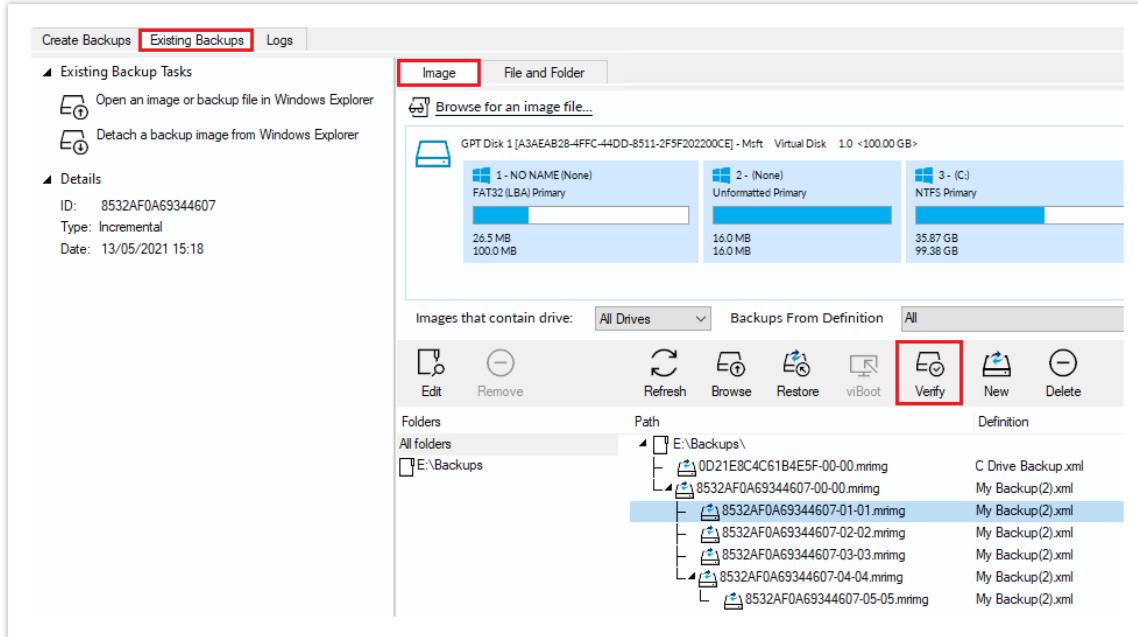
To verify Image and File and Folder backup files using the command line see: [Verifying image and backup files from the command line](#)

To verify using the Macrium Reflect user interface follow the steps below:

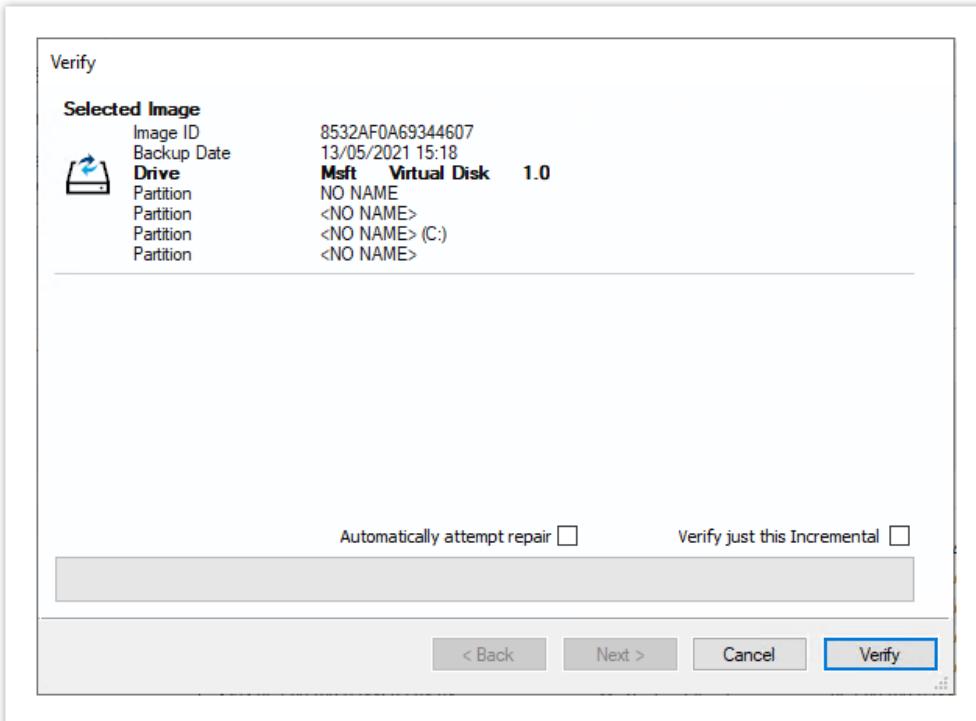
Disk Images

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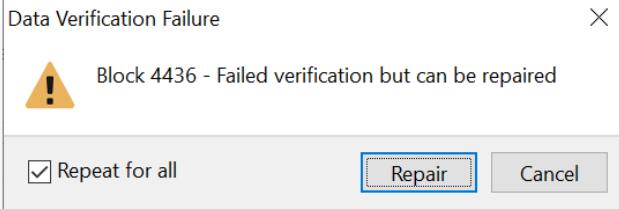
1. Click the **Existing Backups** tab, then select **Image**. Next, select the image you want to verify then click the **Verify** icon.



2. Click the **Verify** button in the dialog that opens:



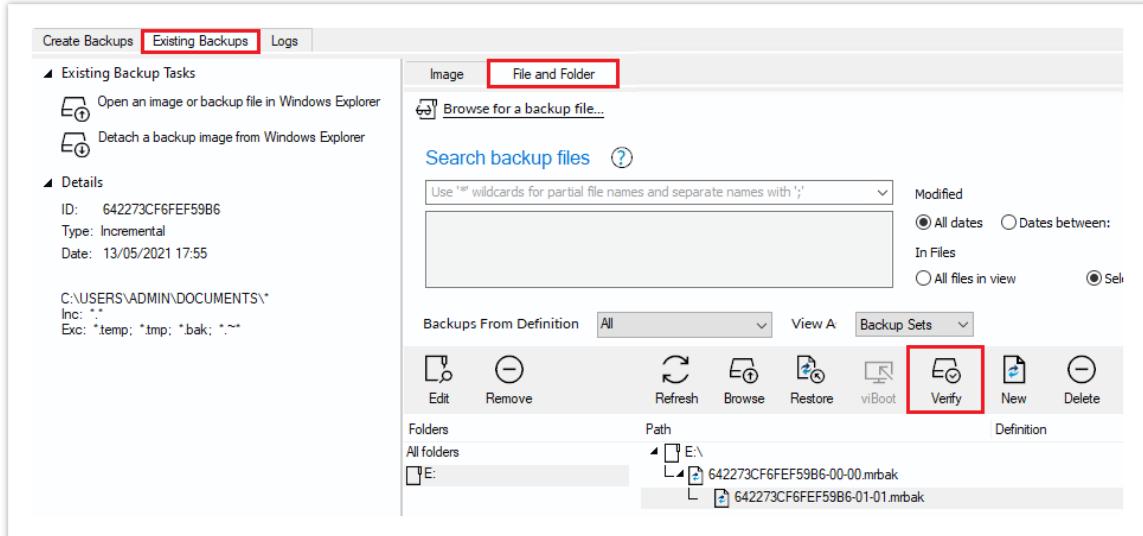
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Automatically attempt repair	<p>If selected and corruption is detected in a backed up data block then the current live file system is checked to see if it contains the original data. If found then the Image file is repaired by replacing the corrupt data.</p> <p>If not selected and corruption is detected and the current live file system contains the original data then the following message box is shown to either cancel the verification or correct the data:</p>  <p>Selected 'Repeat for all' to repair subsequent blocks automatically.</p> <p>Note: Verification will halt on the first un-repairable block detected.</p>
Verify just this Incremental	By default, the entire backup set required to restore the selected backup file will be verified. Select this option to just verify the integrity of the selected Differential or Incremental.

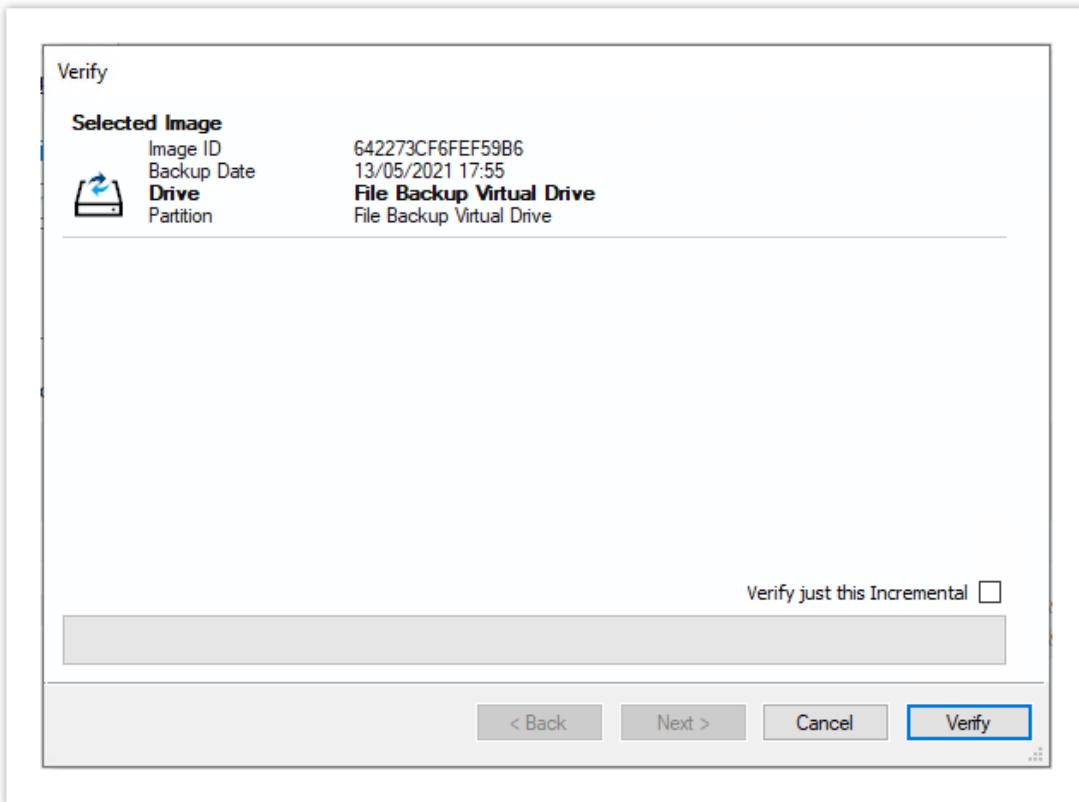
File and Folder Backups

1. Click the **Existing Backups** tab, then click the **File and Folder** tab. choose the File and Folder backup you want to verify and click the **Verify** icon.

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2. Click the **Verify** button in the dialog that opens:



Verify just this Incremental

By default, the entire backup set required to restore the selected backup file will be verified. Select this option to just verify the integrity of the selected Differential or Incremental.

How to backup Hyper-V Cluster Shared Volumes



Please ensure that you are running **Macrium Reflect v6.1.1309 or later**.

Disk images cannot be used to backup Hyper-V Cluster Shared Volumes.

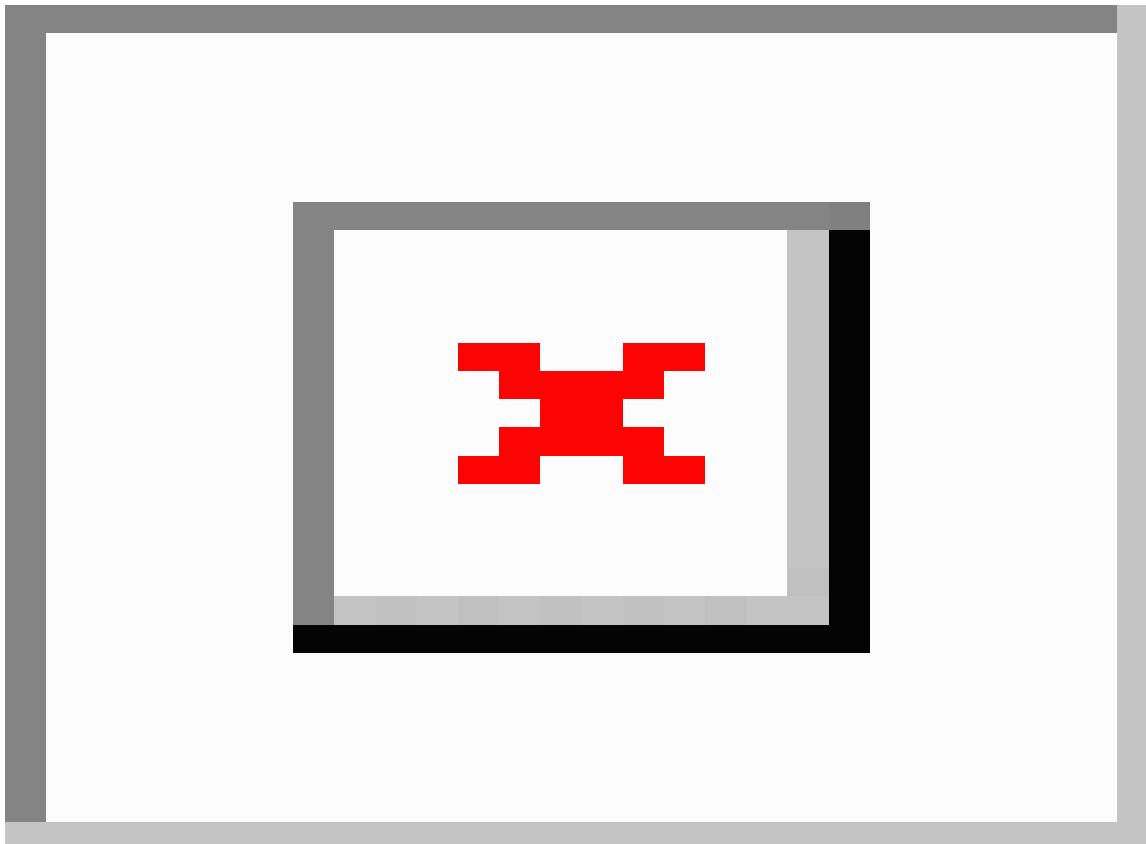
Server 2012R2 Hyper-V Cluster Shared Volumes (CSV) can be backed up using the **File and Folder backup** functionality in Macrium Reflect. **Earlier versions of Windows are not supported.**

You must use the **File and Folder** restore functionality to restore VHD and VHDX files. You cannot mount /browse backup files and use Copy and Paste to restore files larger than 4GB

To ensure that you have correctly backed up the CSV folders please check the backup log.

Successful CSV snapshot Example.

Note the lines 'CSV - Volume n' and the snapshot line:

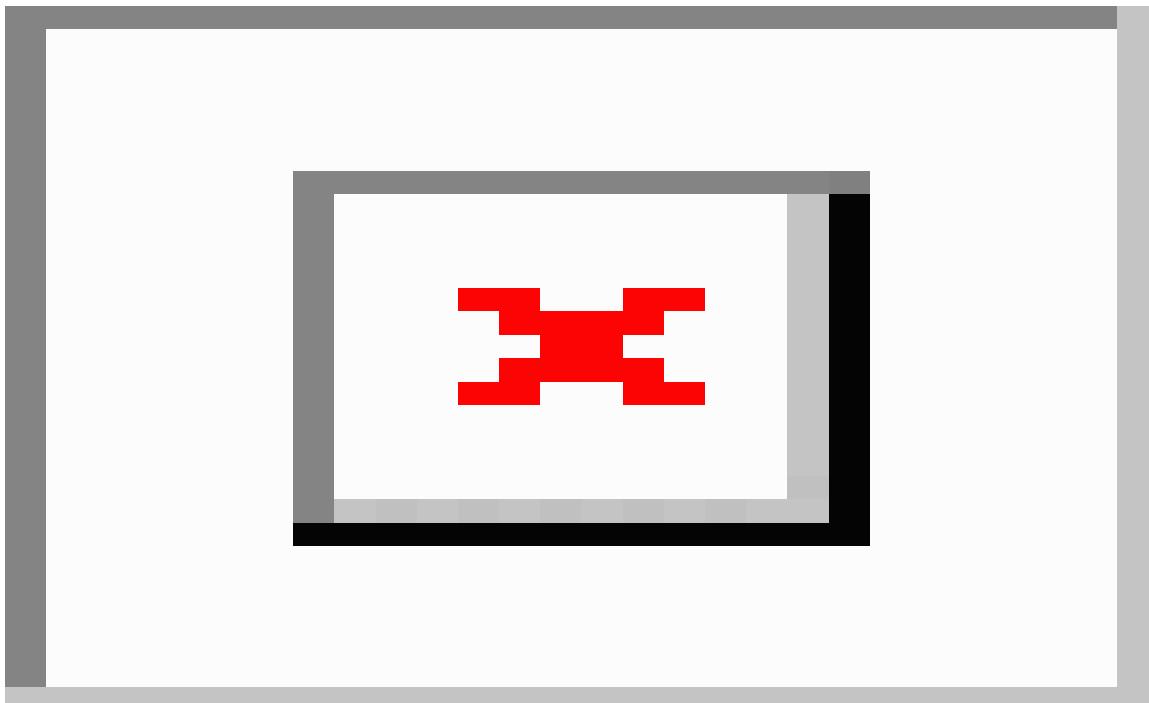


The successful VSS log will also indicate 'C:\ClusterStorage\Volume*' added to the snapshot:

```
Discover explicitly included components ...
Verifying explicitly specified writers/components ...
Select explicitly included components ...
* Writer 'Microsoft Hyper-V VSS Writer':
  - Add component \6FA1E0B1-72D8-4687-BAD8-C7BBC29E8338
Creating shadow set {e72a35c8-eefc-4fe9-bd50-35e95a123fe5} ...
- Adding volume \\?\Volume{12f7f3d3-b552-4a05-b948-da5ba054f7fd}\ [C:
\ClusterStorage\Volume1\] to the shadow set...
- Adding volume \\?\Volume{2cd57d04-80b0-4d12-ac10-406e9f121b09}\ [C:
\ClusterStorage\Volume2\] to the shadow set...
```

Failed Snapshot Example.

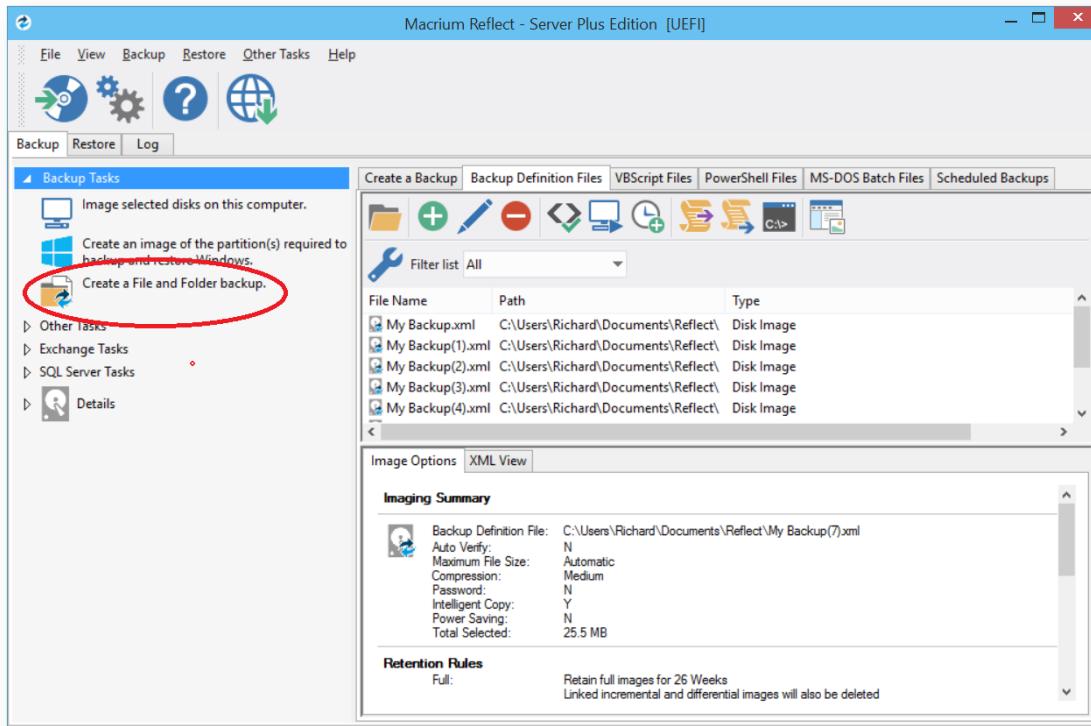
Note the Error message: **VSS failed for Cluster Shared Storage. Ensure that no folders outside of CSV mount points are included in this backup**



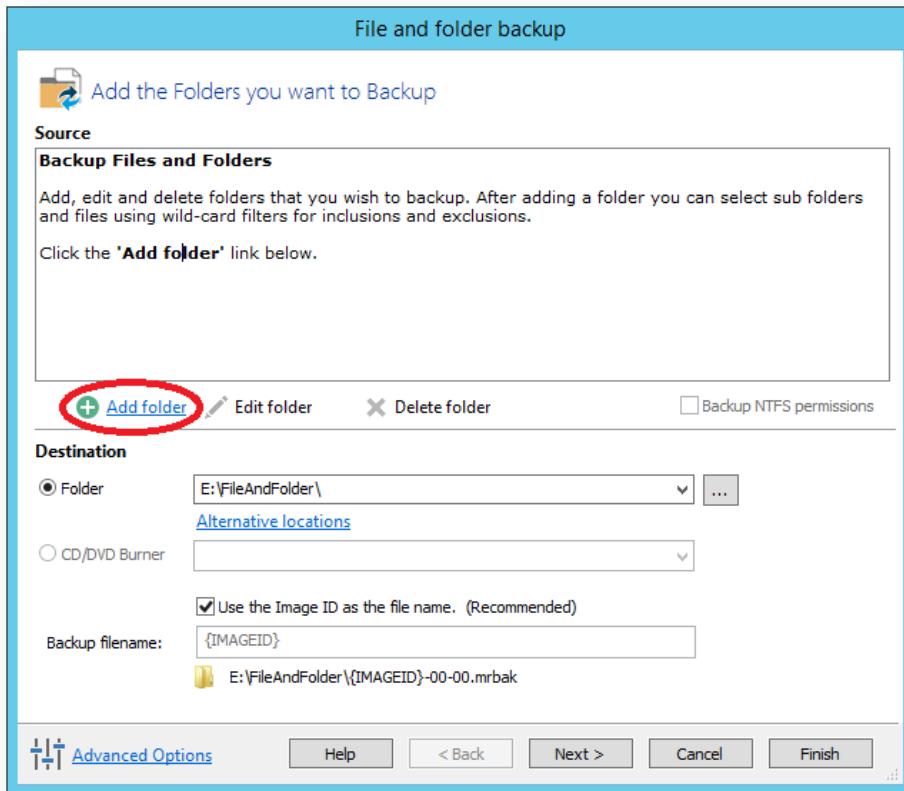
How to backup Cluster Shared Volumes

1. From the **Backup** task bar, select '**Create a File and Folder backup**' to start the backup wizard.

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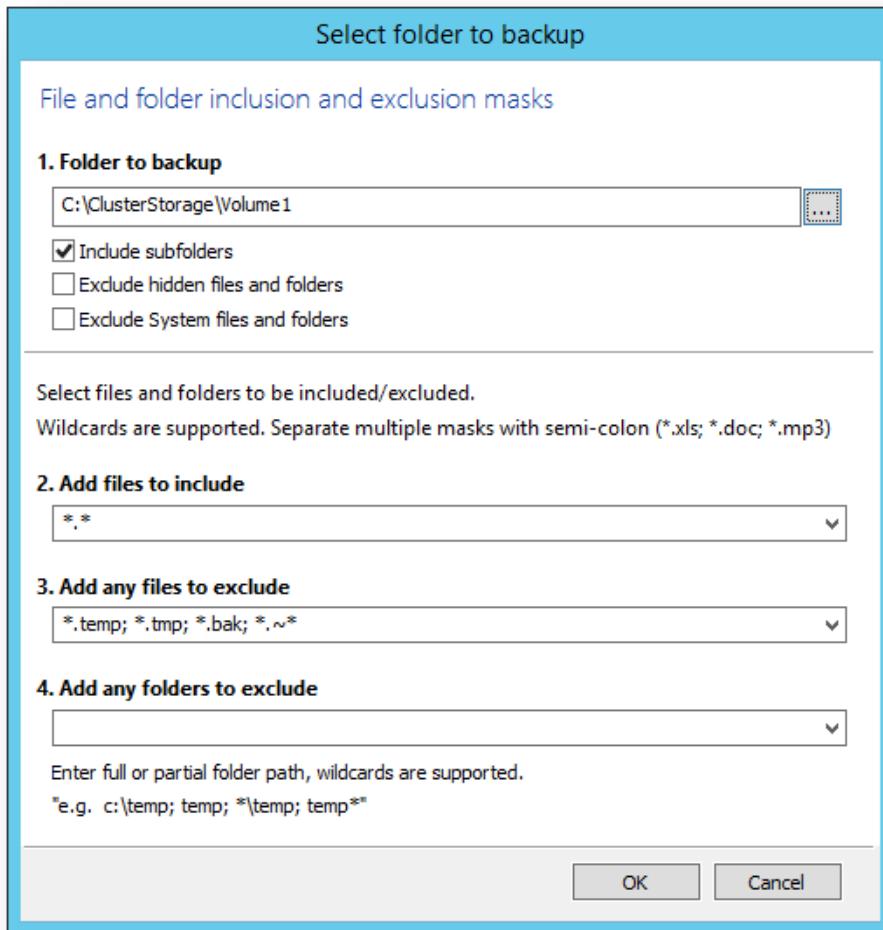


2. Select 'Add folder'.



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The 'Select Folder to backup' dialog appears.



Select/Add only folder(s) **beneath** the **C:\ClusterStorage** in order for the Clustered Shared Volume contents to be included in your backup.
Do not include folders outside of the '**C:\ClusterStorage**' mount point otherwise VSS will fail.

Several different masks and wildcards can be specified to include specific files within the given directory or exclude other files.

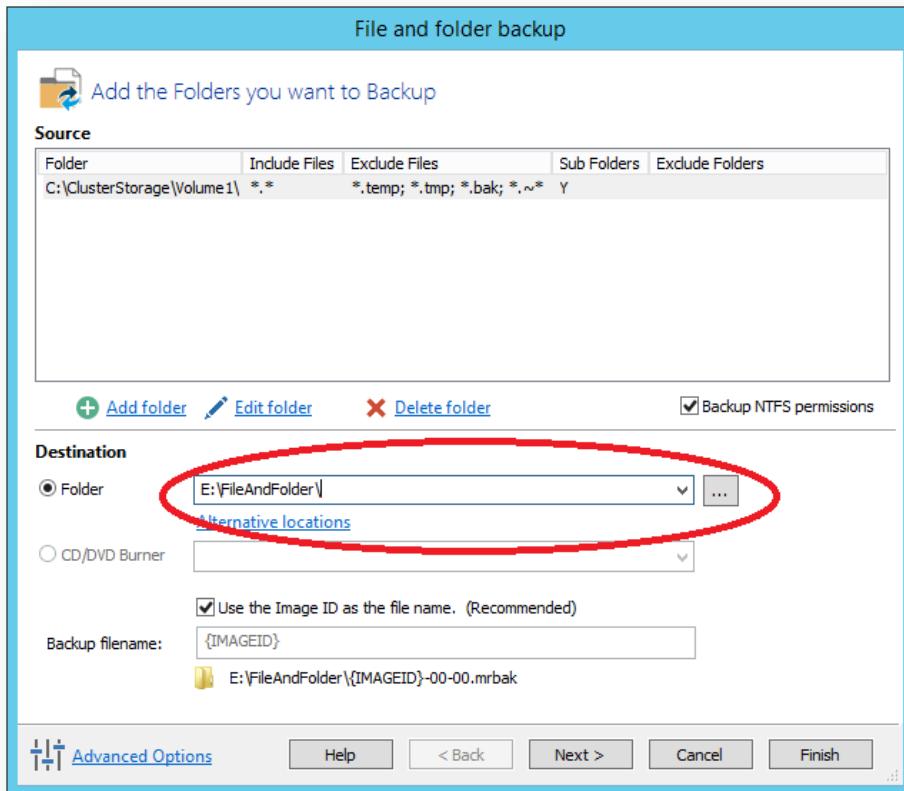
Option	Description
Include sub-folders	Recurse all folders below the backup folder using the specified filters
Exclude hidden files and folders	Do not backup files or folders that have the Hidden attribute

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Option	Description
Exclude system files and folders	Do not backup files or folders that have the System attribute
Add files to include	Add a semi-colon separated list of file name filters to include in the backup. Use the asterisk * character as a wild card. For example; *.doc; *data*; *.xls
Add files to exclude	Add a semi-colon separated list of file name filters to exclude from the backup. Use the asterisk * character as a wild card. Note: Exclude filters take precedence over include filters
Add any folders to exclude	Add a semi-colon separated list of folder name filters to exclude from the backup. Use the asterisk * character as a wild card. Filter names can be full path and/or folder names. For example: *temp* will exclude all folders with the letters 'temp' anywhere in the folder name \data\temp* will exclude all paths where the folder name begins with 'temp' that has a parent folder named 'data'

3. Click **OK**
4. Repeat to add further **CSV** directories if necessary.
5. In the **Destination** section, specify where you want the backup to be created.

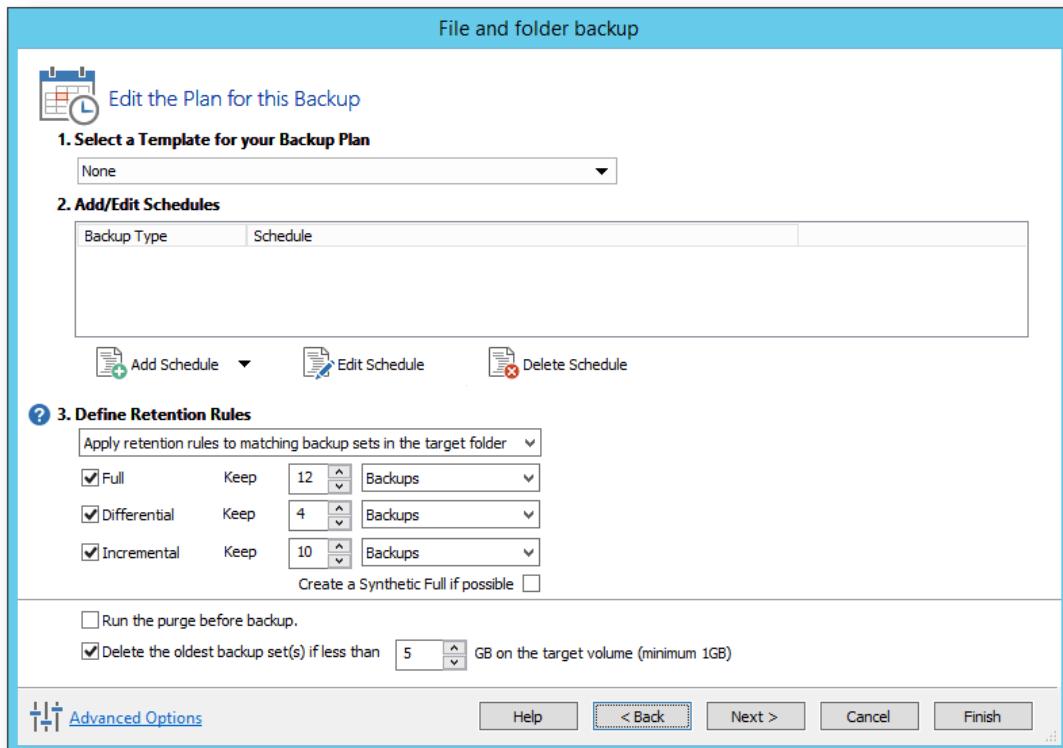
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Alternative Locations can be used to provide backup rotations or as a fail safe for temporary unavailability of the primary backup destination.

6. When you have finished adding folders and making all necessary changes, click **Next**.
7. The **Backup Plan** is shown:

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Macrium Reflect retention rules provide a powerful and flexible way to manage the lifetime and storage space used by your backups.

Choose how backups are matched, and how retention rules are applied to the target folder

Retention rules are applied to the target folder of the backup by selecting one of two options:

Similar backup sets in the target folder.	Disk Images are purged if they contain exactly the same Partitions as the current Image. Partitions are identified using the unique Disk ID stored in sector 0 of the disk and the Partition sector offset . Note: For GPT disks the unique GPT disk GUID is used instead of the Disk ID For File and Folder backups retention rules are applied according to the File and Folder ' Backup Set Matching ' selection.
	All backup sets in the target folder of the same type (Disk Image or File and Folder) are purged according the retention rules.

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All backup sets in the target folder.

Select the age or number of backup types that you wish to keep

Retention Rules Apply To

Matching backup sets in the target folder

Full Keep 12 Backups

Differential Keep 4 Backups

Incremental Keep 10 Backups

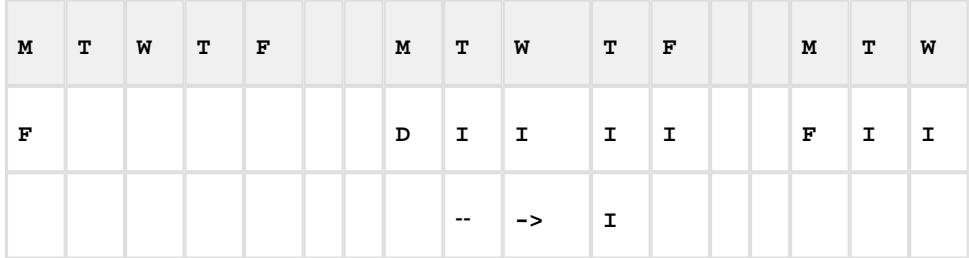
Create a Synthetic Full if possible

Purge before a backup

Purge oldest backup set(s) if less than GB on the target volume

Option	Description
Full	When deleting Full backups all linked incremental and Differential backups in the same backup chain (set) are also deleted. This operation will delete the entire backup set.
Differential	When deleting Differential backups all linked incremental backups in the same backup chain (set) are also deleted.
Incremental	When deleting Incremental backups the integrity of the backup set is maintained by ensuring that the chain is never broken. This is achieved by merging older Incremental backups when required. In the example below, before retention, there is 1 Full backup , 1 Differential backup and 6 Incremental backups. The retention rules are set to retain 4 incremental backups. After retention, the most recent 4 incremental backups are retained. Deleting the oldest 2

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Option	Description
	<p>incrementals would cause the backup chain to be invalid as the oldest retained incremental requires the previous 2 incremental backups to complete the chain. To ensure backup integrity the 2 older incremental backups are consolidated with it to create a new incremental backup.</p> <p>F = Full D = Differential I = Incremental</p> 
Create a Synthetic Full if possible	When purging Incremental backups, if the backup set only contains a Full backup followed by Incremental backups , then this option causes the Full backup to be 'rolled forward' to create a Synthetic Full backup . This is also known as Incremental Forever .
Run the purge before the backup	Select this option to run the retention rules before the current backup. Note: in Macrium Reflect v5 the current backup set wasn't included in the purge calculation when purging before the current backup. In v6 the current backup set IS included. This means that if you set the retention count to 1 Full backup then all of your backups will be deleted and a new Full backup created.
Delete oldest backup set (s) if less than n GB	Automatically remove the oldest backup set(s) in the target folder if the free space on the drive drops below the GB threshold. Note: The free space threshold is actioned dynamically. If the free space available drops below the threshold then the running backup is temporarily paused while older backup sets are purged.

8. The next screen, **Summary**, gives the details of what is being backed up. Click **Finish**.

Restoring and browsing

Macrium Reflect can restore disk partitions exactly as they were when the backup was taken. With File and Folder backups you can restore all or selected files and folders to their original or new location.

You can also explore any backup or image file in Windows Explorer. This powerful feature enables you to restore individual files or folders by simply using copy and paste.

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To restore whole computers, including boot partitions, Macrium Reflect uses Windows PE, a cut down version of Windows. On a working system, when you restore to an earlier time, Macrium Reflect reboots into the Windows PE operating system, carries out the requested restore, then boots back into the restored operating system. On a system that is not working, to restore to an earlier time, you need to boot from your Windows PE rescue media, whether that is a CD, DVD or USB-stick. The rescue media contains Macrium Reflect so that you can carry out the restore, then boot back into the restored operating system.

Although this all sounds complex, it really is very simple to perform with Macrium Reflect leading you through each step.

Finally, if you have *Macrium Reflect Server Plus*, it has a rich feature set for restoring backups of SQL databases and Microsoft Exchange Servers while giving you the power to restore to any time and granularity right down to an individual email.

Further reading:

- Restoring an image from within Windows
- Understanding partition alignment
- Browsing Macrium Reflect images and backups in Windows Explorer
- Restoring a file and folder backup
- Restoring MS SQL
- Restoring MS Exchange databases
- Restoring an MBR System image to UEFI/GPT
- Restoring a UEFI/GPT System image to MBR
- Bare metal restore of a Dynamic disk system
- Drive letters assigned to restored or cloned partitions
- Restore to VHD

Restoring an image from within Windows

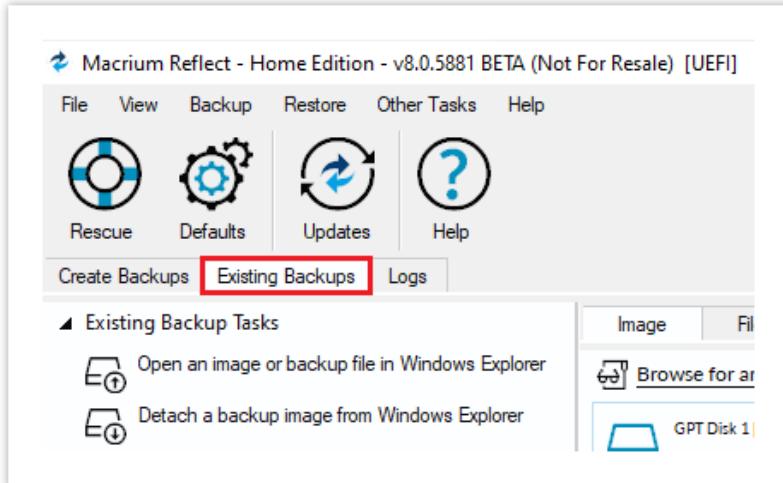
This topic is for restoring a data image. For restoring a system image see [Restoring a System image from Windows](#).

If the image contains only data, restoring it is very simple using Macrium Reflect. You can restore it back to its original location without interrupting the operating system.

Before you begin: You must have a backup image of the disk ready to restore.

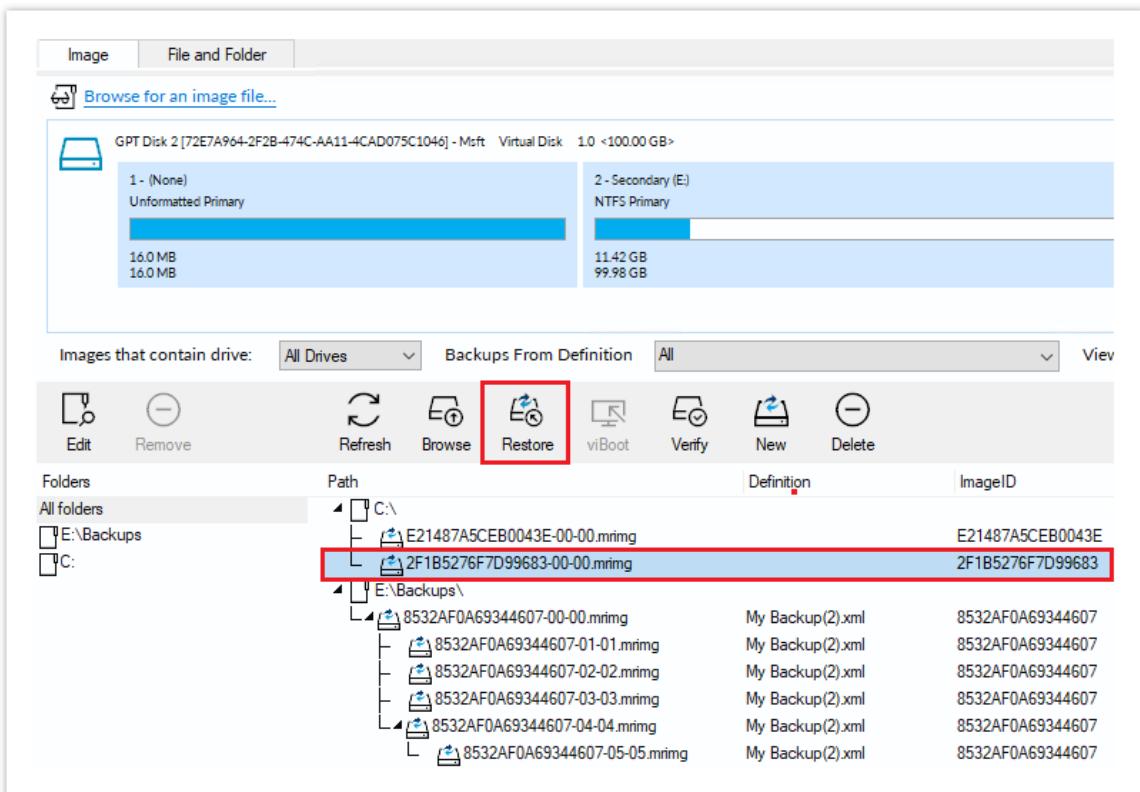
1. On the main screen, select **Existing Backups**.

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Backup images available to be restored are shown in the main pane.

2. Select the image you wish to restore and click the **Restore** icon.



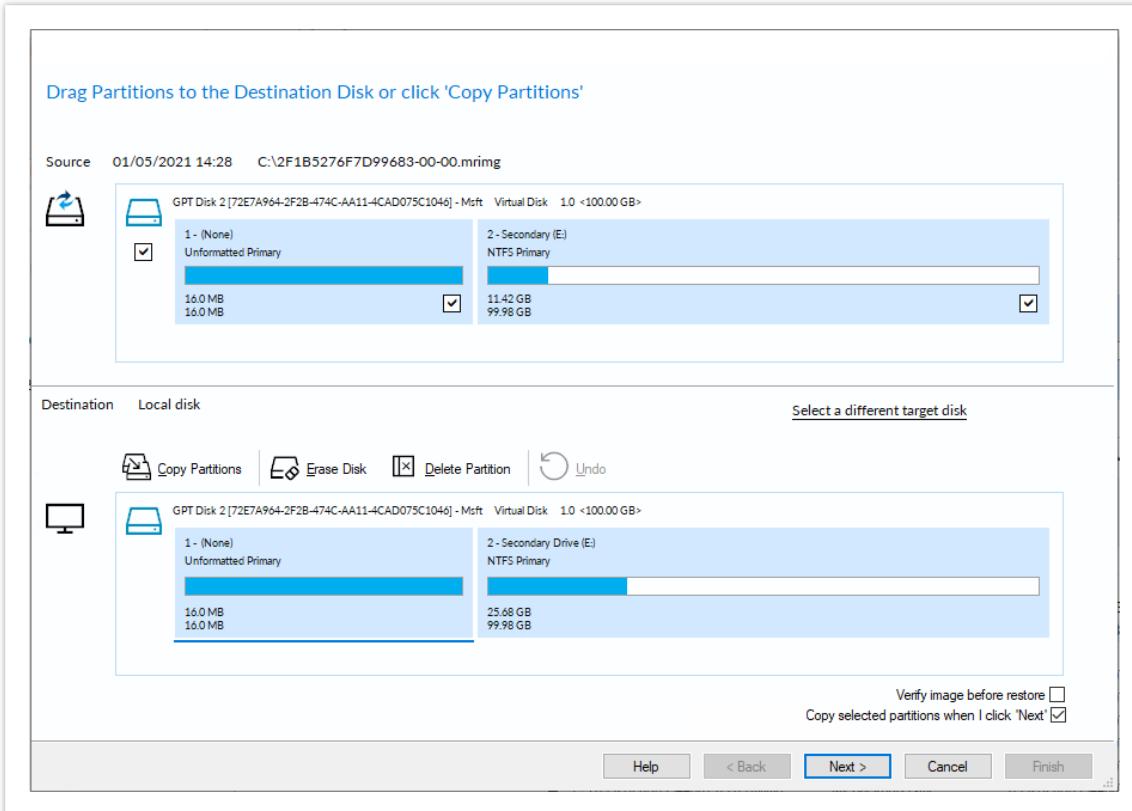
3. The next dialog gives you the opportunity to modify the destination properties.

① Moving and Resizing the restored partition

To restore partitions, select **Copy Partitions**, you can then select **Exact partition offset and length** to restore the partitions to the same location on the target disk, or select **Shrink or extend to fill the target disk** to resize the partitions automatically to fit the target. It's also possible to

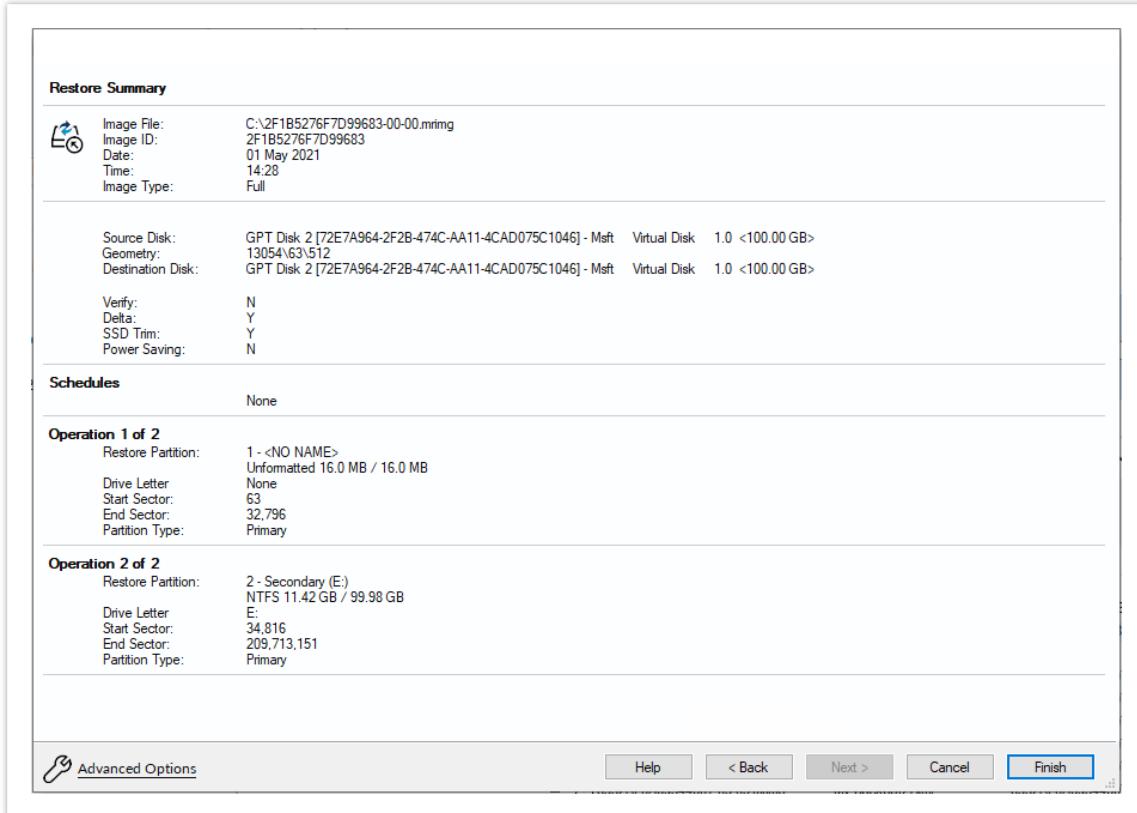
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select a different target disk and to drag partitions to different locations, and resize them manually them to use the available space. Simply drag the source partition to any available partition or free space on the target disk. You can also delete partitions on the target disk to make space. For more destination options and further information, see [Modifying restored partition properties](#).



4. Click **Next** to restore back to the original location.

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5. If required, set Advanced Options as follows:



Option	Description
Rapid Delta Restore:	Copy only changed data blocks to complete the restore process more quickly See: Rapid Delta Restore - RDR
SSD Trim:	Enable TRIM on restore to increase both the lifetime and the performance of the SSD. See: SSD Trim Support
Verify Image:	To verify the image integrity before restoring.
Master Boot Record:	

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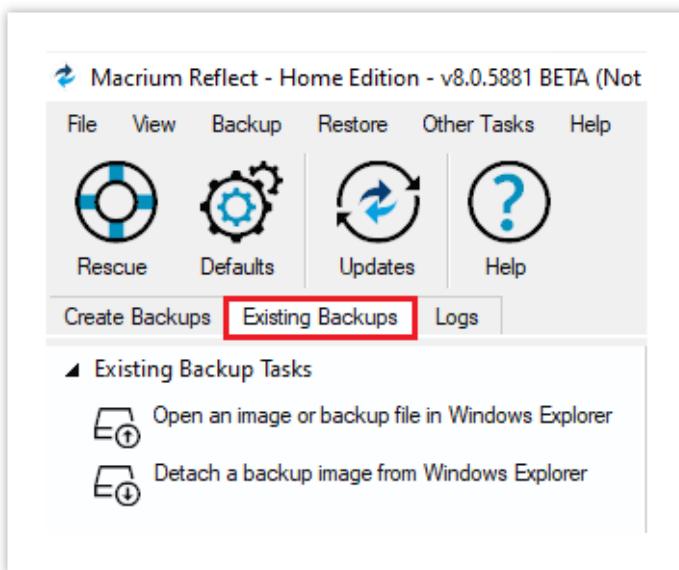
Option	Description
	To replace the Master Boot Record (MBR) with the MBR from the backup. The MBR is a small program that executes when the computer starts up. If this program becomes corrupt then you can have problems starting the computer operating system. Note: On modern GPT/UEFI systems this option has no effect.
Shutdown	Set power saving options after a restore task has completed.

6. A summary screen is displayed confirming the choices that have been made, click **finish**.

Restoring a System image from Windows

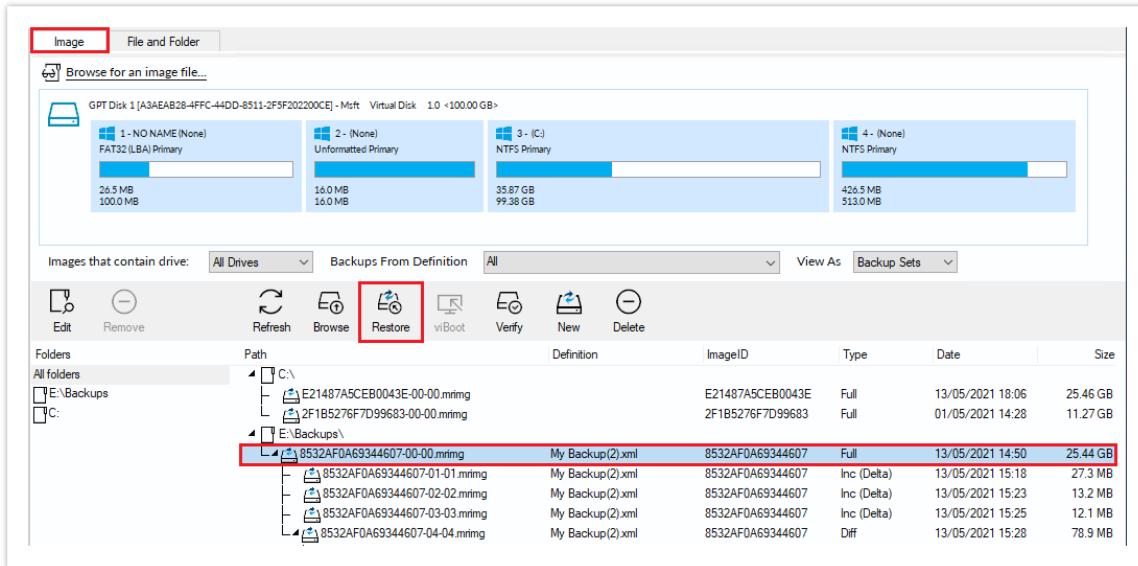
System images of, for example, the C drive, contain operating system files so it is not possible to restore files in real-time because they will be in use by the operating system. To resolve this Macrium Reflect boots Windows PE, a cut-down version of Windows. It then restores the file system before rebooting again and loading the restored Windows OS. Although this sounds complex, it really is very simple to perform.

1. In the main application window, select **Existing Backups**.

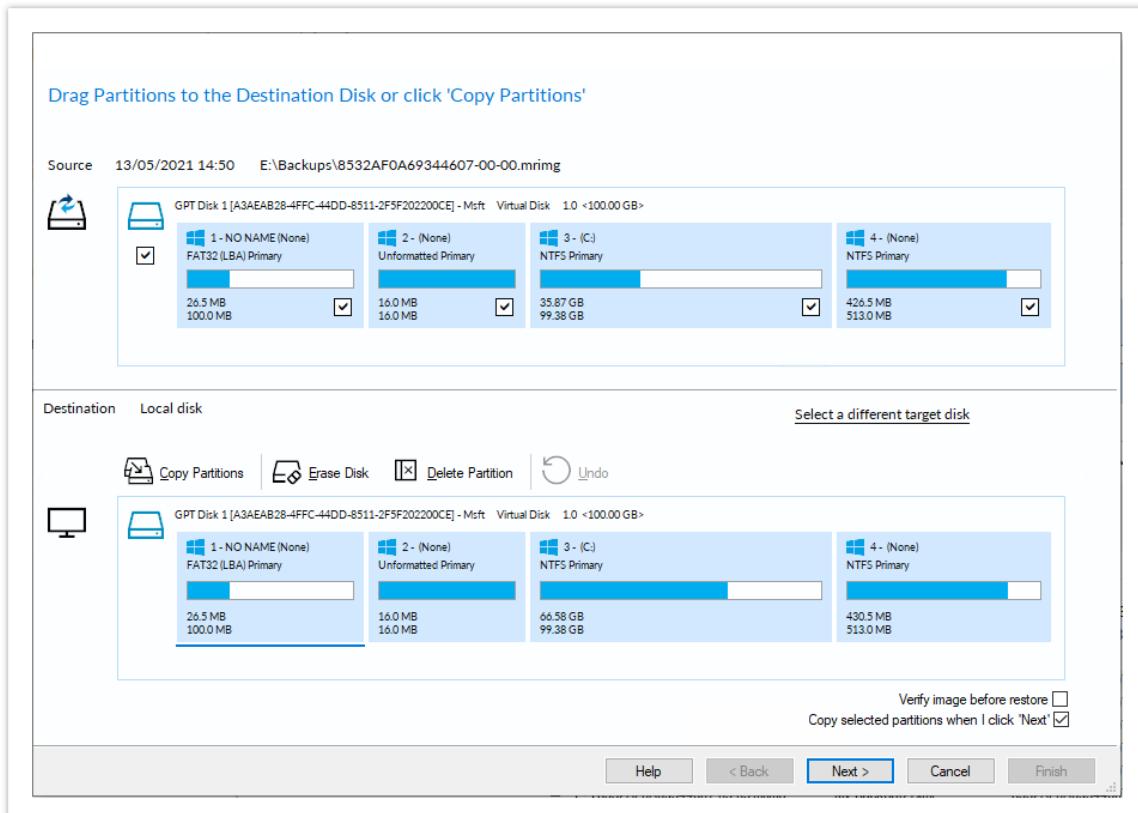


2. Select the required image and click the **Restore** icon.

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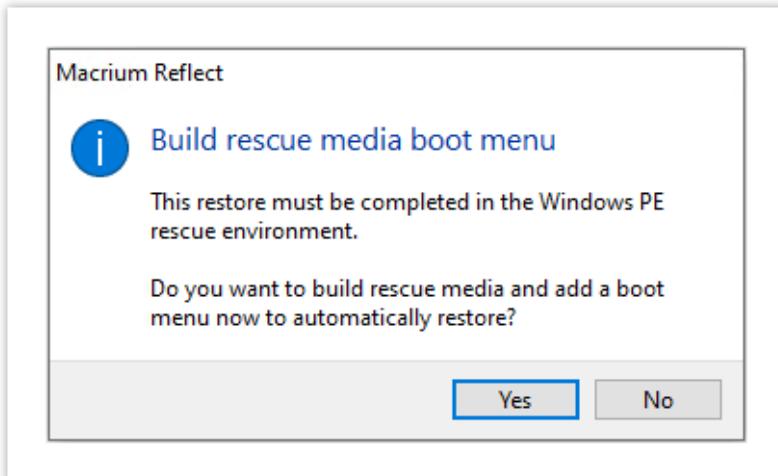
3. The next dialog gives you the opportunity to restore the image, click **Next** and select all defaults.



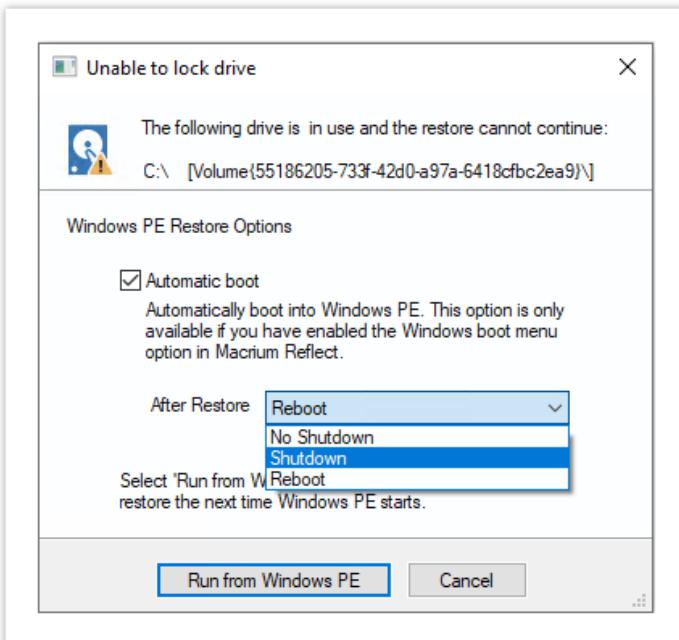
Note: By default, partition(s) restore to their original locations. However, it is possible to restore to a different partition by using Drag and Drop. Simply drag the source partition to any available partition on the target disk. See [Modifying restored partition properties](#)

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4. Review the summary and click **Finish**.
5. Macrium Reflect, recognizing that it is not possible to restore the image to the C drive, displays a dialog informing you that Windows PE must be used. Click **Yes**.



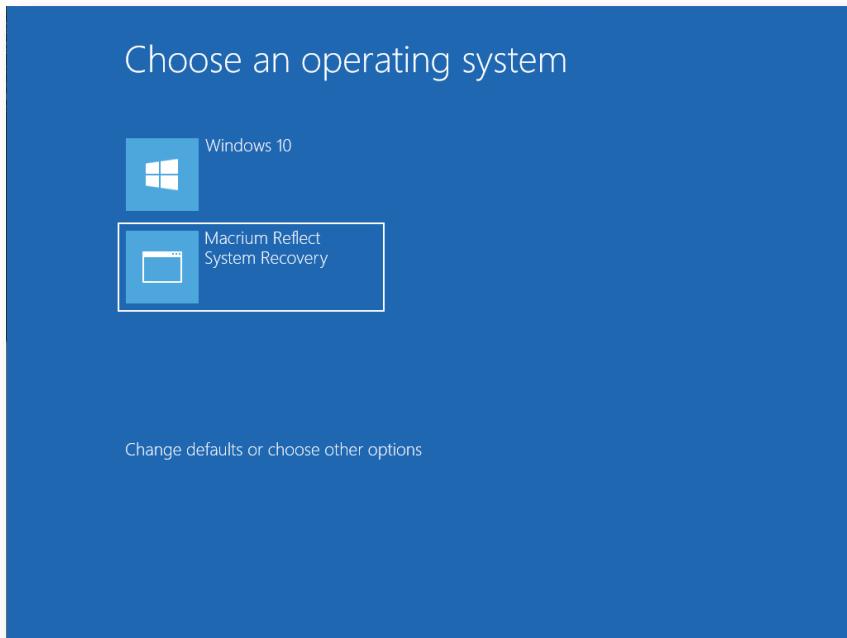
6. You will then be prompted to boot into Windows PE and configure what will happen after the restore. Once you have selected what will happen after the restore, select **Run from Windows PE**.



Note: If the option for 'Automatic boot' is unavailable please follow the steps [Adding a Boot Menu option for system Image recovery](#) and retry the restore.

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7. You are prompted to restart your PC. Close any saved work and click **Restart Now**.



8. The system reboots, Macrium adds a boot menu option and automatically selects the recovery environment.
9. Windows PE boots and automatically runs Macrium Reflect. Macrium Reflect detects which image is to be restored and starts restoring automatically. When restore is complete, Macrium automatically reboots the PC again and the restored Windows OS boots as normal.

Restoring a system image video

Modifying restore destination partition properties



Note: Macrium Reflect v8 adds improved the Restore and Clone functionality by adding automatic fill /shrink where the target disk is a different size to the source. The most common disk copy tasks are automated by using the toolbar 'Copy' functionality but we've also added the ability to set free space before and after a copied partition to precisely locate and resize partitions on the target disk.

Please see [Restore and Clone Partition Layout](#)

Hard disks are organized into partitions, similar to a filing cabinet, to optimize the use of space on the device. Each partition contains a small amount of error correction data, in case of a fault. Partitions are aligned to further optimize the amount of error correction data they require, maximizing the available space on the device.

There are two alignment possibilities used by Windows:

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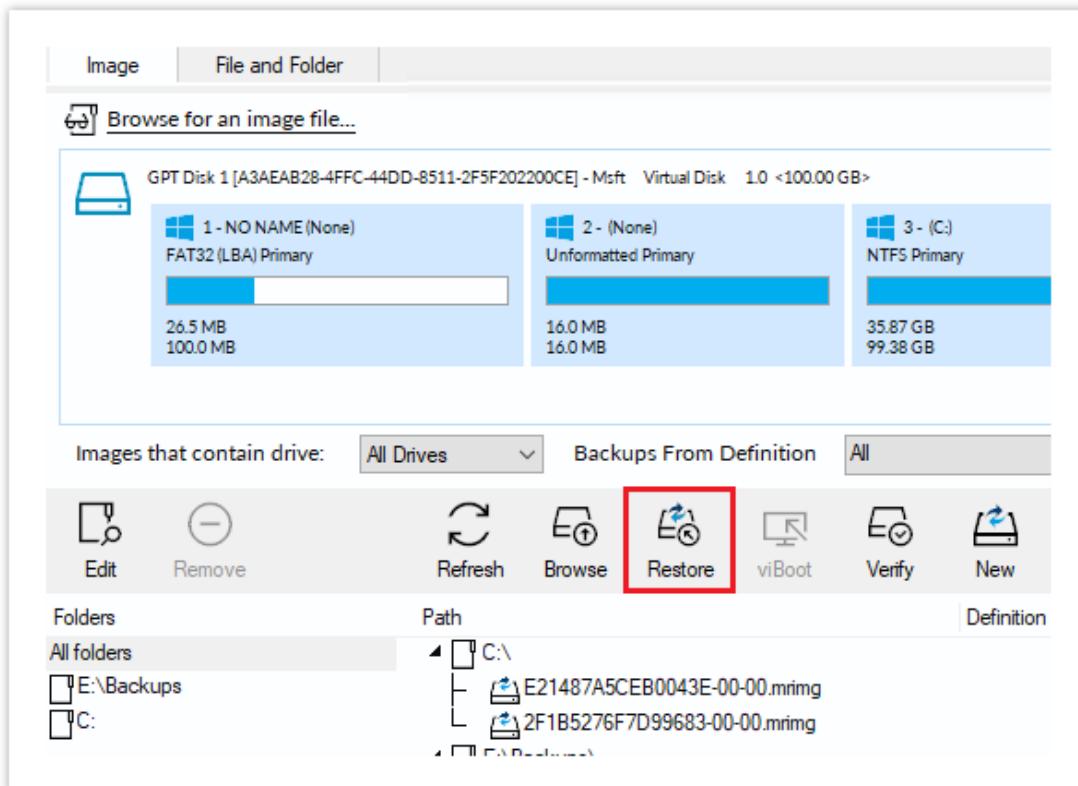
1. 1MB alignment. Beginning with Windows Vista/Server 2008 partitions are aligned on 1MB boundaries. For a disk with 512 bytes per sector, this equates to 2048 sector alignment.
2. Cylinder, Head, Sector (CHS) alignment. This is the alignment used by all Windows versions, up to and including Windows XP/Server 2003. Disks are described as having sectors, heads, and cylinders, typically 512 bytes per sector, 63 sectors per head, and 255 heads per cylinder. A head is often referred to as a track. Partitions start on a head (or track) boundary and end on a cylinder boundary <http://en.wikipedia.org/wiki/Cylinder-head-sector>.

Solid State Disks (SSD) require partition alignment to 4KB boundaries for optimum performance and life. 1MB aligned partitions are aligned on 4KB boundaries so present no problem, however, CHS aligned partitions are often aligned on 63 sectors (31.5KB) degrading SSD performance and life span considerably. This can be improved by modifying restore destination partition properties when you restore an image.

When you ask to restore images Macrium Reflect initially sets out to restore the partitions back to their original position on the disk. From here you can modify their destinations.

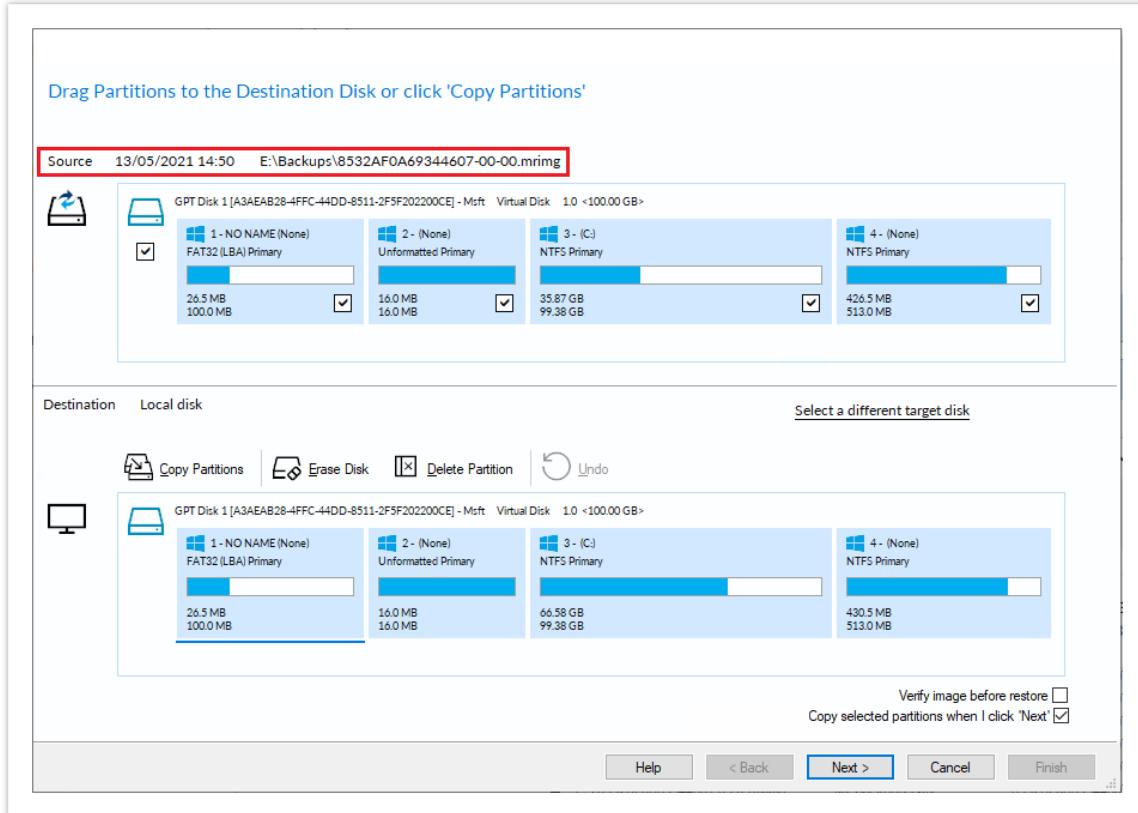
To modify the restore destination:

1. Click the **Restore** icon.



2. The following dialog shows. **Source** shows the location of the image file we are restoring from. The **Target** is the original location.

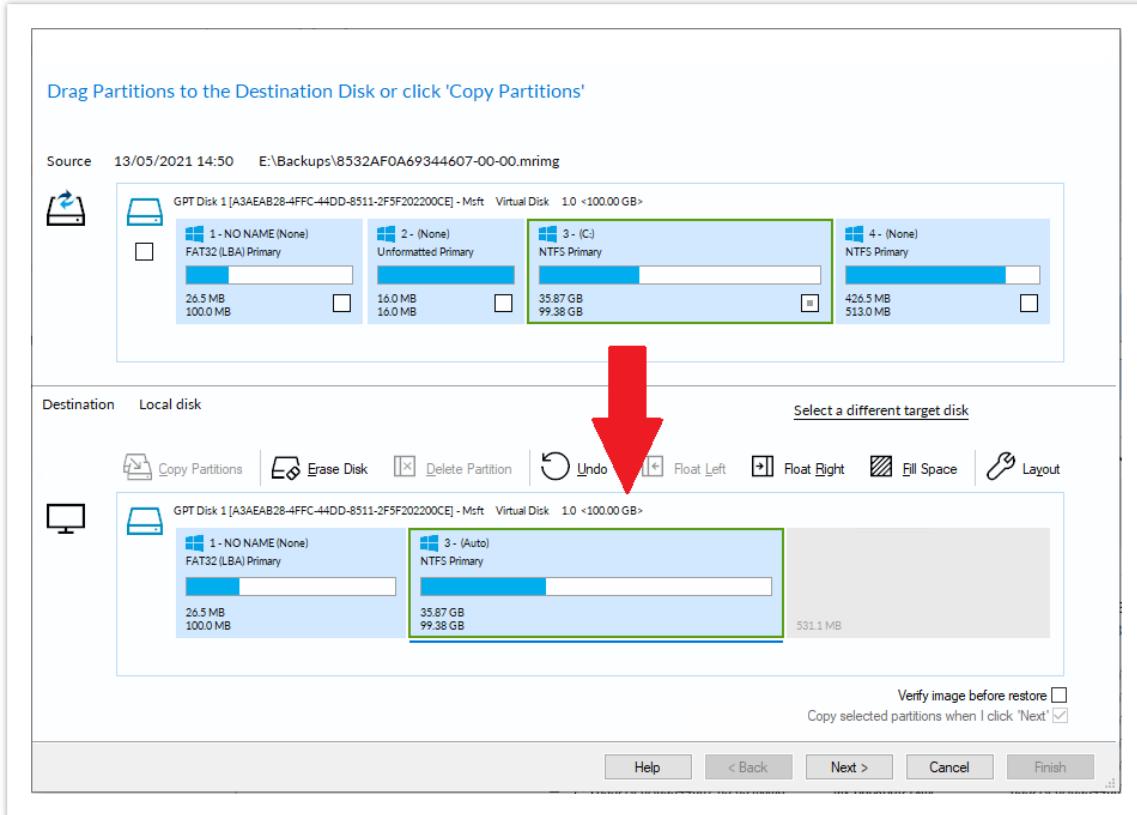
Macrium Reflect v8.0 User Guide



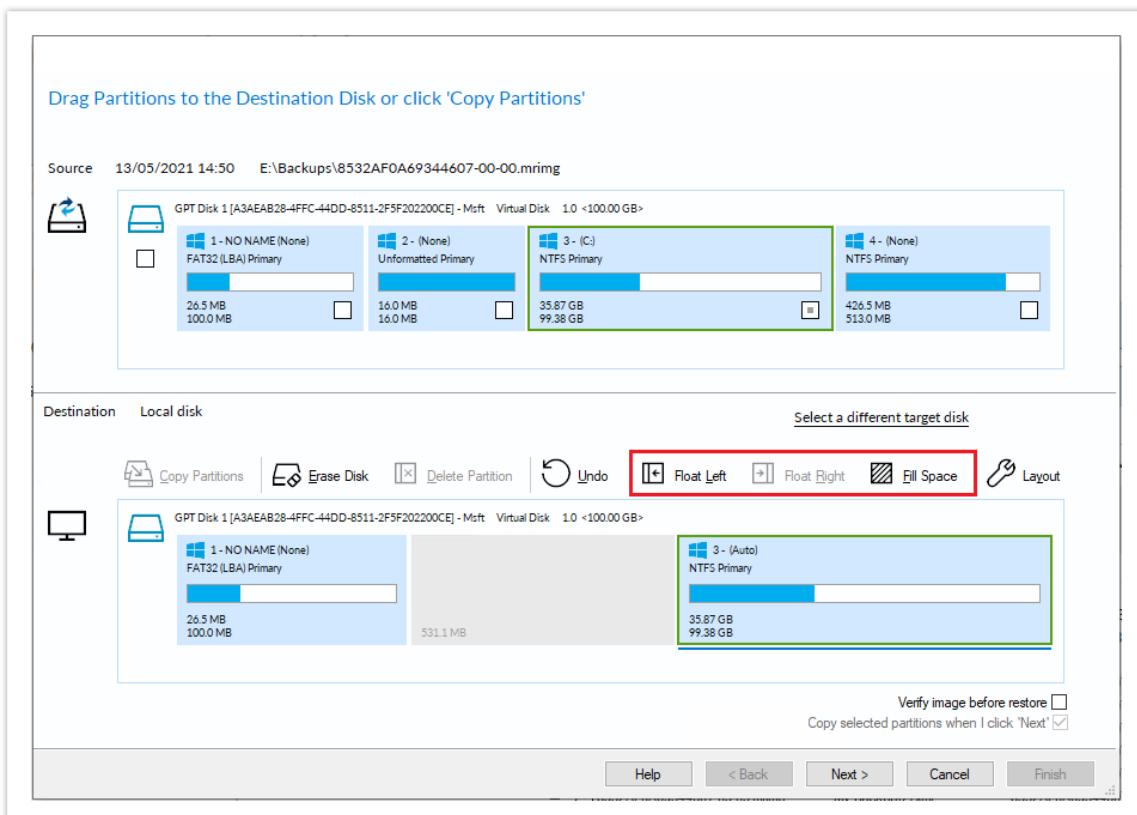
3. Click **Select a different target disk** and select the required target disk.
4. If you have partitions on the target disk which you are sure can be deleted, select each one in turn and click **Erase Disk** to delete all partitions on the disk, or select **Delete Partition** to delete certain partitions.
5. Drag the source partition onto the destination partition.

The partition locates to the first available free area of the new disk. In this case, partition 2.

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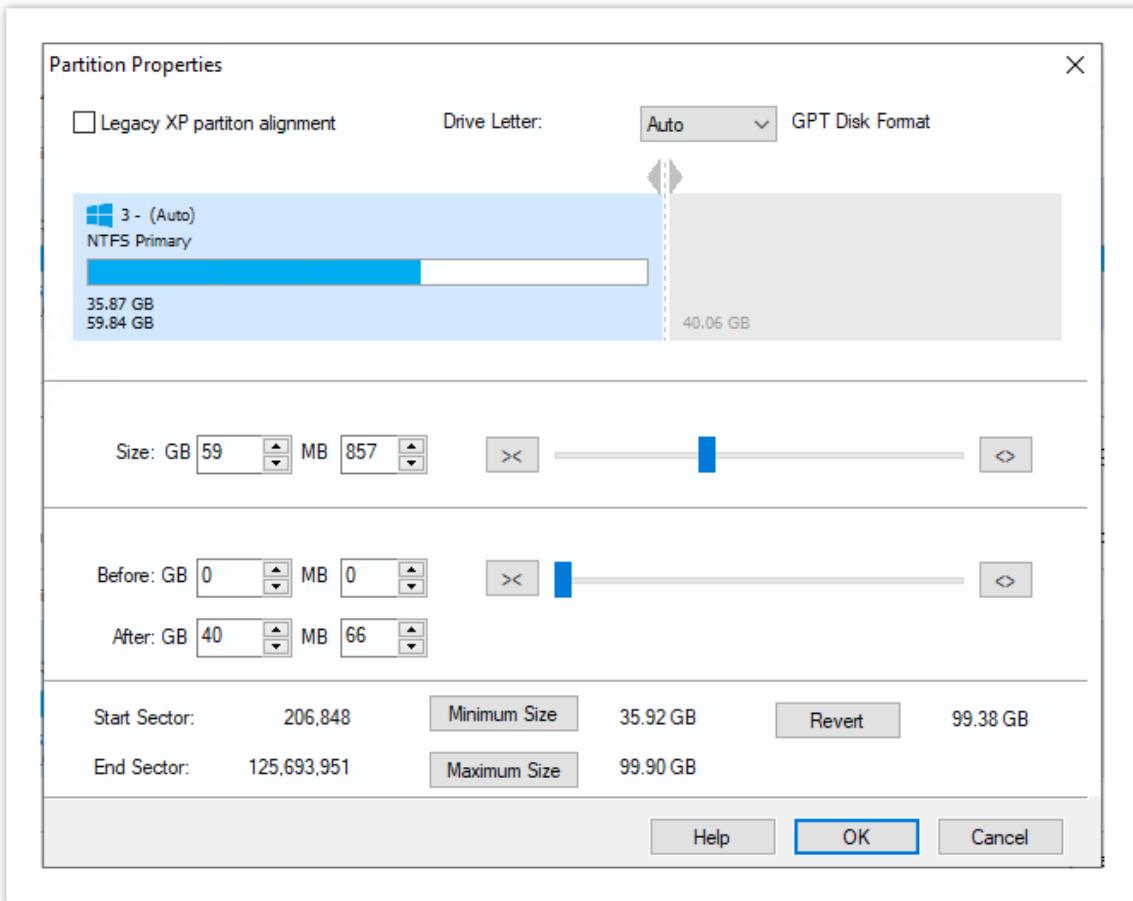


6. The partition can be floated between the left and right of the disk, and also resized. The partition shown below has been floated to the right:



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7. Click **Layout** to open the partition properties window for additional options.



8. There are a number of things you can do here:

- Modify the drive letter by selecting another from the list.
- Click between the arrows < > above the disk view and drag the partition to a new size.
- Fine-tune the **Partition Size**, **Free Space**, and **Location** on the destination disk.
- Click **Maximum Size** to configure the partition to the maximum available unallocated space on the disk, in this case about 10 TB (the size of the disk)
- Click **Minimum Size** to configure the partition to the minimum size, The minimum size is equivalent to the used space on the restored partition plus 50MB.
- Click **Revert** to set the partition to the same size as it was when backed up.



Note: If the source disk is an MBR disk and the target is greater than 2TB in size then the restore process will automatically convert the disk to GPT style format.

9. Click **OK**.

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See also: [Drive letters assigned to restored or cloned partitions](#)

Understanding partition alignment

Partition alignment refers to the physical sector offset of partitions. There are two alignment possibilities used by Windows:

1. **1MB alignment.** Beginning with Windows Vista/Server 2008 partitions are aligned on 1MB boundaries. For a disk with 512 bytes per sector this equates to 2048 sector alignment.
2. **Cylinder, Head, Sector (CHS) alignment.** This is the alignment used by all Windows versions, up to and including Windows XP/Server 2003. Disks are described as having sectors, heads and cylinders, typically 512 bytes per sector, 63 sectors per head and 255 heads per cylinder. A head is often referred to as a track. Partitions start on a head (or track) boundary and end on a cylinder boundary. <http://en.wikipedia.org/wiki/Cylinder-head-sector>

Partition alignment and Solid State Disks (SSD)

Solid State Disks require partition alignment to 4KB boundaries for optimum performance and life. 1MB aligned partitions are aligned on 4KB boundaries so present no problem, however, CHS aligned partition are often aligned on 63 sectors (31.5KB) degrading SSD performance and life time considerably.

Partition alignment and the Macrium Reflect cloning and restore function

To preserve the source partition alignment either...

1. Select the source partition check box(es) and click the 'Copy selected partitions' link.
 2. Drag and drop the source partition(s) to free space on the target disk
-

To use the target partition alignment.

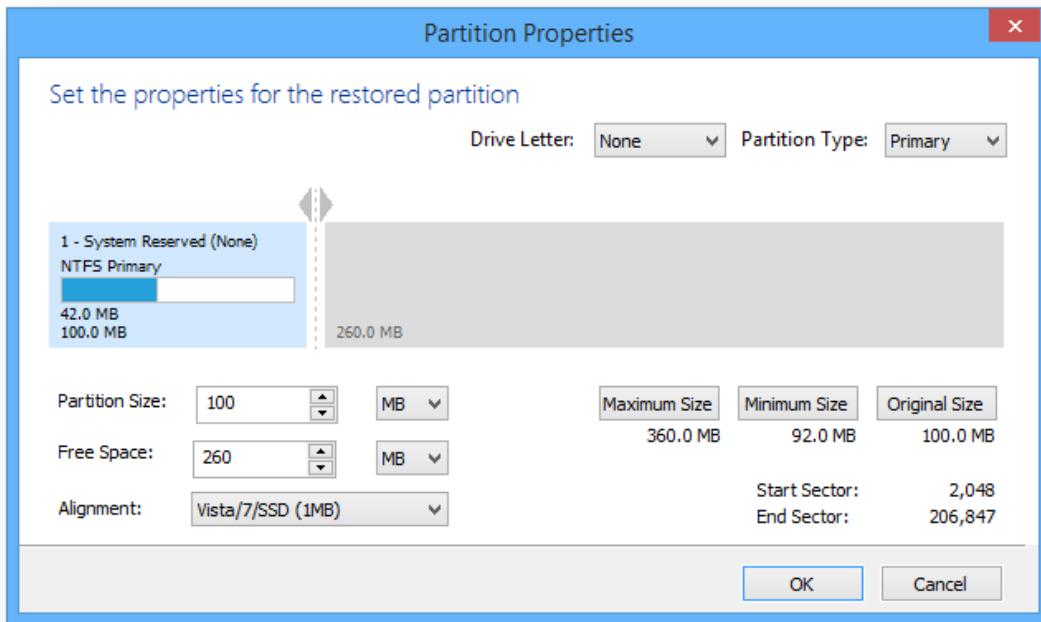


Note: This could be used to 'convert' an XP aligned partition for SSD alignment

1. Drag and drop the source partition to an existing partition on the target disk

These defaulted alignment possibilities can be overridden in the Partition Properties dialog by selecting the 'Alignment' drop down control.

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Browsing Macrium Reflect images and backups in Windows Explorer

Introduction

By mounting image files in Windows Explorer you can browse or explore an image and access all the files in a backup. The backed up data appears as a temporary drive in Windows Explorer that you can access, just like any other drive, mounted with its own drive letter. Individual Files and Folders can easily be recovered by using Copy and Paste.

If you mount an Incremental or Differential backup, the chosen folder must contain *all* the files required to load the image. Meaning an Incremental backup requires all the previous files in the backup set to be present, and a Differential backup requires the Full backup to be present. For example, If your backup is split across multiple DVD's then it isn't possible to mount the backup.

If you restart Windows, all temporarily mounted images are detached.

There are several ways to mount/unmount an image:

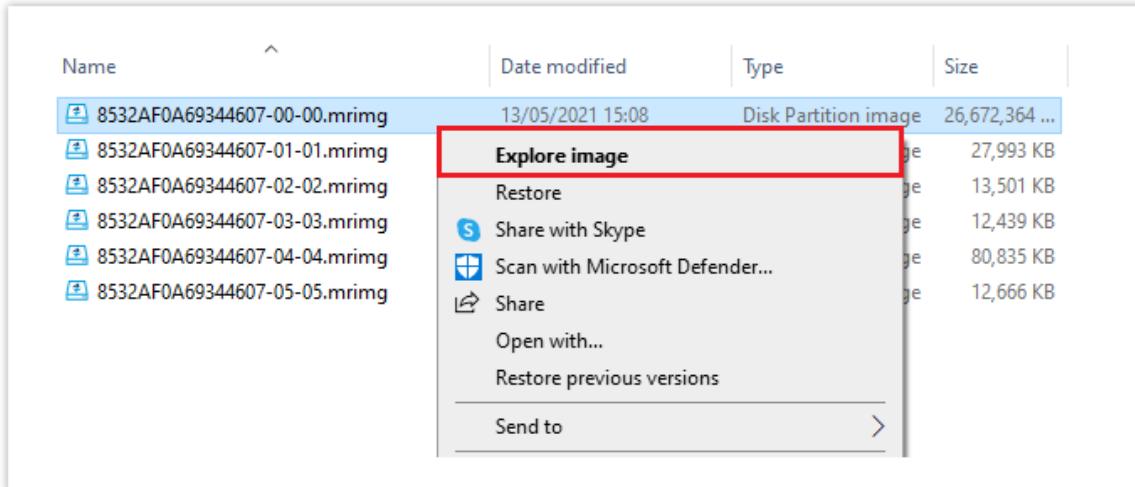
- Mounting an image in Windows Explorer
- Using Macrium to mount an image
- Using Macrium Reflect Command Line Interface (CLI) to mount an image
- Unmounting a temporary mounted drive

See also: [Browsing Linux Ext File System Images](#)

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Mounting an image in Windows Explorer

1. Navigate to the location of the image you wish to mount.
2. Right-click the image file and select **Explore image**.

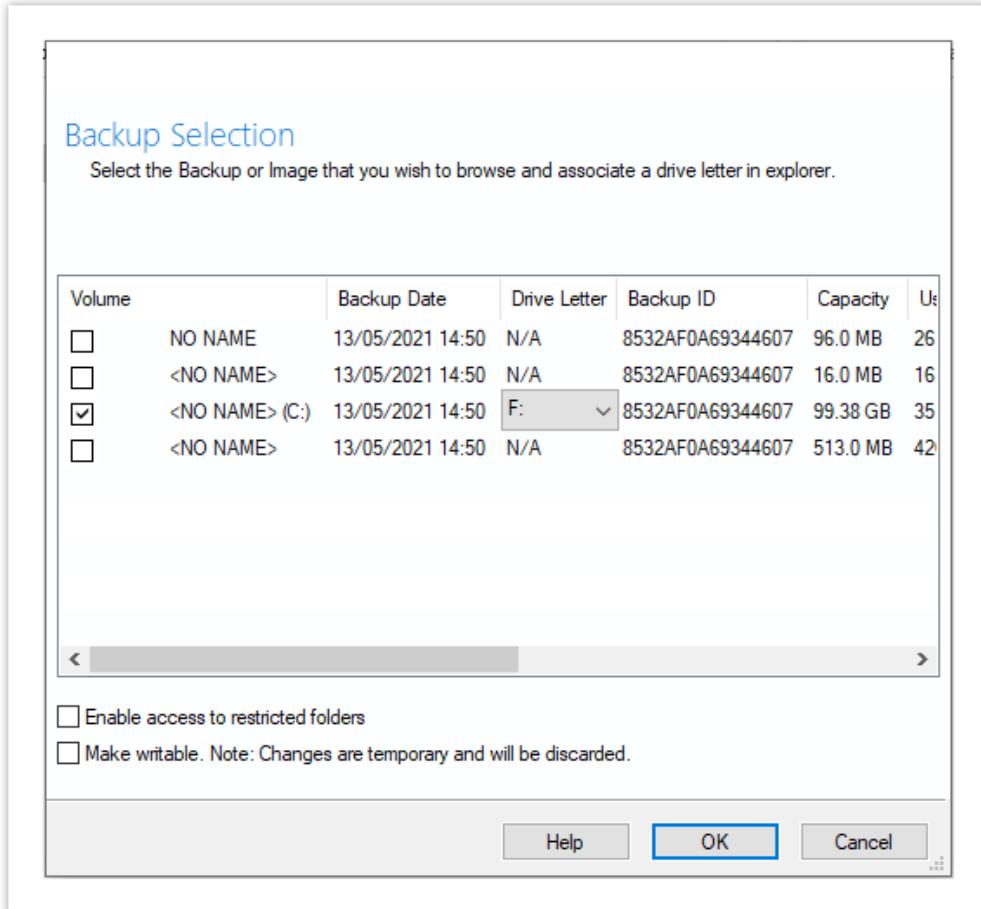


3. Select the partition you wish to mount and click **OK**.

In this example, the image only contains one partition.

You can also select which **Drive Letter** you would like to be assigned.

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The option **Enable access to restricted folders** mounts the image with full NTFS access rights to all folders in the image. This means you can browse images created on another PC without having to grant NTFS permissions.

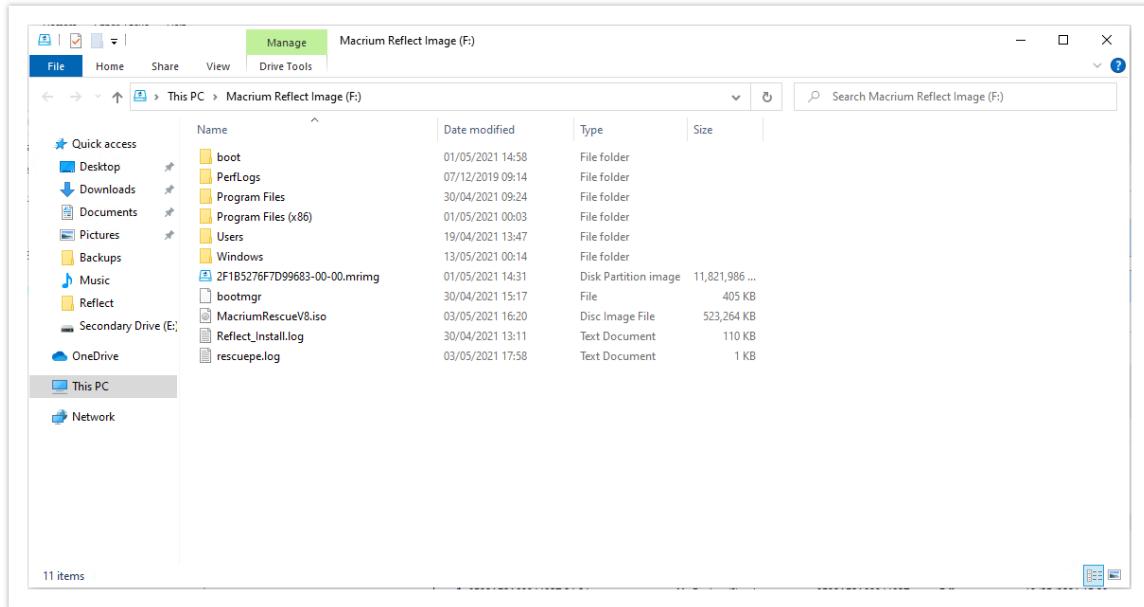
The option **Make writable** makes the mounted file system temporarily writable. This is useful when accessing files in the image where the opening application is required to write to the file. For example, Microsoft Virtual Hard Disk (.vhdx) files can be mounted and files in the mounted backup can be recovered without having to restore the .vhdx file first.



Note: Changes made to the mounted file system are temporary and are discarded when the image is unmounted.

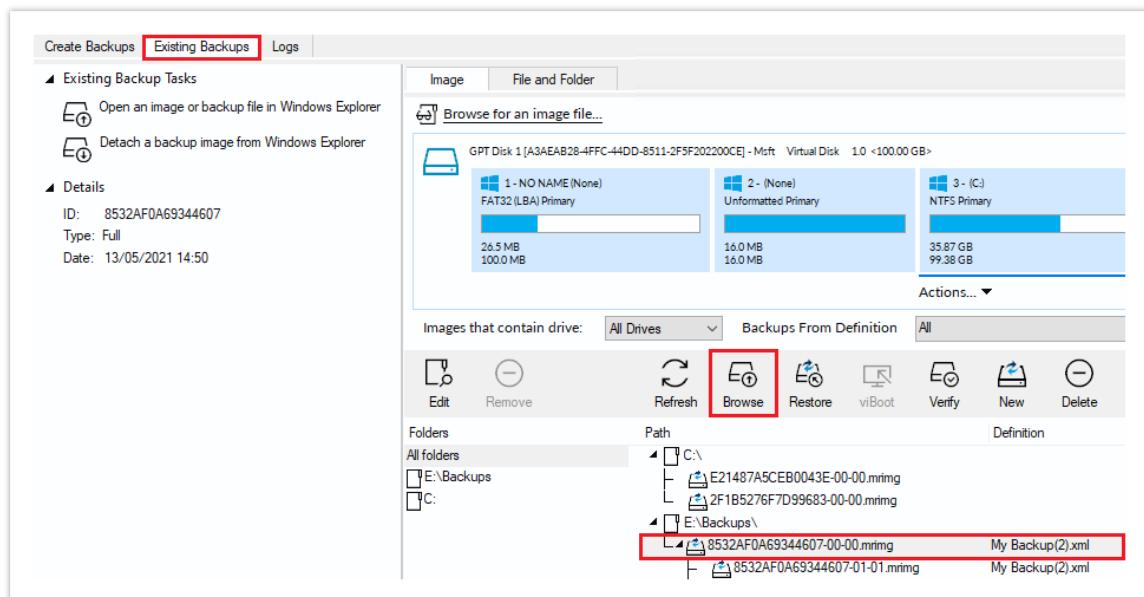
4. You can now navigate through the image in Windows Explorer.

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Using Macrium to mount an image

1. In the main window of Macrium Reflect, select **Existing Backups**, then select the **Image** tab.



2. Select the image you wish to mount then click the **Browse** icon.

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Using Macrium Reflect Command Line Interface (CLI) to mount an image

1. Open a **command prompt** and change the directories as necessary so the path to reflect.exe is shown.
See [Running an elevated command prompt](#).

Complete the command line as follows:

```
reflect.exe [ "Path to Image file" ] [Add one or more switches]
```

Note: Instead of inserting Path to Image file you can also replace it with LAST_FILE_CREATED if you want the last Image created in the current Windows session to be mounted.

Available CLI switches:

-b	Browse Image, always needed to mount Image.
-auto	Do not show the Backup Selection dialog and automatically mount all partitions in the image file.
-drives	A comma separated list of drive letters to use for the mounted image eg; -drives m,n If no drive letters are specified then the next available letters are used.  Note: To 'skip' mounting a partition use the Asterisk character instead of a drive letter
-pass	Use for password protected Image files, add password in inverted commas. e.g. -pass "password"

Note: If you do not use -auto you will be prompted with the **Backup Selection** dialog to assign the drive letters.

Some examples of using the CLI to mount images:

To mount an image and prompt for a drive letter:

```
C:\Program Files\Macrium\Reflect>reflect.exe "J:\76FF71EBB032A35-00-00.mrimg" -b
```

To mount all partitions of an image using the next available drive letter(s):

```
C:\Program Files\Macrium\Reflect>reflect.exe "J:\76FF71EBB032A35-00-00.mrimg" -b -auto
```

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To mount all partitions for the last image created in the current Windows session:

```
C:\Program Files\Macrium\Reflect>reflect.exe "LAST_FILE_CREATED" -b -auto
```

To mount all partitions in an image using drive letters p,q,r

```
C:\Program Files\Macrium\Reflect>reflect.exe "J:\76FF71EBBB032A35-00-00.mrimg" -b  
-auto -drives p,q,r
```

To mount the third partition only using drive letter 'R'

```
C:\Program Files\Macrium\Reflect>reflect.exe "J:\76FF71EBBB032A35-00-00.mrimg" -b  
-auto -drives *,*,r
```

To mount all partitions in a password protected image using drive letters p,q,r where *pwd* is the password,(the password is case sensitive):

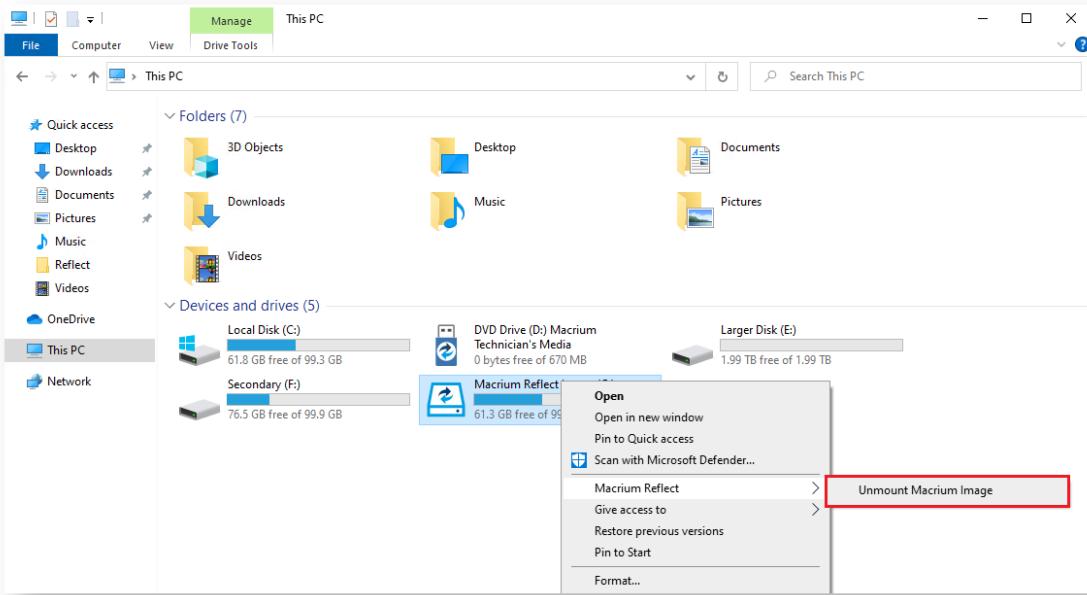
```
C:\Program Files\Macrium\Reflect>reflect.exe "J:\76FF71EBBB032A35-00-00.mrimg" -b  
-auto -drives p,q,r -pass "pwd"
```

Unmounting a temporary mounted drive

Using Windows Explorer:

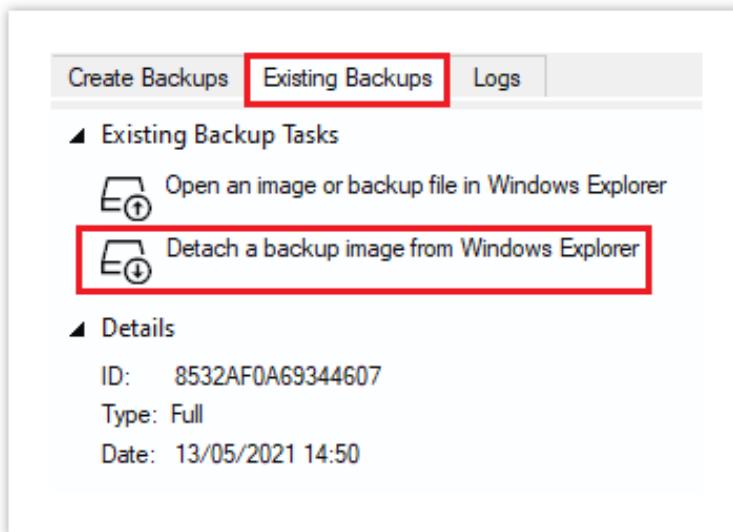
1. To detach a temporary mounted drive using Windows Explorer, right-click the drive you wish to unmount.
2. Scroll to **Macrium Reflect**, click **Unmount Macrium Image**.

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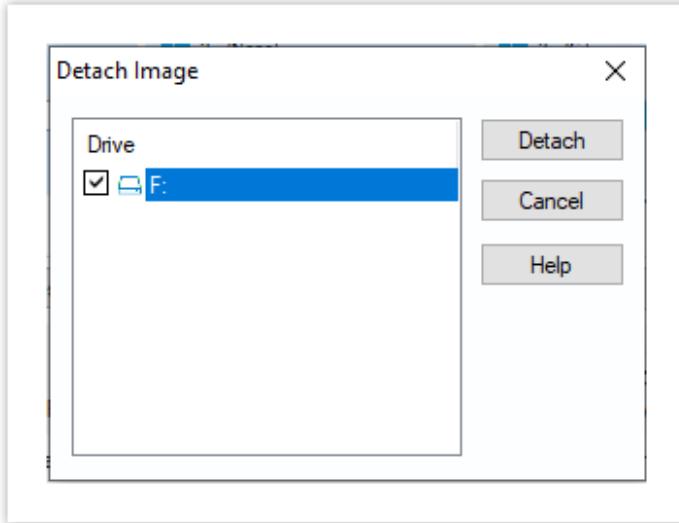
Using Macrium Reflect:

1. In the Macrium Reflect application, select **Existing Backups** in the top menu.
2. Expand the **Existing Backup Tasks** then select **Detach a backup image from Windows Explorer**.



3. Select the drive letter you wish to unmount.

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Using the CLI:

1. Open a **command prompt** and change the directory as necessary so the path to `reflect.exe` is shown.
See [Running an elevated command prompt](#).
2. Complete the command line as follows:

```
reflect.exe [drive letter to detach] [-u]
```

(if no drive letter is included the switch `-u` will detach all temporary mounted drives).

3. Press **Enter**.

Examples of using CLI to unmount an image:

To Detach all temporary drives:

```
C:\Program Files\Macrium\Reflect>reflect.exe -u
```

To Detach Drive J only:

```
C:\Program Files\Macrium\Reflect>reflect.exe J -u
```

Problems mounting images

If you have a problem mounting your images, it is possible that the image mounting system driver has failed to load correctly. To resolve this issue it is recommended you reinstall Macrium Reflect. This problem can be caused by anti-virus software disabling features as a security precaution.

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Browsing Linux Ext File System Images



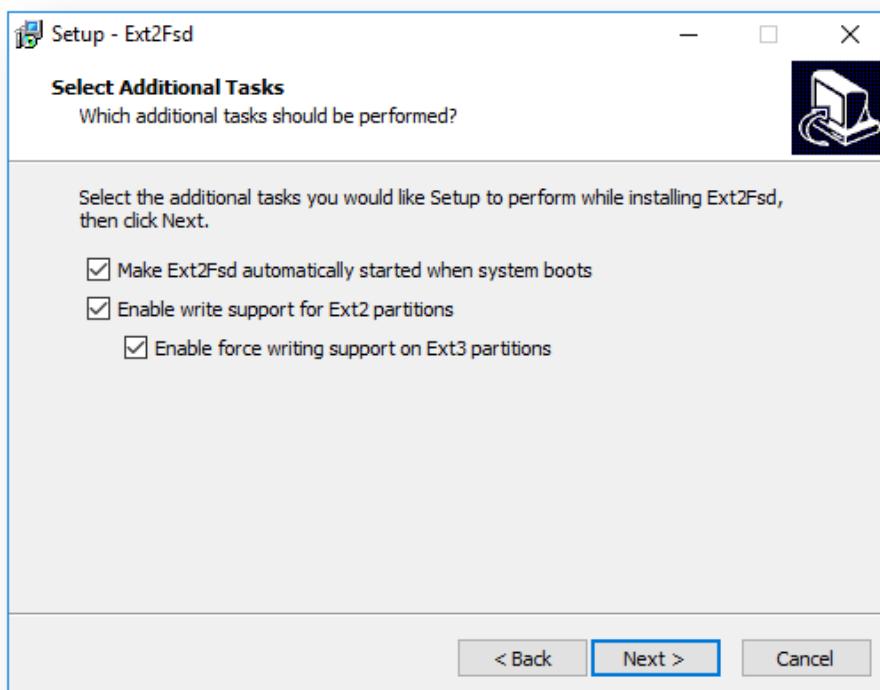
Note: It's been reported that **Ext2Fsd** is no-longer compatible with Windows 10.

This page is provided for reference and it is no-longer recommend that this driver is installed.

By default Windows doesn't recognize file systems formatted using Linux ext, however, Images containing Linux ext file systems can be browsed by using a free Windows driver.

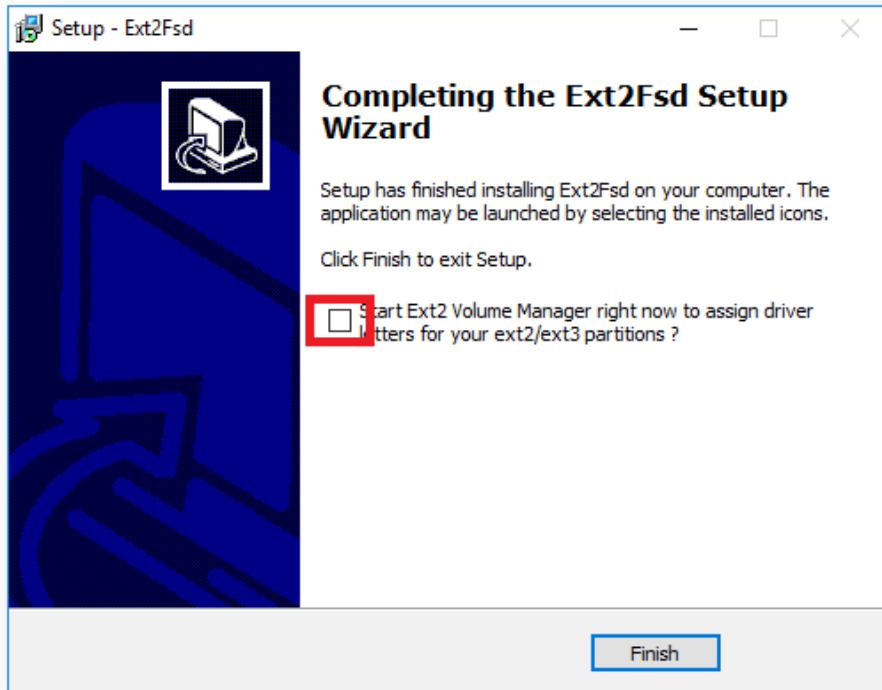
Download **Ext2Fsd** from here: <https://sourceforge.net/projects/ext2fsd/>

Once downloaded, run the installer accepting any defaults.

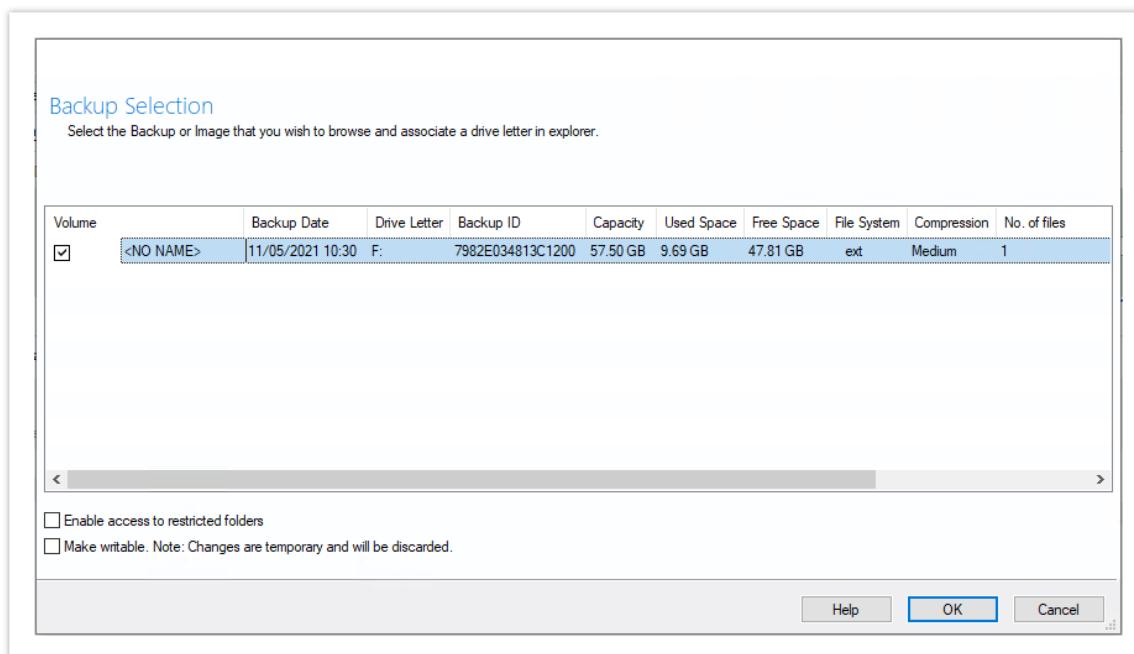


De-select launching the volume manager as this isn't required.

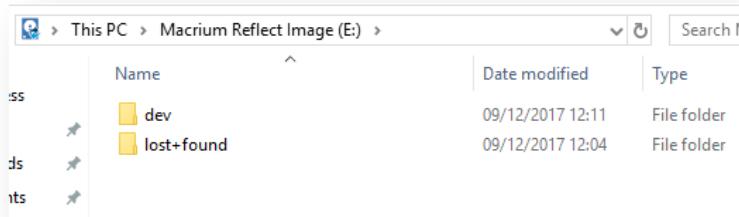
Macrium Reflect v8.0 User Guide



Linux ext partitions in Macrium Reflect image files can now be mounted and explored.



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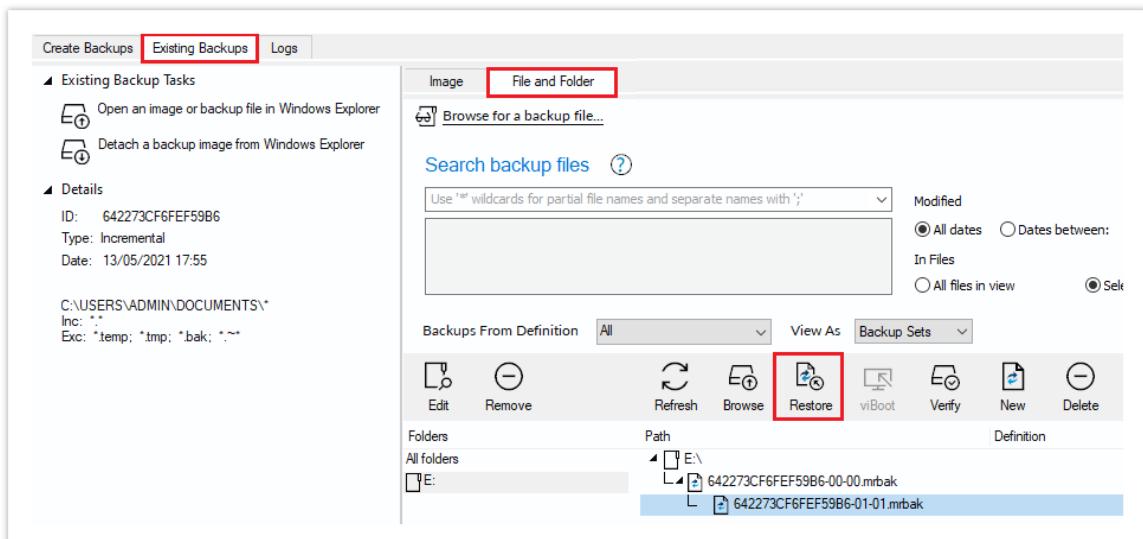
See also: [Linux ext file systems can show a larger used and total space in Macrium Reflect](#)

Restoring a file and folder backup

When you restore a file and folder backup, you can restore files to their original folder or restore the folder structure and selected files to a place of your choosing. If you want to restore individual files without their folder structure, browse them instead and use Windows Explorer to copy and paste them.

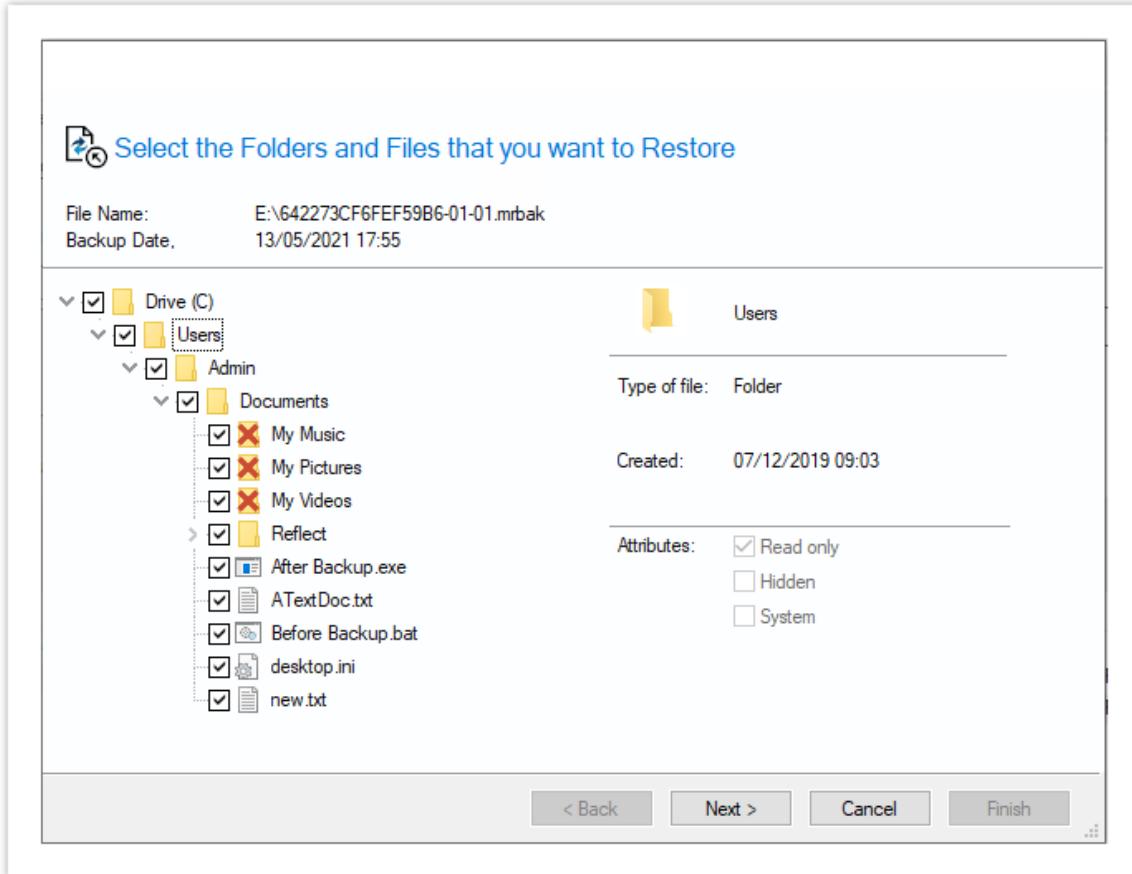
i This tutorial is only for **File and Folder backups** and not image backups. For information on restoring image backups see [Restoring a System image from Windows](#).

1. Open Macrium Reflect and select the **Existing Backup** tab, then select **File and Folder**.
2. Select your backup, if none show select **Browse for a backup file...** and locate the file you want, it is added to the list of backups in the bottom half of the window.



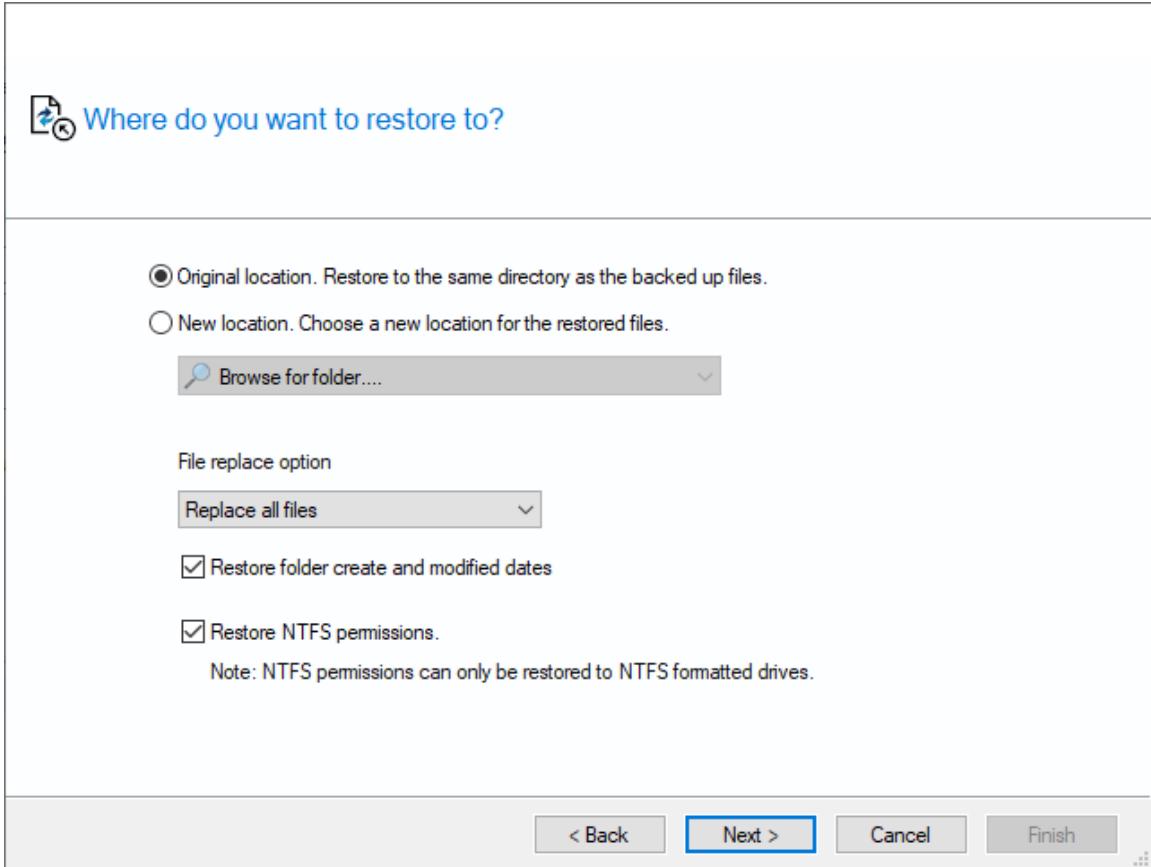
3. Click the **Restore** icon.

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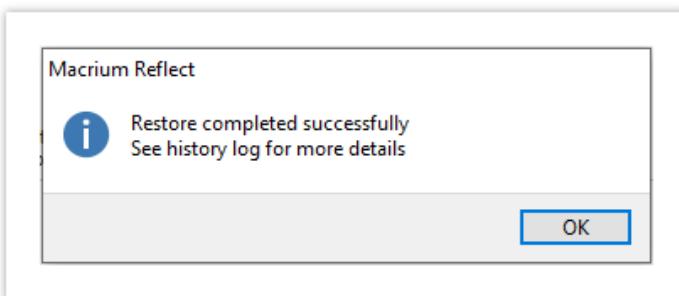


4. Select the files that to be restored. You may restore all the files as shown in this tutorial, or select individual directories and files you wish to restore.

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5. Click **Next**.
6. Select where you would like the files restored to. By default, they are placed in the original location, but it is possible to restore them to a new location.
7. Click **Next**.
8. A summary window displays showing the details of the restore.
9. Click **Finish**.



Restoring MS SQL

Macrium Reflect Server Plus offers a rich feature set for restoring backups taken of SQL databases.

- Restoring MS SQL to time of backup

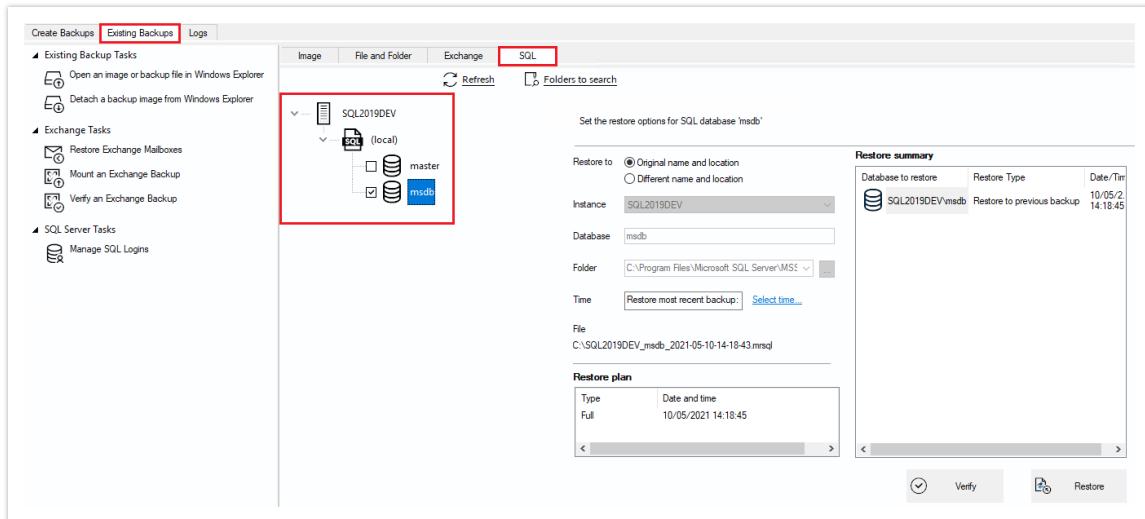
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- Restoring MS SQL to a point-in-time
- Restoring MS SQL to a different instance, folder, or database name

Restoring MS SQL to time of backup

1. Select **Existing Backups** then select **SQL**.

You should see your backups. If no backups show click **Folders to search**, to direct Macrium Reflect to the location of the SQL backup files.



The left-hand tree shows databases that can be restored.

2. Select the databases you wish to restore.

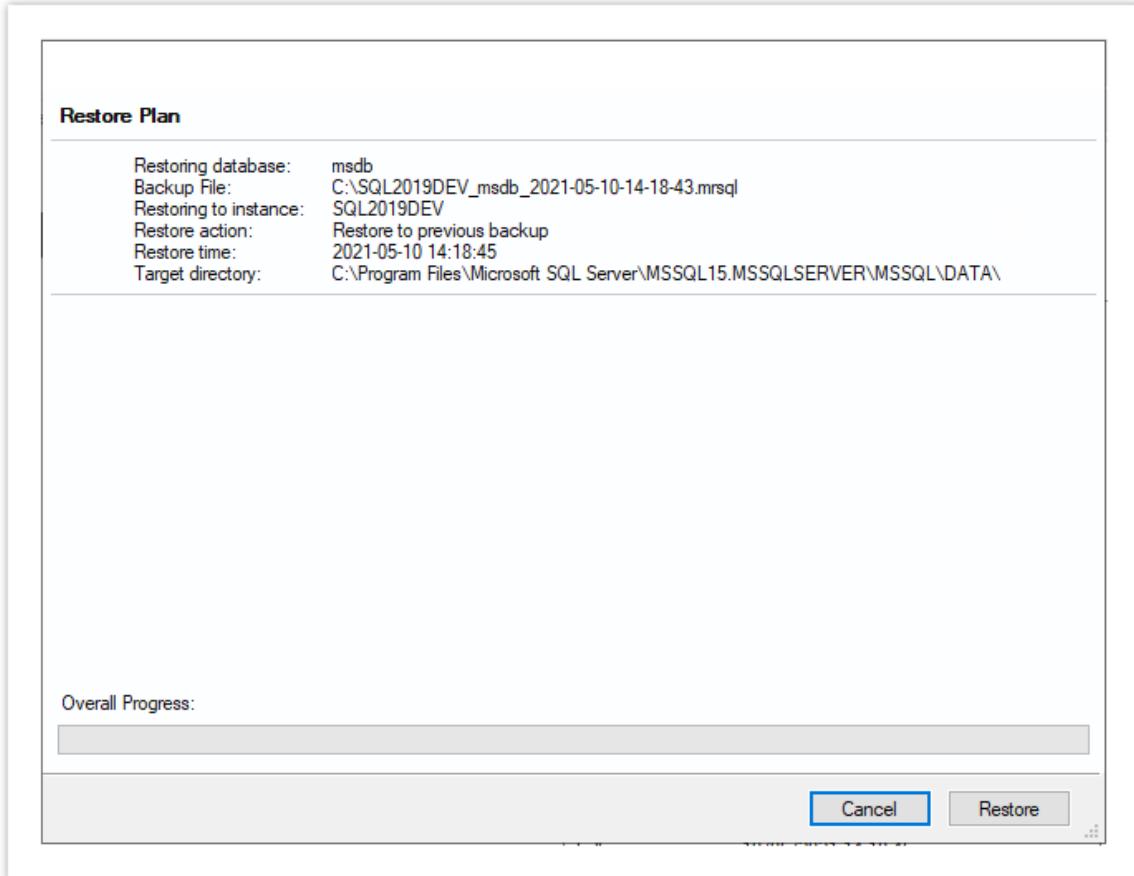
The middle of the screen shows controls for choosing the destination instance, database name and directory that contains the MDF and LDF files. The controls automatically default to the instance, database name and directory of the original backup. The latest backup is selected.

3. If you wish to restore to a different backup click **Select time...** and select the backup you wish to restore to.

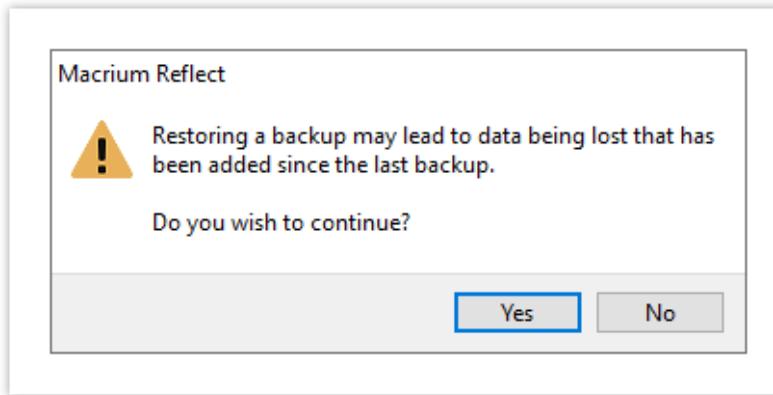
4. When you are happy with the selection, click **Restore**.

5. Review the summary and click **Restore**.

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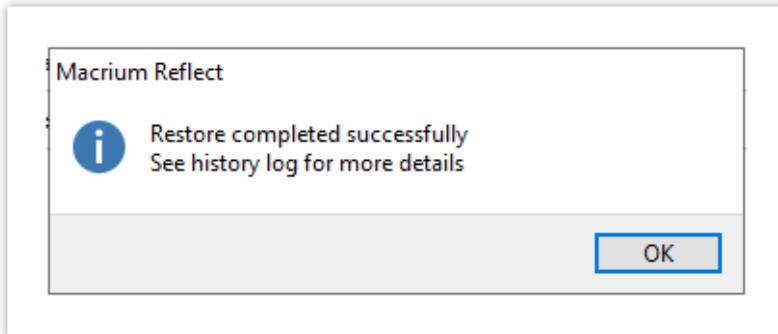


6. A warning box appears, if appropriate click **Yes** to continue with the restore.



The restore completes and a dialog box advising completion appears.

7. Click **OK**.



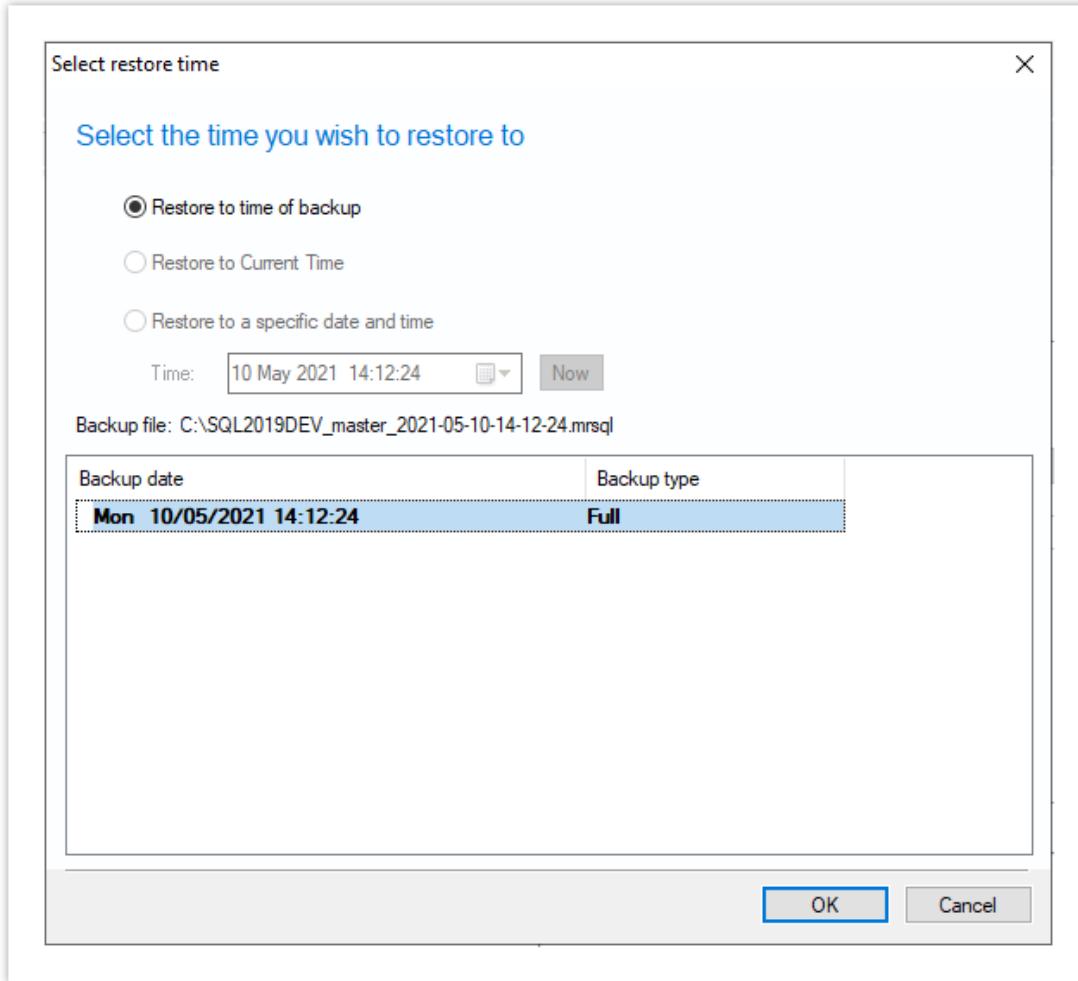
Restoring MS SQL to a point-in-time

In some circumstances, it is possible to restore a database to a specific point-in-time. This is especially useful if you have accidentally deleted a table or other specific piece of data and need to roll back to the point just before the delete was done. The following situations must be considered when trying to restore to a point-in-time:

- The database must be running the FULL recovery model.
- It is not possible to restore to a point-in-time prior to the last full or differential backup.
- It is not possible to restore to a point-in-time between full or differential images. You can restore to a point-in-time from the last full or differential to the present.

In order to restore to a point-in-time:

1. On the **Existing Backups** task pane, select **SQL** and select a database.
2. Click **Select Time...** you see the following dialog showing the history of backups made for the selected database.



3. Select **Restore to a specific date and time**.
4. Select the time you wish to restore to, either setting the time and date manually, or selecting the backup you wish to restore and then tweaking the date/time as required. It is not possible to set the controls to a date/time that can not be restored. Click **OK**.
5. Continue as above.

Restoring MS SQL to a different instance, folder, or database name

It is possible to restore a backup to a different instance by selecting the target instance in the **Instance** drop-down combo box. Be aware that there can be compatibility issues when restoring databases to Microsoft SQL instances of differing versions.

By default, the folder selected in **Restore to directory** is the default folder where the instance places MDF and LDF files associated with the databases. If you change the folder, upon restoration, the MDF and LDF files move to the target directory, wherever they were to start with.

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By default, Macrium Reflect restores the database back to the original database name. However, if you change the name of the database in **Target database name**, a new database of that name is created. The MDF and LDF files that restore also rename. This ensures the original database does not change but can be deleted manually when it is no longer required.

Restoring MS Exchange databases

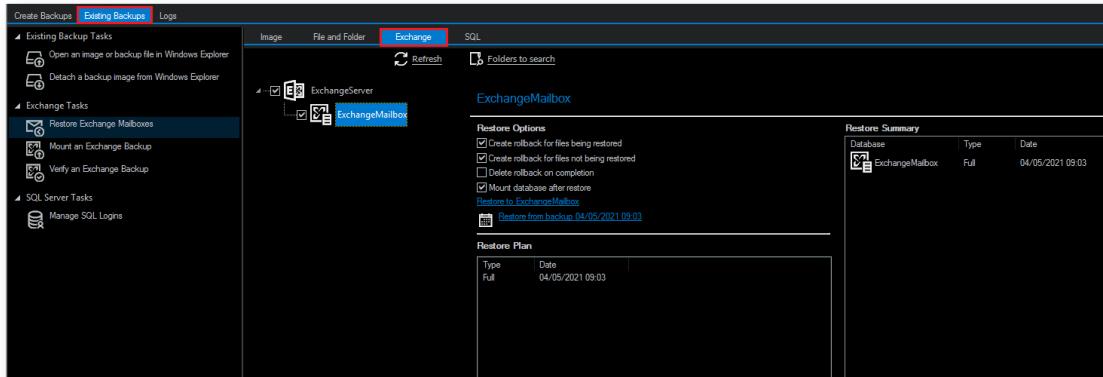
Macrium Reflect Server Plus can restore select databases back to your Microsoft Exchange Server providing the following restore scenarios:

- Restoring MS Exchange databases to time of backup
- Restoring MS Exchange databases to point in time
- Restoring MS Exchange databases to a different name or location

Restoring MS Exchange databases to time of backup

1. Select **Existing Backups** then select **Exchange**.

Available databases will be displayed. If no databases are showing, click **Folders to search** to search for Microsoft Exchange backup files.

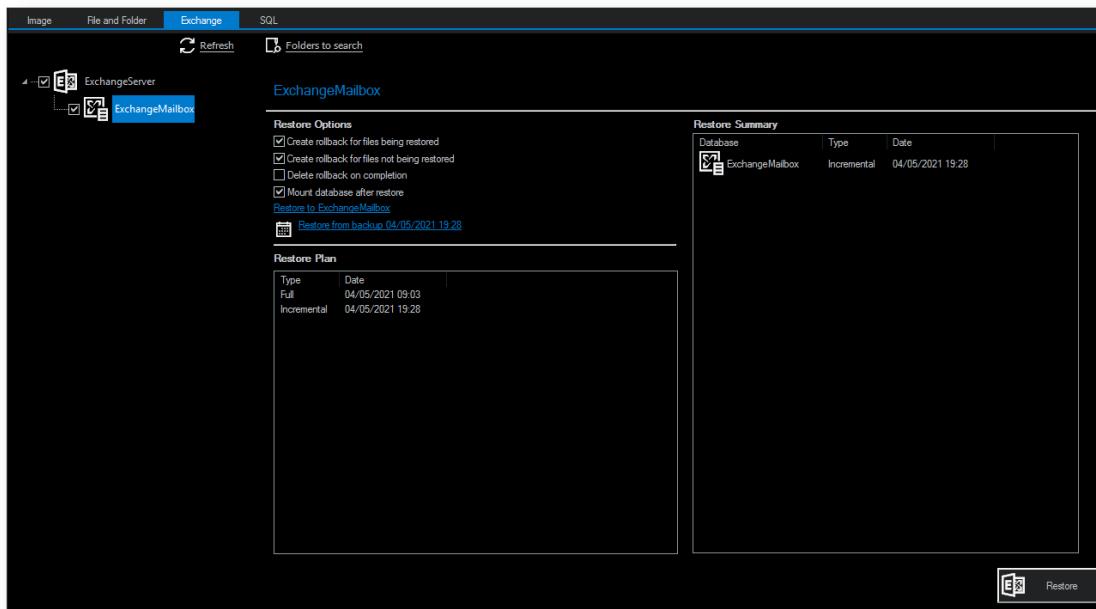


2. Select each database to restore. By default, the most recent backup is selected.

Restore Plan shows the backup files selected.

Restore Summary lists all databases restoring and the date/time of the backup file to restore from.

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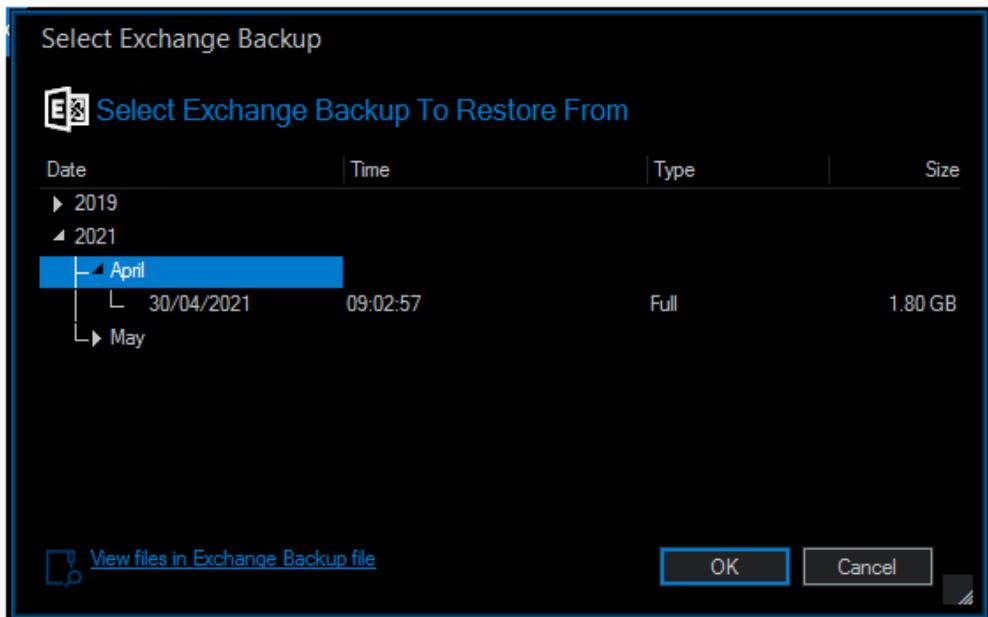
3. Click **Restore** to restore selected databases back to their original volume locations and database names.
4. Review the information and click **Restore**.

Restoring MS Exchange databases to point in time

When you restore to a different point in time, only the log files up to that point in time are restored which are then replayed into the restored database. If you restore to a different point in time Macrium Reflect replays the log files up until the selected point.

1. Select the databases to restore.
2. For each database restoring, select **Restore from backup**.

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3. Select a file in the list.
4. Click **OK**.
5. Optionally, click **View files in Exchange Backup file** to show files contained in the backup.
6. Click **OK** to keep the current selection.



Note: When restoring databases to point in time for the same storage group (under Microsoft Exchange 2003/2007) Macrium Reflect forces you to use the same backup file in a single restore operation to maintain log file consistency during the mount process. If you need to restore databases in the same storage group to different points in time, do so in separate restore operations.

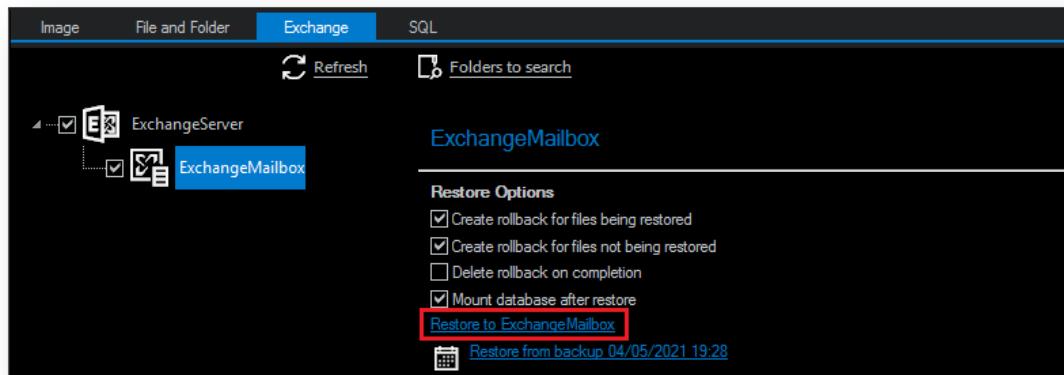
7. Review the information and click **Restore**.

Restoring MS Exchange databases to a different name or location

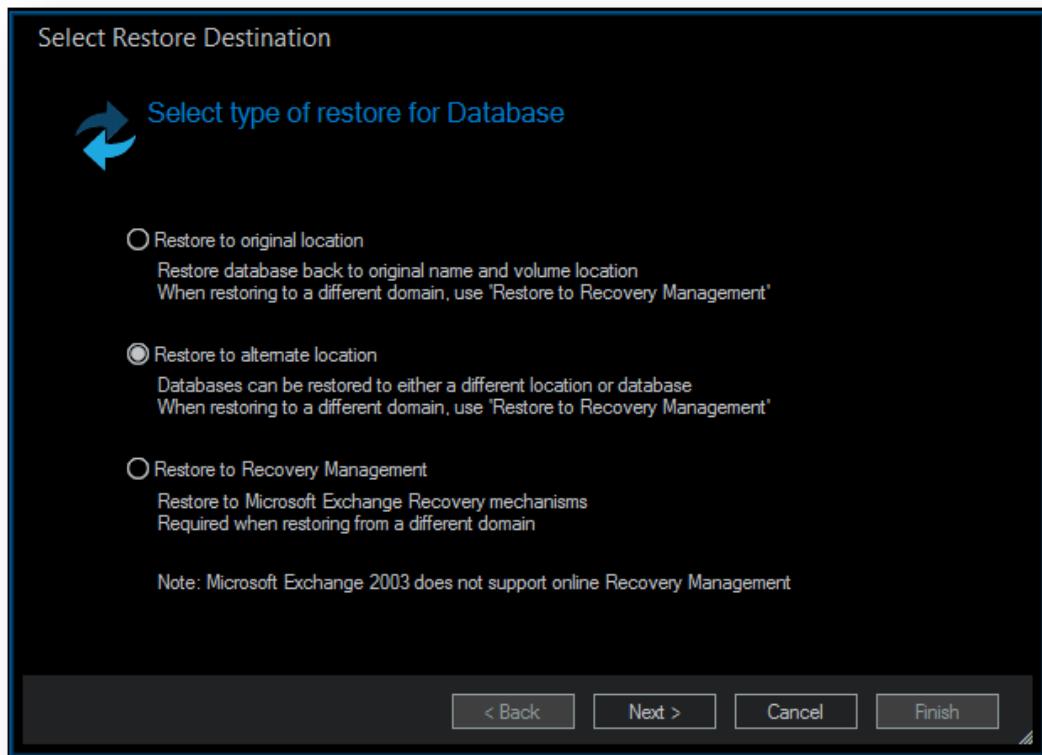
Macrium Reflect Server Plus allows you to restore databases to different names and locations with support for storage group and database creation.

1. Select the databases to restore.
2. Click **Restore to** (in this example) **Mailbox Database**.

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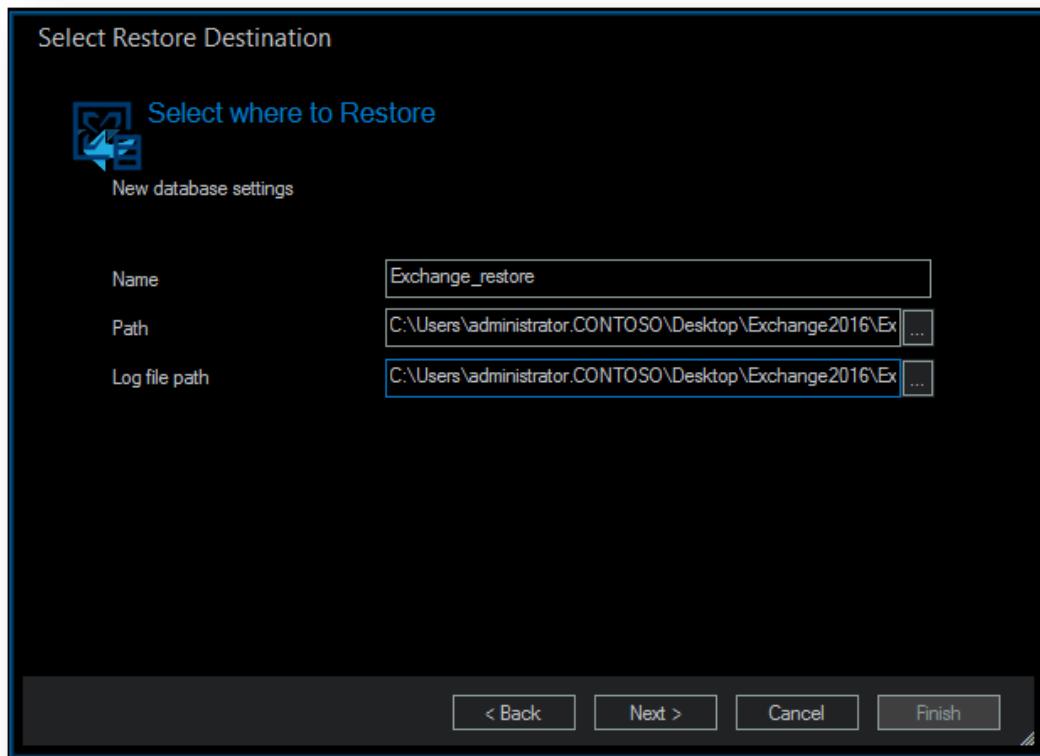


Select Restore Destination wizard begins:



3. Select **Restore to alternate location**.
4. Click **Next**.
5. Specify the database to restore to:

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Name:	Specify the name for the database
Path:	Specify the folder where you want the database restored.
Log file path:	Specify the folder where transaction log files are stored.

6. Click **Next**.

7. Review the information and click **Finish**.

Restoring emails with Mailbox Restore

In Macrium Reflect Server Plus you can use Mailbox Restore to restore individual emails from a backup of Microsoft Exchange. This is useful if your backup contains some vital emails or attachments, but you don't want to have to restore the whole MS Exchange server in order to access them.

Mailbox Restore can restore emails, appointments, contacts, journal entries, notes, and tasks in the same way.

Before you begin:

Macrium Reflect v8.0 User Guide

For Mailbox Restore to function, Microsoft Exchange MAPI and CDO must be installed on the server. These are present by default on Microsoft Exchange Server 2003. For Exchange 2007 or later, they can be downloaded from the following link:

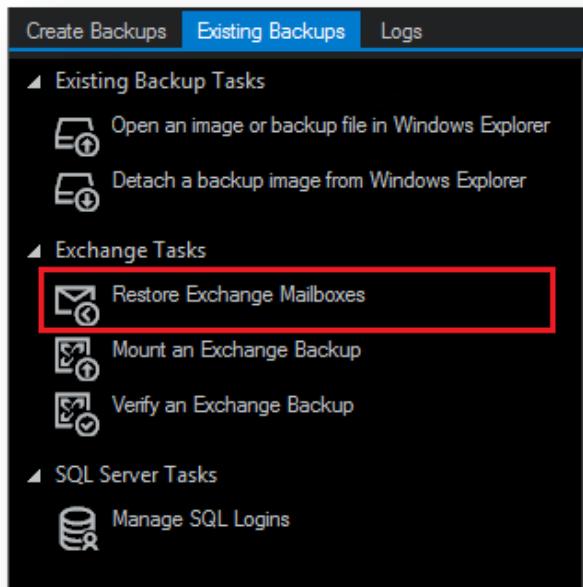
<http://www.microsoft.com/en-us/download/details.aspx?id=42040>

To restore an email using Mailbox Restore, the edition of Microsoft Exchange running on the target server must be the same as the original server. An email backed up on a server running Exchange Server 2007, for example, can be restored onto other servers running Exchange 2007, but not to a server running Exchange 2010.

Note: A mailbox needs to exist on the target server, with the same name as the original mailbox.

The user running Macrium Reflect must have full access permissions for the mailbox being restored to.

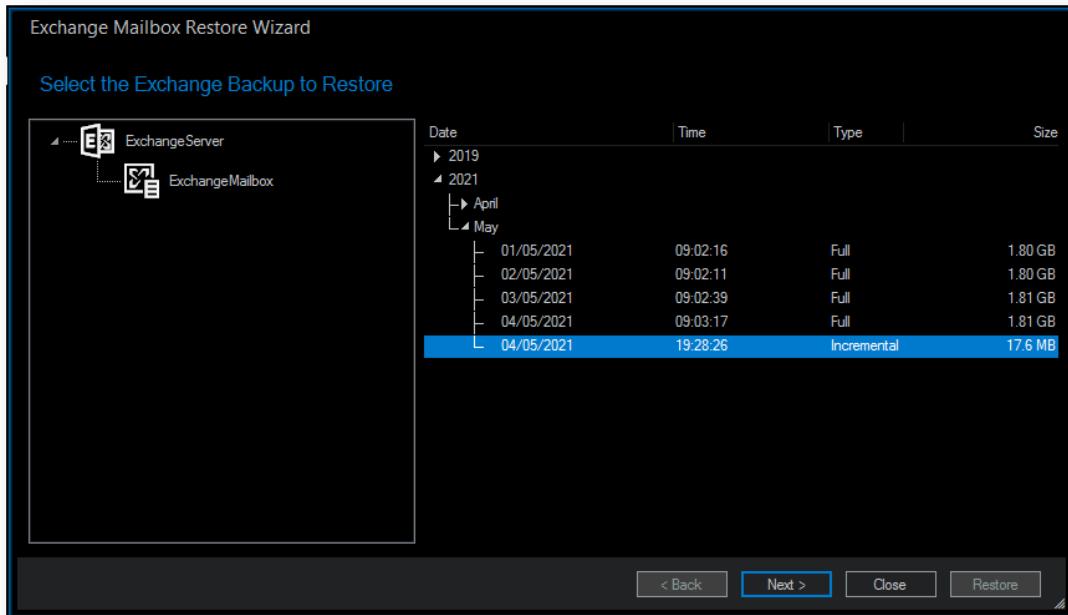
1. In **Existing Backups**, select **Exchange**.
2. Select **Restore Exchange Mailboxes**.



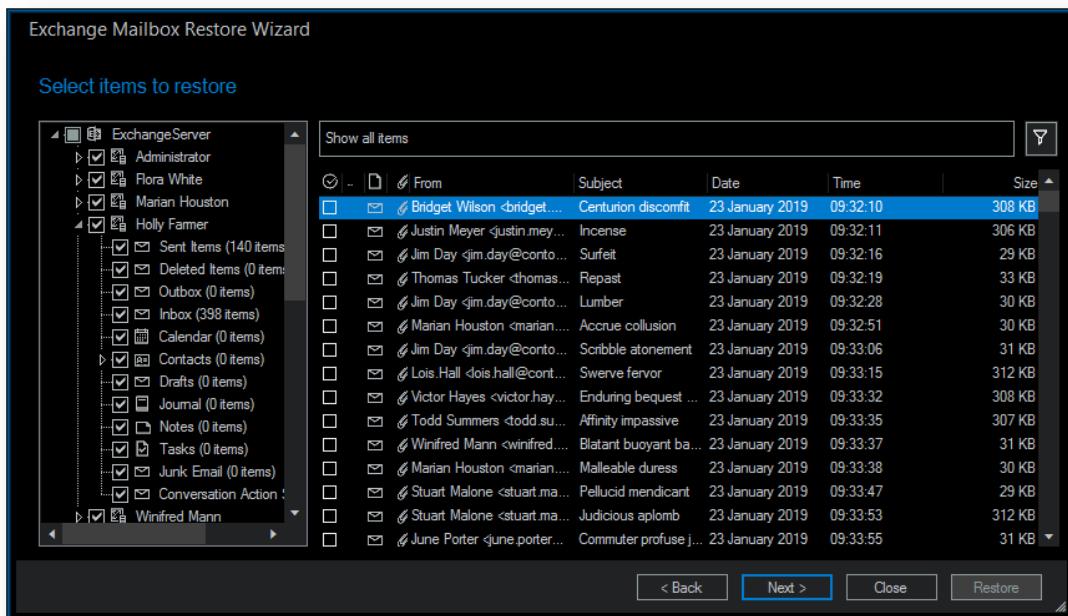
The **Exchange Mailbox Restore Wizard** appears.

3. Select the required message store/database to restore from and click **Next**.

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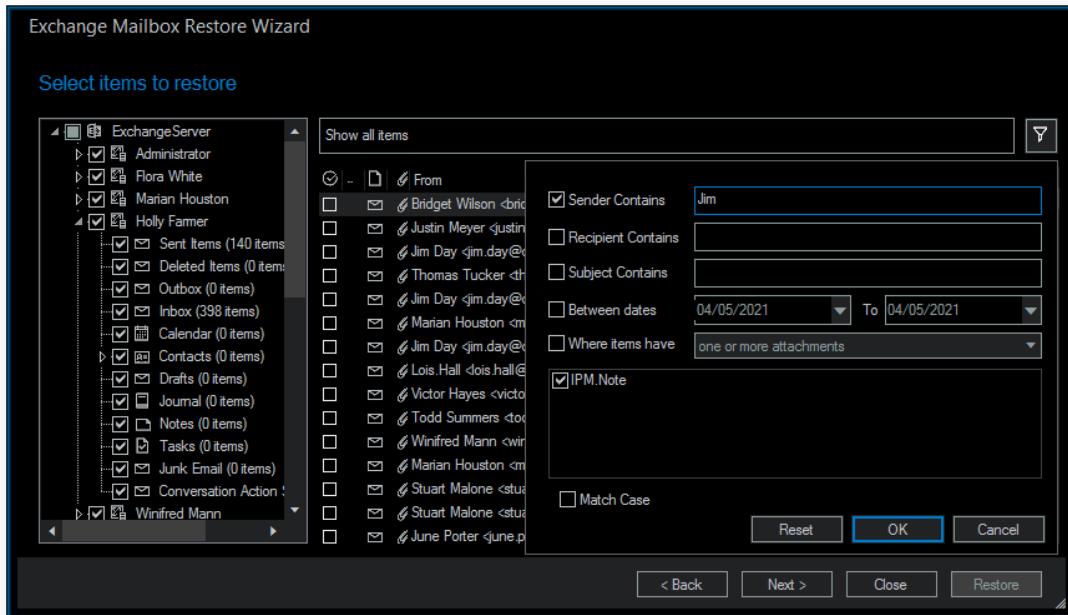


4. Select the required folder, or click an appropriate folder to select the required individual email to restore.



5. Click the filter button to filter the email list by **Sender**, **Recipient**, **Subject**, **Between dates**, or whether there are **attachments**.

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6. When you have made all the required selections/deselections, click **OK**.
7. Click **Restore**.

Setting up permissions for Mailbox Restore

MS Exchange 2007 or more recent

1. Open the Microsoft Exchange Management Shell as an administrator.
2. Run the following commands:

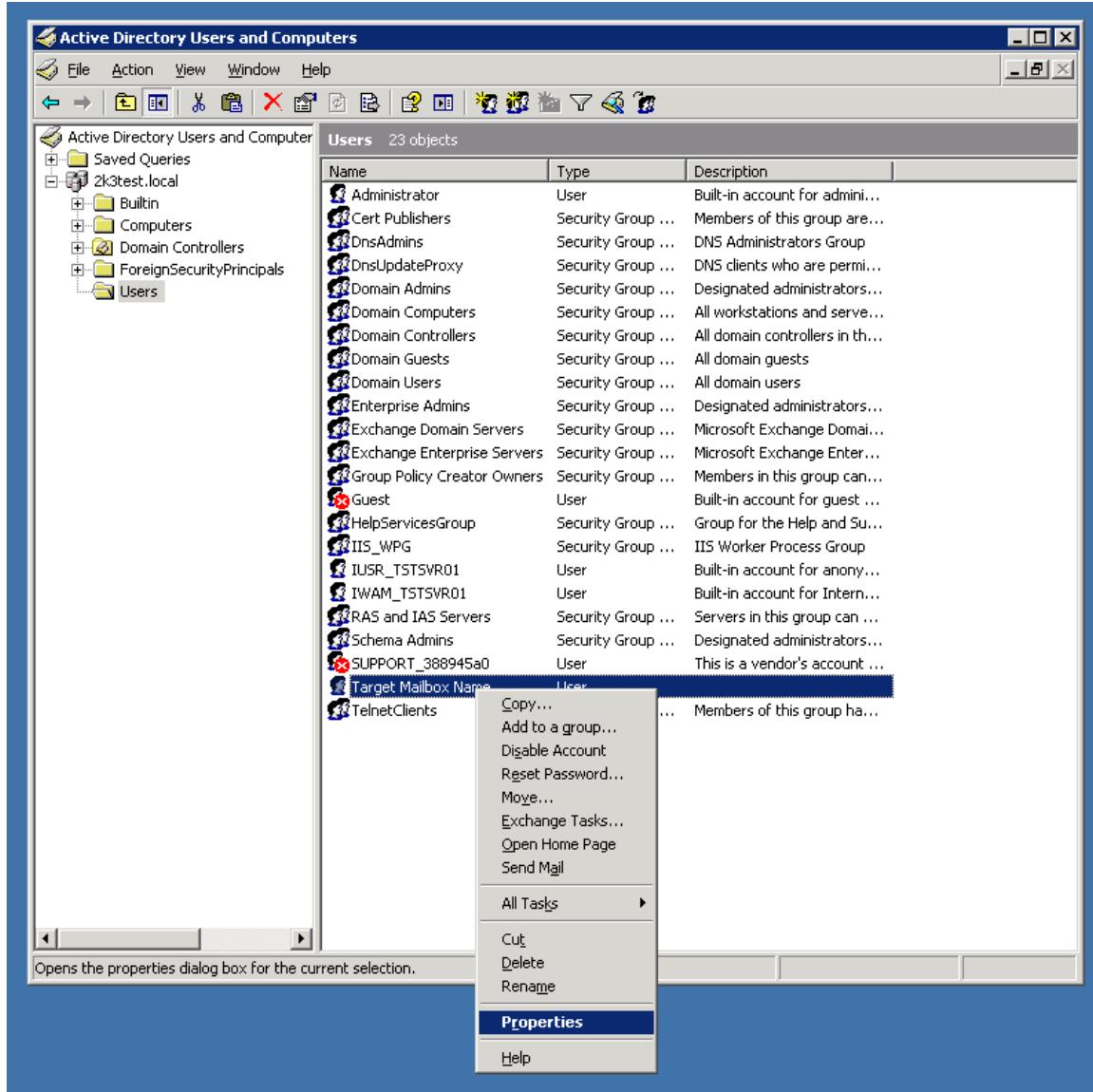
```
Add-MailboxPermission -user USERNAME -AccessRights FullAccess -  
InheritanceType All MAILBOX  
Add-ADPermission -user USERNAME -ExtendedRights Send-As MAILBOX  
Add-ADPermission -user USERNAME -ExtendedRights Receive-As MAILBOX
```

substituting `USERNAME` and `MAILBOX` with your own username and the name of the user of the target mailbox.

MS Exchange 2003

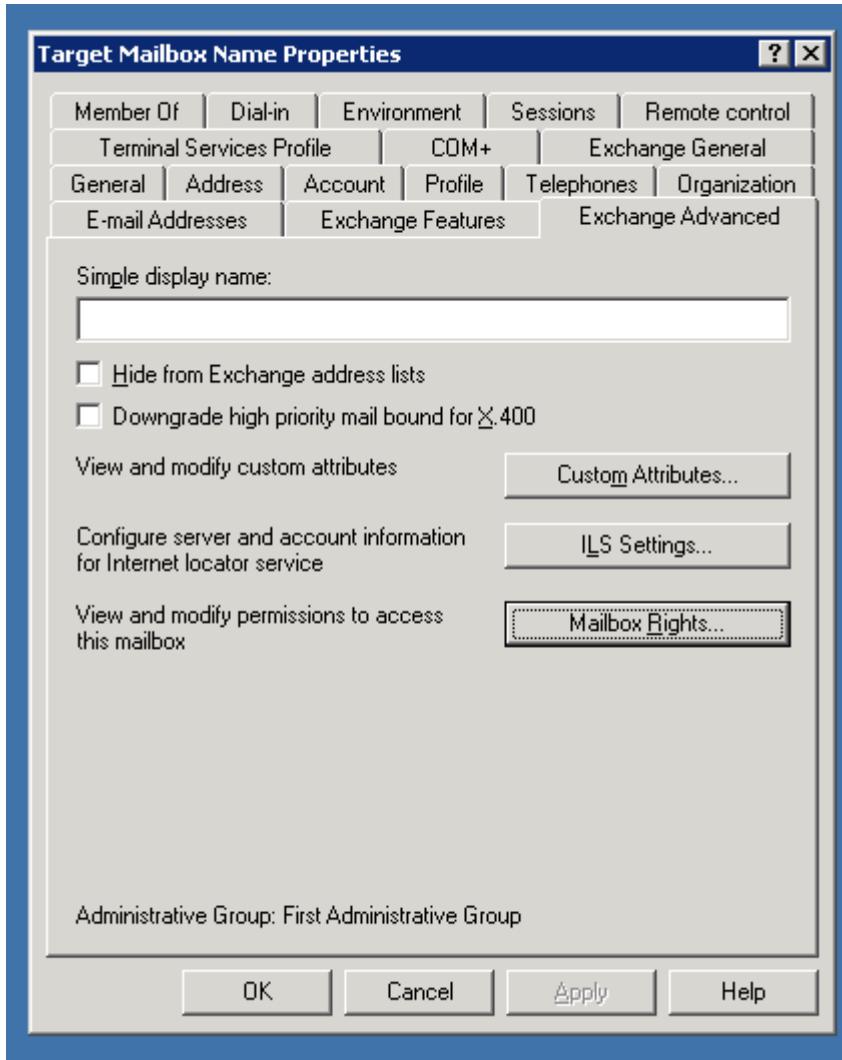
1. Click Start > Administrative Tools > Active Directory Users and Computers.
2. Under **Users**, right click on the user whose mailbox you wish to restore to, and click **Properties**.

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3. In Exchange Advanced, click **Mailbox Rights**.

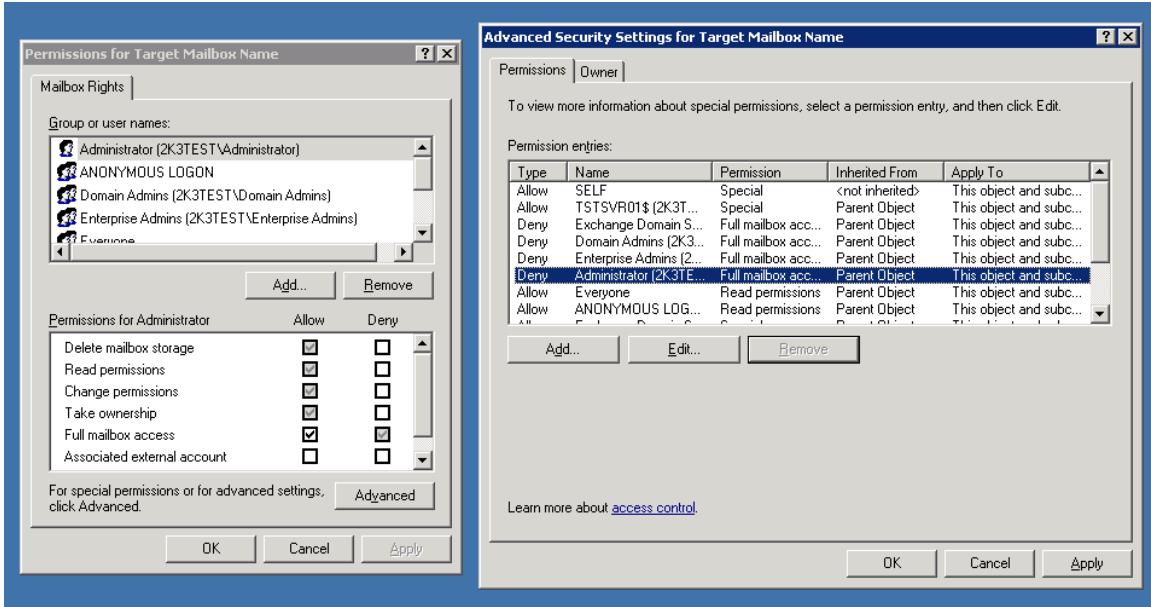
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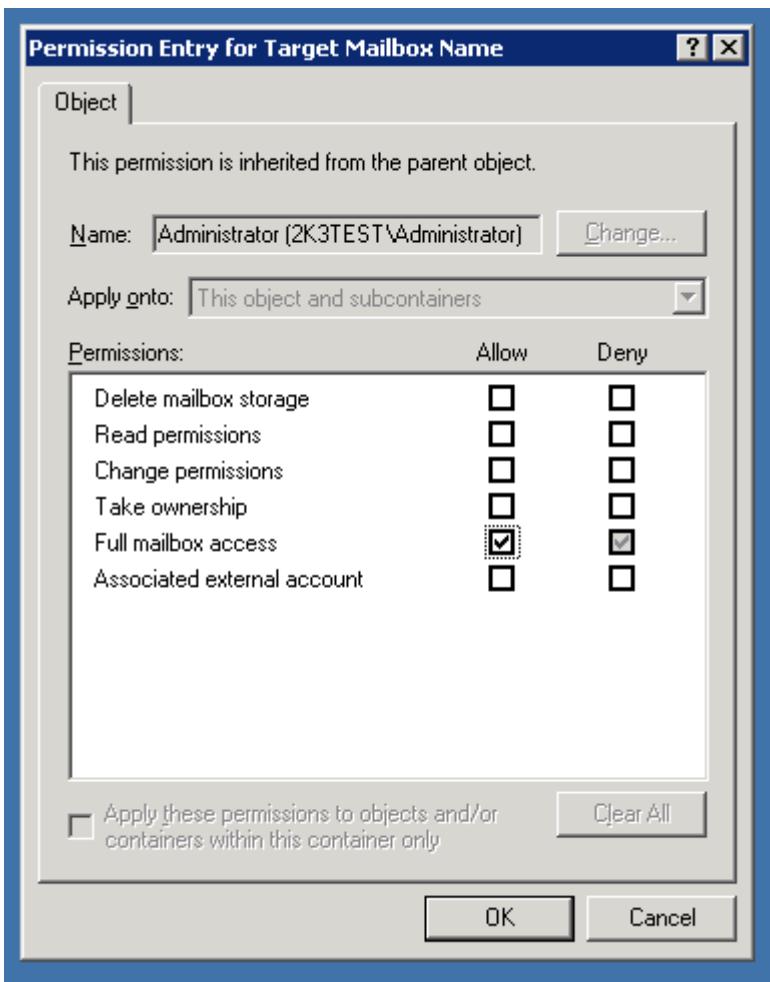
4. In the Permissions dialog, click **Advanced**, select your user name in the list, and click **Edit**.

If your user name does not appear on the list, then click **Add**, use the dialog to select your user name, then click **OK**.

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5. Check **Full mailbox access - Allow**, and click **OK**.



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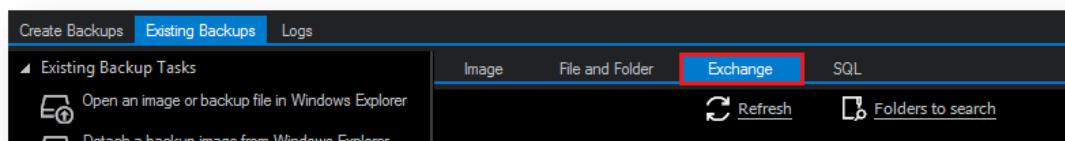
Adding MS Exchange search folders

Macrium Reflect Server Plus maintains a list of all Microsoft Exchange backup folders, these folders are queried in the Microsoft Exchange Restore view for storage groups/databases that can be restored.

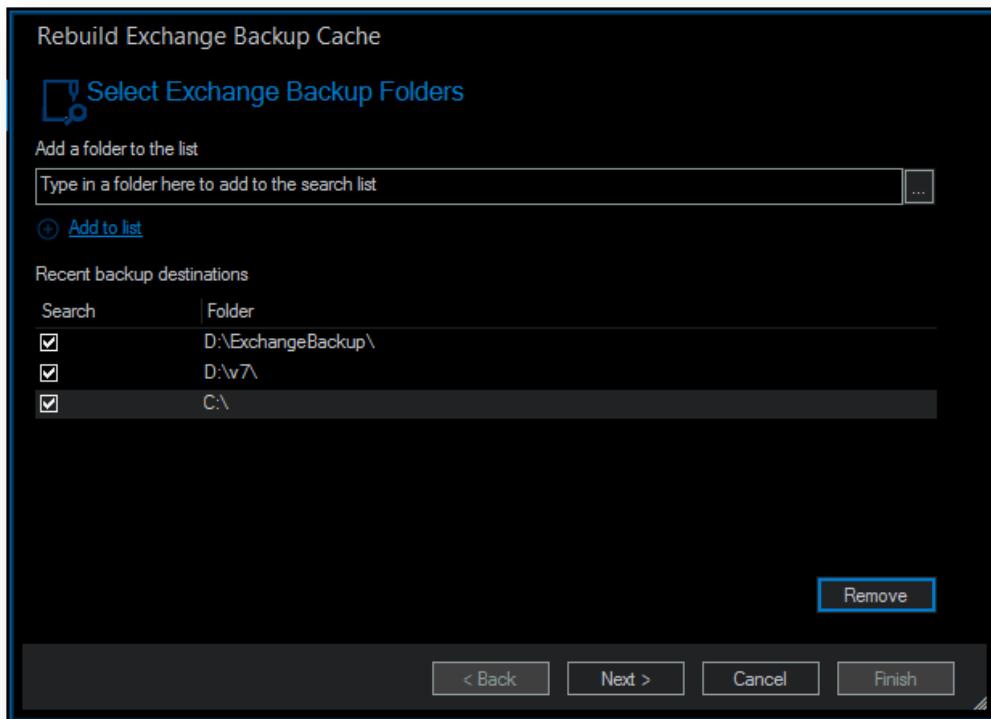


Note: Macrium Reflect Server Plus can discover backups of Microsoft Exchange made on different servers by using the following steps but only detects backups made from the same version of Microsoft Exchange. When restoring databases from a different server you must restore databases to Microsoft Exchange recovery mechanisms before migrating mailboxes using Microsoft Exchange.

1. Select **Folders To Search** at the top of the **Exchange** tab.



The **Rebuild Exchange Backup Cache** wizard displays.

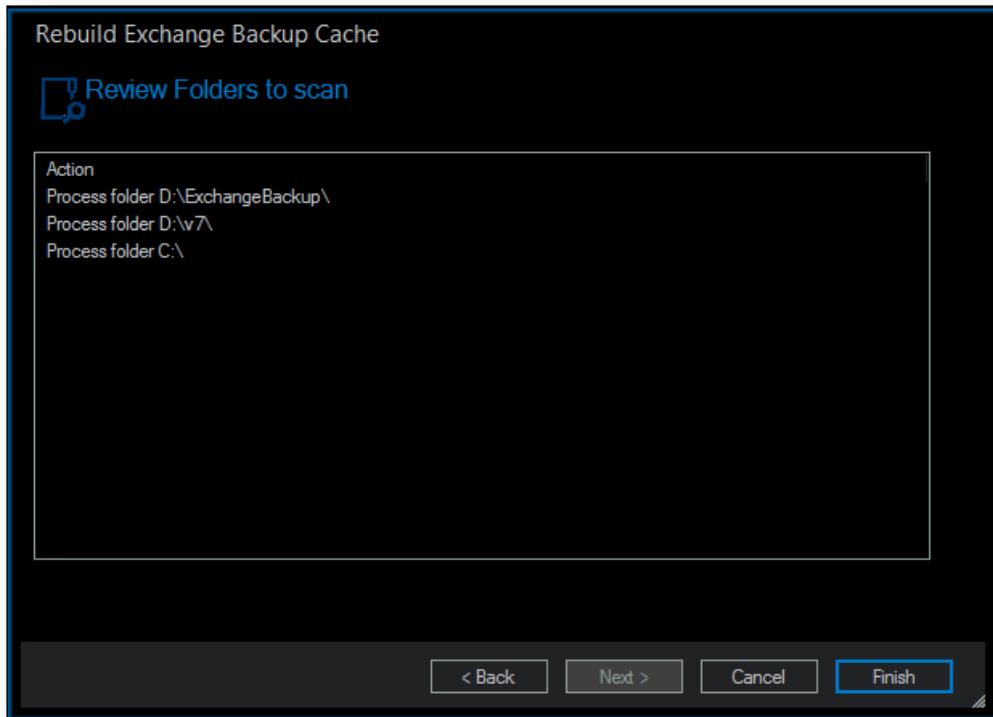


2. To add additional folders to the search by either:

- a. Typing a folder name into the edit box.

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- b. Clicking the browse button.
- c. Selecting **Add to list** and browsing available folders.
3. Select required folders and click **Next**.



4. Review the folders to scan.

5. Click **Finish**.

Macrium Reflect scans the specified folders for Microsoft Exchange backups and lists those available for restore in **Microsoft Exchange Restore**.

Restoring an MBR System image to UEFI/GPT

The Unified Extensible Firmware Interface (UEFI) is an interface between a computer's firmware and operating system. It is designed as a replacement for Basic Input/Output System (BIOS). UEFI supports hard disks with either master boot record (MBR) or the newer GUID Partition Table (GPT) system. GPT is a newer standard that supports disks larger than 2TiB and allows for more than four primary partitions per disk.

As UEFI and GPT are increasingly widespread, older images of MBR disks often need restoring to replacement UEFI / GPT systems.



Rescue media created on Windows 7 and later is dual boot, meaning it boots in both MBR and UEFI mode. **Boot your rescue media in UEFI mode**. Consult your Motherboard user manual for information on how to do this.

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Caution: We assume there are no other hardware differences between the system being imaged and the system being restored to. For dissimilar hardware, use ReDeploy.

1. Boot into Windows PE.
2. Open a Windows command window. To open a command window click the icon  on the taskbar.
3. Type:

```
diskpart
```

4. Type:

```
list disk
```

5. Select the disk number that you want to restore to. For example:

```
select disk 0
```

6. Clean the selected disk:

```
clean
```

7. By default, "clean" creates an empty MBR disk. Convert it to GPT:

```
convert gpt
```

8. Create the EFI partition:

```
create partition efi size=200
```

9. Format the EFI partition:

```
format fs=fat32
```

10. Create the MSR partition:

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```
create partition msr size=128
```

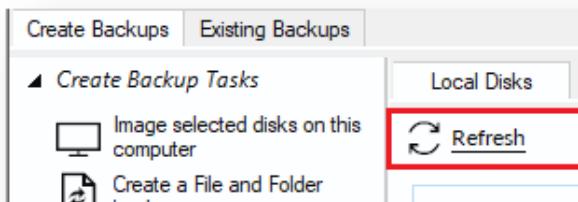
11. Exit Diskpart:

```
exit
```



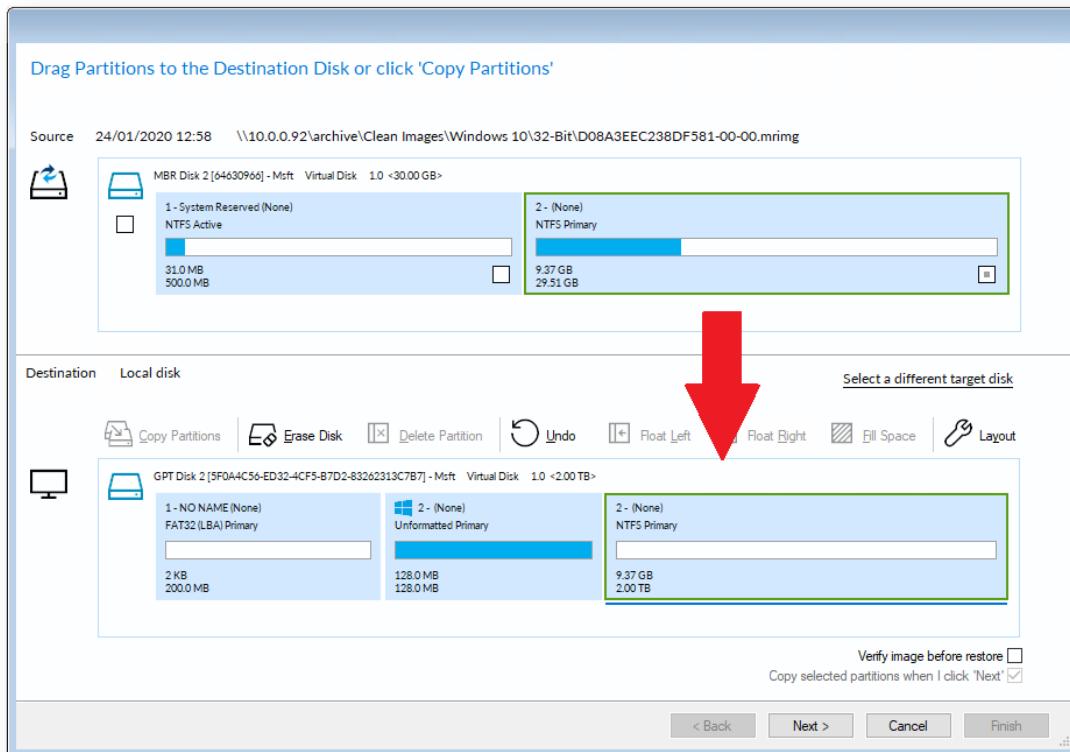
12. In Macrium Reflect, click **Create Backups** tab.

13. Click **Refresh** to read the newly initialized disk.



14. Click the **Existing Backups** tab.

15. Select the image file and select the **Restore** icon, *drag and drop the imaged partitions* but *DO NOT restore the MSR partition* from the image file. In this example, only the C partition is restored to the target disk.



- When the restore is complete, configure the UEFI boot files in the EFI system partition.

Follow the steps in the section **Fix Boot problems for GPT/UEFI Boot Systems** in the following KB article:
Fixing Windows boot problems



You may need to edit the UEFI configuration to tell it to boot into the new GPT hard disk.

Restoring a UEFI/GPT System image to MBR

The Unified Extensible Firmware Interface (UEFI) is an interface between a computer's firmware and operating system. It is designed as a replacement for Basic Input/Output System (BIOS). UEFI supports hard disks with either master boot record (MBR) or the newer GUID Partition Table (GPT) system. GPT is a newer standard that supports disks larger than 2TiB and allows for more than four primary partitions per disk.

This article covers restoring a disk image of a UEFI/GPT system and enable the restored image to boot using legacy MBR booting.



Caution: We assume there are no other hardware differences between the system being imaged and the system being restored to. For dissimilar hardware, use ReDeploy.

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1. Boot into Windows PE.

2. Open a Windows command window. To open a command window click the icon  on the taskbar.

3. Type:

```
diskpart
```

4. Type:

```
list disk
```

5. Select the disk number that you want to restore to. For example:

```
select disk 3
```



Please ensure that you use the correct disk number in the above command.

6. Clean the selected disk:

```
clean
```

7. Ensure that the target disk is MBR formatted

```
convert mbr
```

8. Create the Microsoft System Reserved partition

```
create par pri size=300
```

9. Format the MSR partition:

```
format fs=NTFS quick
```

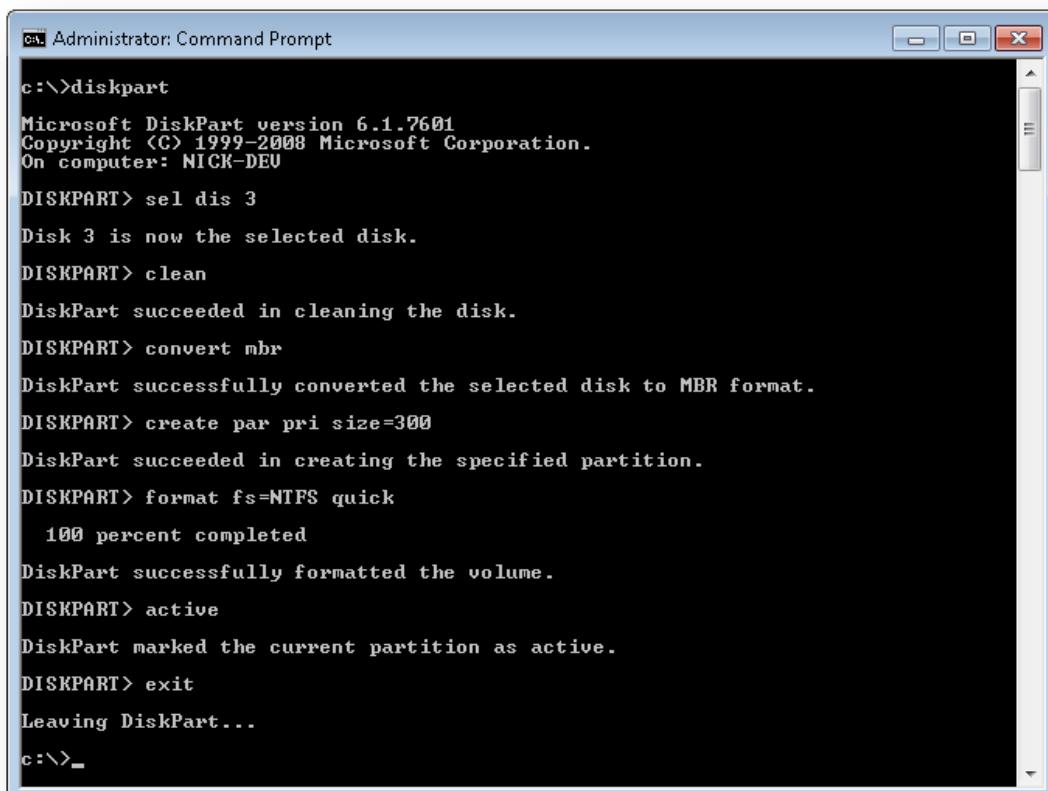
10. Set the partition 'Active'

```
active
```

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11. Exit Diskpart:

```
exit
```



```
c:\>diskpart
Microsoft DiskPart version 6.1.7601
Copyright (C) 1999-2008 Microsoft Corporation.
On computer: NICK-DEU

DISKPART> sel dis 3
Disk 3 is now the selected disk.

DISKPART> clean
DiskPart succeeded in cleaning the disk.

DISKPART> convert mbr
DiskPart successfully converted the selected disk to MBR format.

DISKPART> create par pri size=300
DiskPart succeeded in creating the specified partition.

DISKPART> format fs=NTFS quick
    100 percent completed
DiskPart successfully formatted the volume.

DISKPART> active
DiskPart marked the current partition as active.

DISKPART> exit
Leaving DiskPart...
c:\>
```

12. In Macrium Reflect, click **Backup tab**.

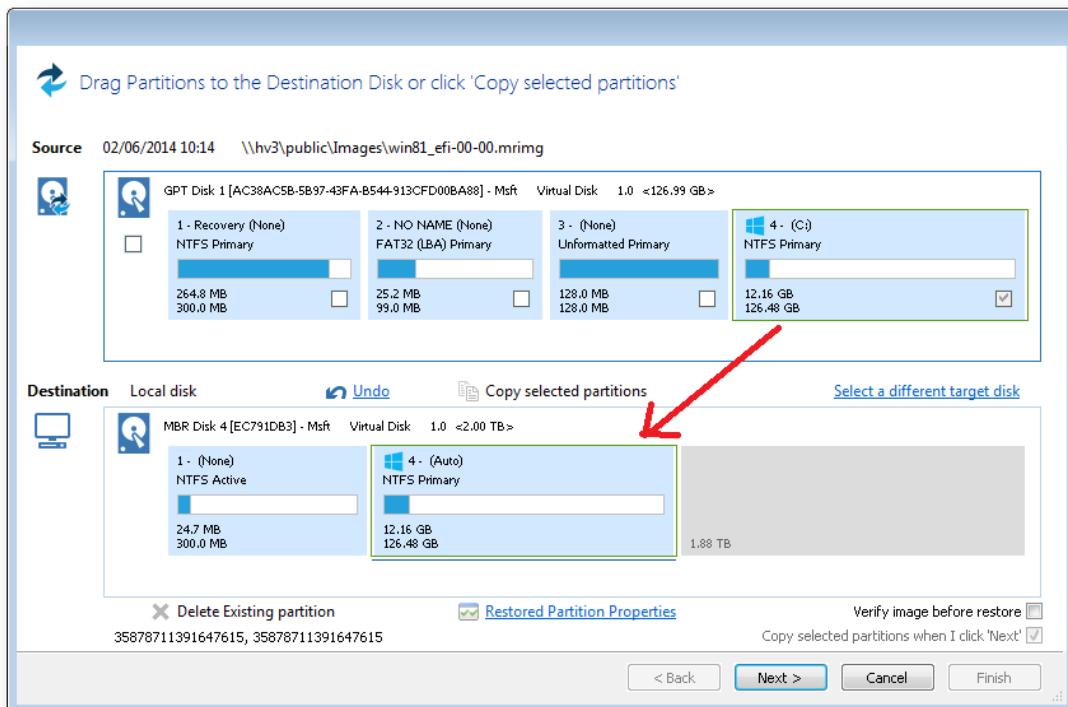
13. Click **Refresh** to read the newly initialized disk.



14. Click **Restore tab**.

15. Select the image file, drag and drop just the **Windows System partition** to the free space on the target disk. In this example, only the 'C:' partition is restored to the target disk.

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Note: You can click '**Restored Partition Properties**' to resize the restored partition to fill the new disk if you wish.

16. Follow the steps in the section **Fix boot problems on MBR/BIOS systems** in the following KB article:
[Fixing Windows boot problems](#)

Note: You should select the newly created 300MB partition as the 'Active' partition when running 'Fix Boot Problems'

Bare metal restore of a Dynamic disk system

Introduction

Dynamic disks are Microsoft's LVM implementation. It is analogous to RAID enabling volumes to be extended over more than one disk, be mirrored over multiple disks, etc. Unlike RAID, it does not need any specific hardware.

As dynamic volumes support many more than the 4 primary partitions of an MBR partitioning scheme but can still be booted (in mirrored or simple configurations), they are occasionally used for single disk configurations.

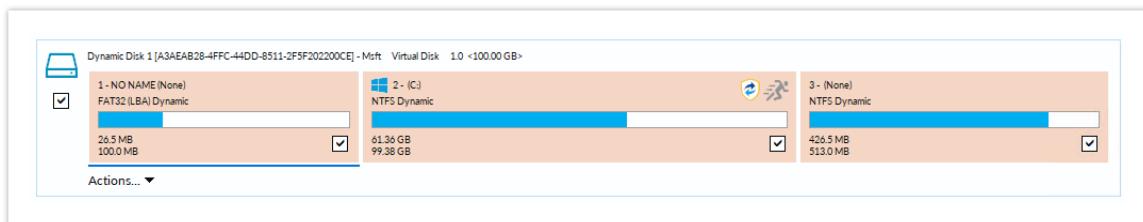
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Non-Dynamic disks are known as Basic disks by Microsoft.

How Reflect images a Dynamic disk

Dynamic disk systems can be imaged by Macrium Reflect Home, Workstation, and Server editions. The physical structure of the source dynamic volume is not stored in the image and so dynamic volumes restructures to the physical layout of the target disk when restored.

Dynamic volumes are differentiated from standard partitions by the use of a contrasting color and the disk title.



How to restore a Dynamic disk

Typically, the target will be the same as the dynamic disk from which the backup was taken; in which case the restore is automatically configured when the image is selected for restore. It is just as straightforward as the restore of a Basic disk.

There are some limitations if you wish to restore to an already configured dynamic volume:

1. Before the backup is started, the Dynamic disk initialization and Volume configuration must be have been completed by an external tool such as [Disk Management](#) or [diskpart](#) (both included with all versions of Windows).

i Dynamic disk initialization and Volume configuration is not possible in the rescue environment, even with diskpart. This is a known limitation of Windows PE (read more [here](#) and [here](#)) as a result of not being able to persist the Dynamic disk state in the (possibly absent) host OS. If your target disk is not initialized, and you need to restore it from the rescue environment, then you must restore to a Basic disk, and convert it back to dynamic once you have booted your (restored) Windows system. See the next section for more details.

2. The restore is by volume. As part of the restore configuration, volumes to be restored must be "dragged" to already configured Dynamic volumes on your target disk. It is not possible to reconfigure the target volume size, so the "Restored partition properties" option is not available.

i You can also drag and drop dynamic volumes to Basic MBR or GPT partitioned or an uninitialized target disk. This enables you to convert a Dynamic disk back to Basic. This is not possible with Microsoft tools.

How to restore a bootable Dynamic volume to an uninitialized disk

If your computer is not bootable, the restore must be run from the Reflect PE-based rescue environment.

The process is complicated as it is not possible to create a Dynamic disk from the rescue environment.

Therefore, the recommended method is to restore up to the first 4 partitions from within the rescue environment ensuring the C: partition and your system reserved (if used) are included. Follow the restore steps, [here](#), noting that you **must drag each partition** from the backup layout to the target disk.

Note that if there is no target disk then start the PE command window (icon lower left). Then type

```
diskpart  
list disks
```



Note: If you don't see your target disk, then a driver is missing for your target mass storage interface. Please read about adding additional drivers [here](#).

Identify the target disk and note the disk number. Then type

```
sel disk <disk number>  
clean
```



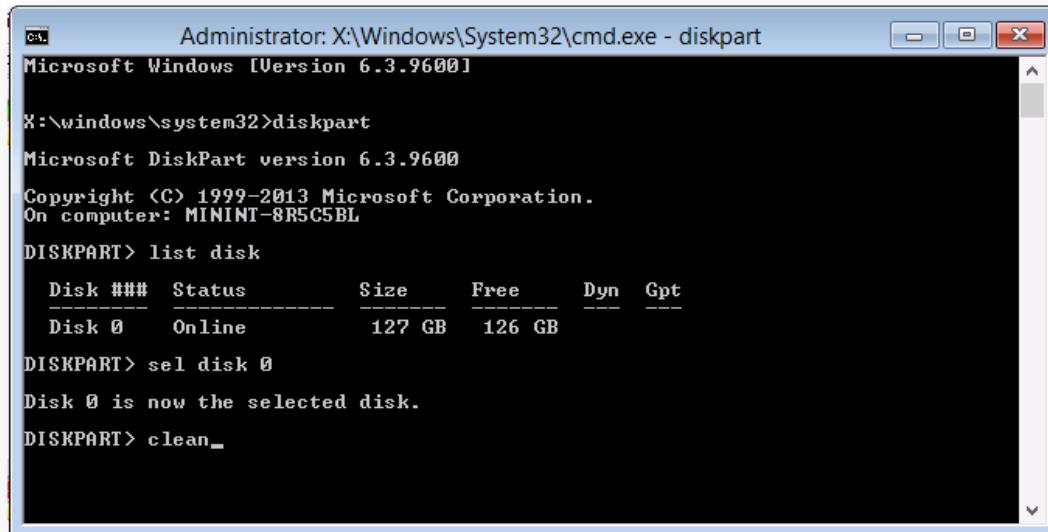
Note: The clean command will reinitialize your disk. Any data will be lost. Please ensure that you select the correct disk!

To update windows PE with the new disk configuration, type

```
rescan  
exit
```

Example diskpart session...

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```
Administrator: X:\Windows\System32\cmd.exe - diskpart
Microsoft Windows [Version 6.3.9600]

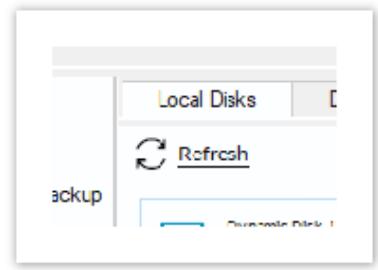
X:\windows\system32>diskpart
Microsoft DiskPart version 6.3.9600
Copyright <C> 1999-2013 Microsoft Corporation.
On computer: MININT-8R5C5BL

DISKPART> list disk
Disk ### Status Size Free Dyn Gpt
Disk 0 Online 127 GB 126 GB

DISKPART> sel disk 0
Disk 0 is now the selected disk.

DISKPART> clean
```

Then use the refresh link in the backup tab. You should now be able to see the disk.

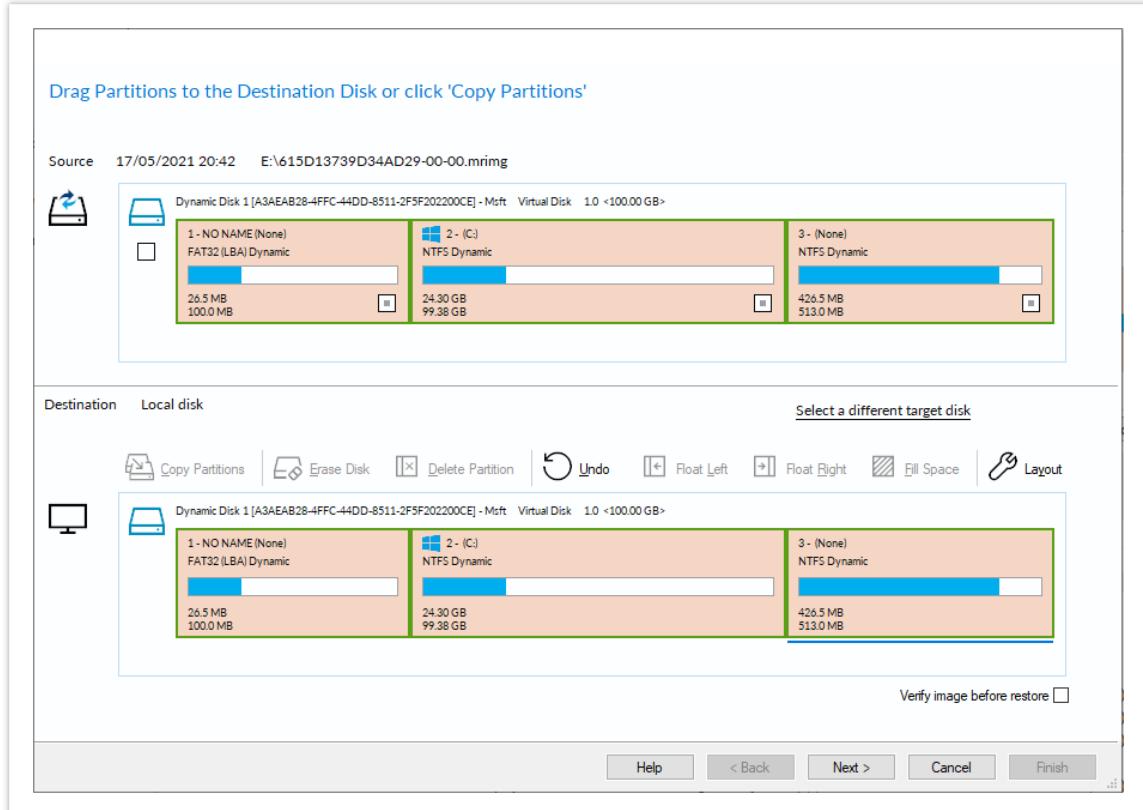


You should now be able to drag and drop up to 4 partitions from your image to your target disk.



If your Dynamic disk is UEFI / GPT configured, you will be able to restore all your partitions to a Basic GPT disk.

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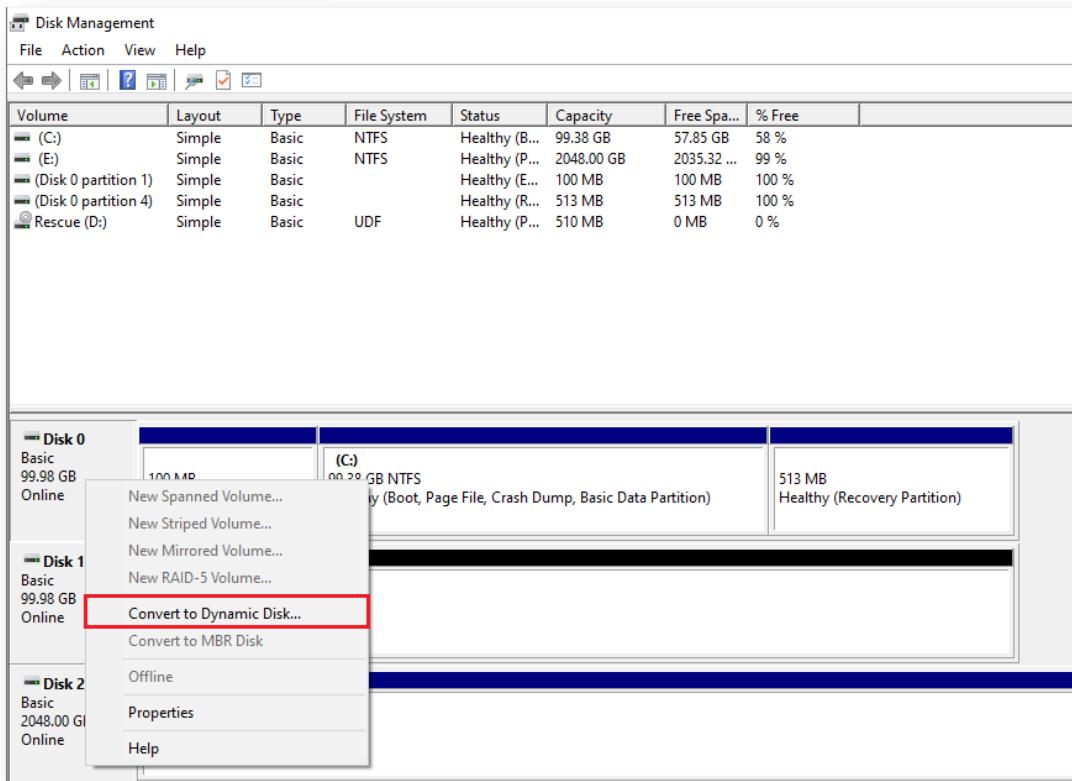
Once the restore has completed you should be able to reboot your computer, this time booting into your restored Windows system.



If your system doesn't reboot, you can use the fix boot problems feature.

You now have the choice of leaving your system as it is or converting back to a Dynamic configuration. To do this, use Disk Management, right click on the disk, and select "Convert to Dynamic Disk...".

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Once you have taken this step, if you have already restored all your volumes from the rescue environment, the restore task is complete.

If you have further volumes to restore, you should use [Disk Management](#) (or `diskpart`) to create the new volumes of a large enough size to contain the partitions to be restored. You can then restore any additional partitions that could not be restored from the rescue environment.

Drive letters assigned to restored or cloned partitions

This article explains how to change the drive letters of restored or cloned partitions during and after the restore or clone process.

- How Windows assigns drive letters to mounted volumes (drives) on your system
- Changing drive letters in the 'Restore Wizard' or 'Clone Wizard' when running Reflect in Windows
- Changing drive letters using the Windows Disk Management Console after restoring or cloning

How Windows assigns drive letters to mounted volumes (drives) on your system

Windows maintains driver letter persistence by storing a reference to each mounted volume and drive letter in the system registry using the following registry key

HKEY_LOCAL_MACHINE\SYSTEM\MountedDevices

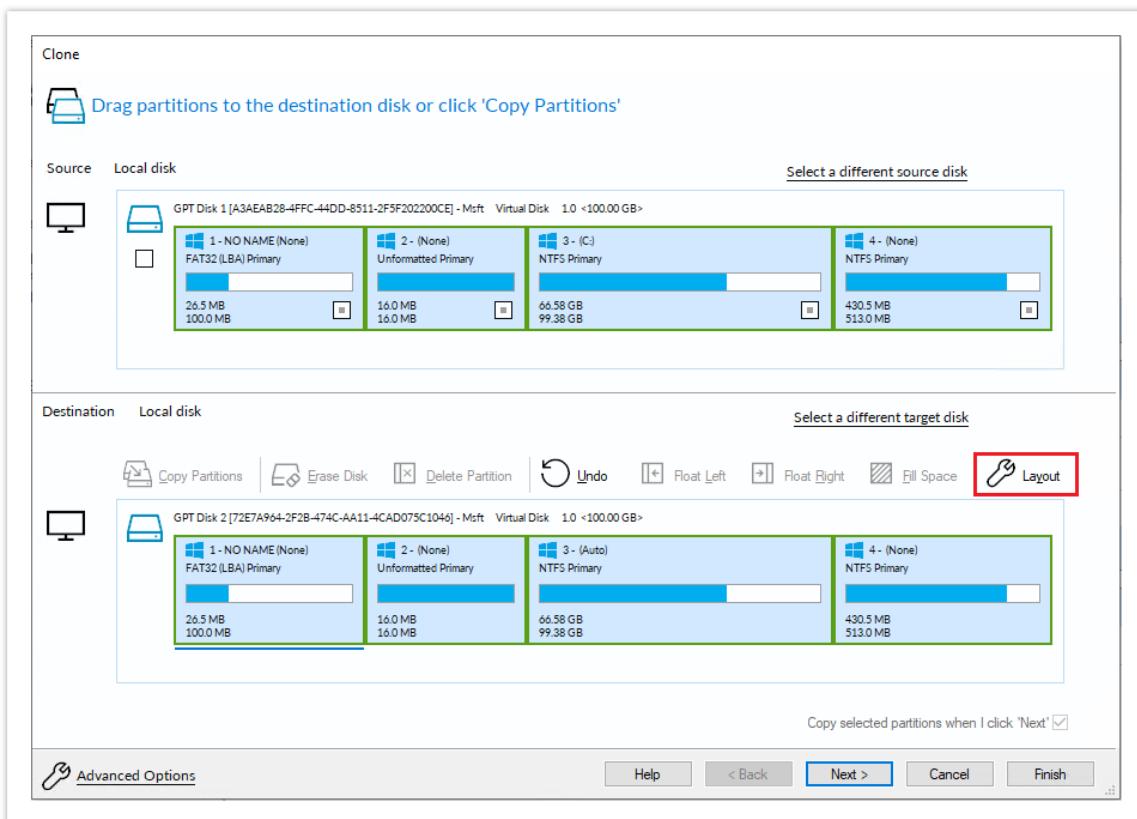
<https://technet.microsoft.com/en-us/library/cc978525.aspx>



Note: When restoring using the **Windows PE** rescue media, the letters assigned to restored partitions are **temporary** for that Windows PE session only. When you **boot into the restored system**, drive letter assignments will be **exactly the same** as they were when the image was created.

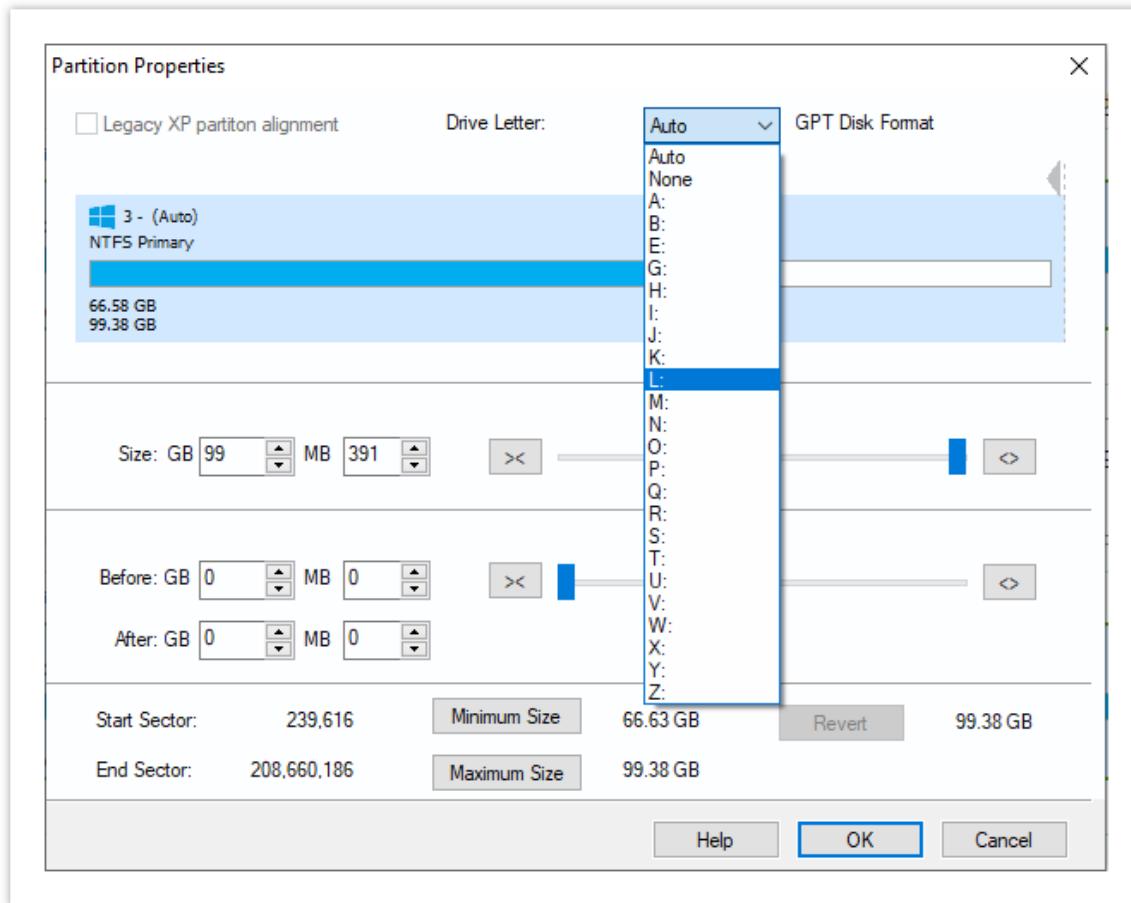
Changing drive letters in the 'Restore Wizard' or 'Clone Wizard' when running Reflect in Windows

1. In the Restore Wizard click the **Layout** icon link after copying or dragging the partition to the target disk:



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2. In the 'Partition Properties' dialog click the **Drive Letter** **combo box**:



Property	Description
Auto	Let Windows automatically assign the next available drive letter
None	No drive letter will be assigned to the restored partition
Letter	Select a drive letter to use from the list of free letters. The original drive letter will be selected by default.

Changing drive letters using the Windows Disk Management Console after restoring or cloning

Windows ships with a utility to maintain local drives and partitions called the **Windows Disk Management Console** (DMC). Using the DMC you can easily change the drive letters assigned to any partition on your system, (except for your system drive C:),

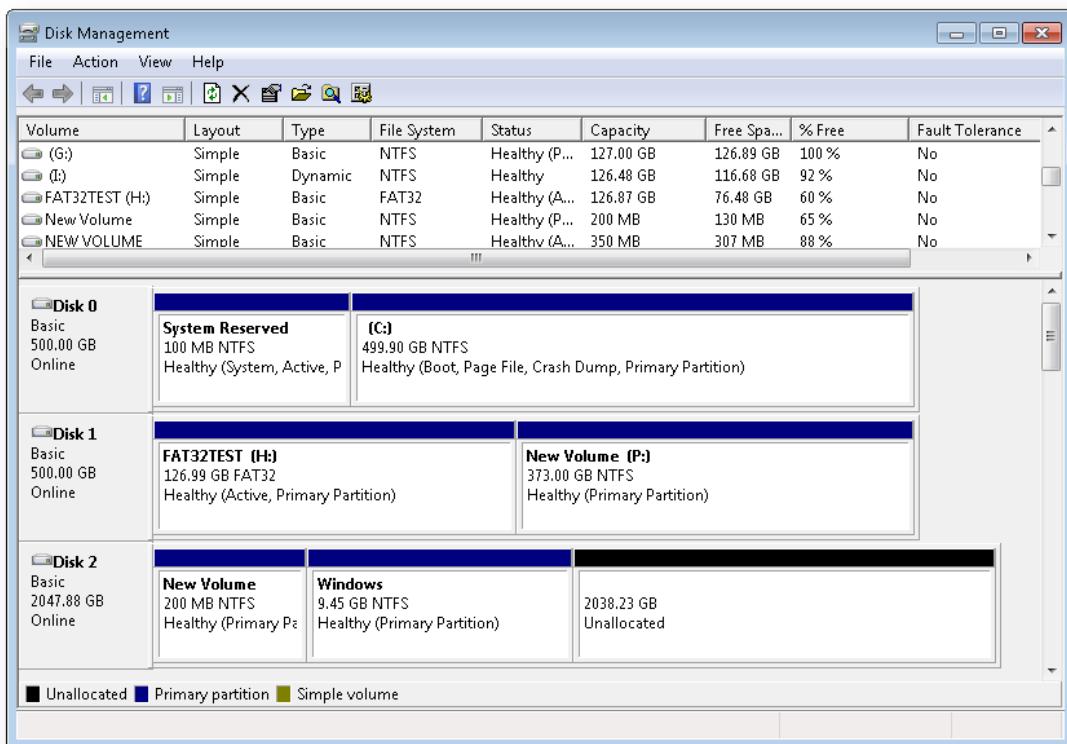
Macrium Reflect v8.0 User Guide

1. To start the Windows Disk Management Console

Click 'Start' or press the Windows Key, Type the following, and press enter:

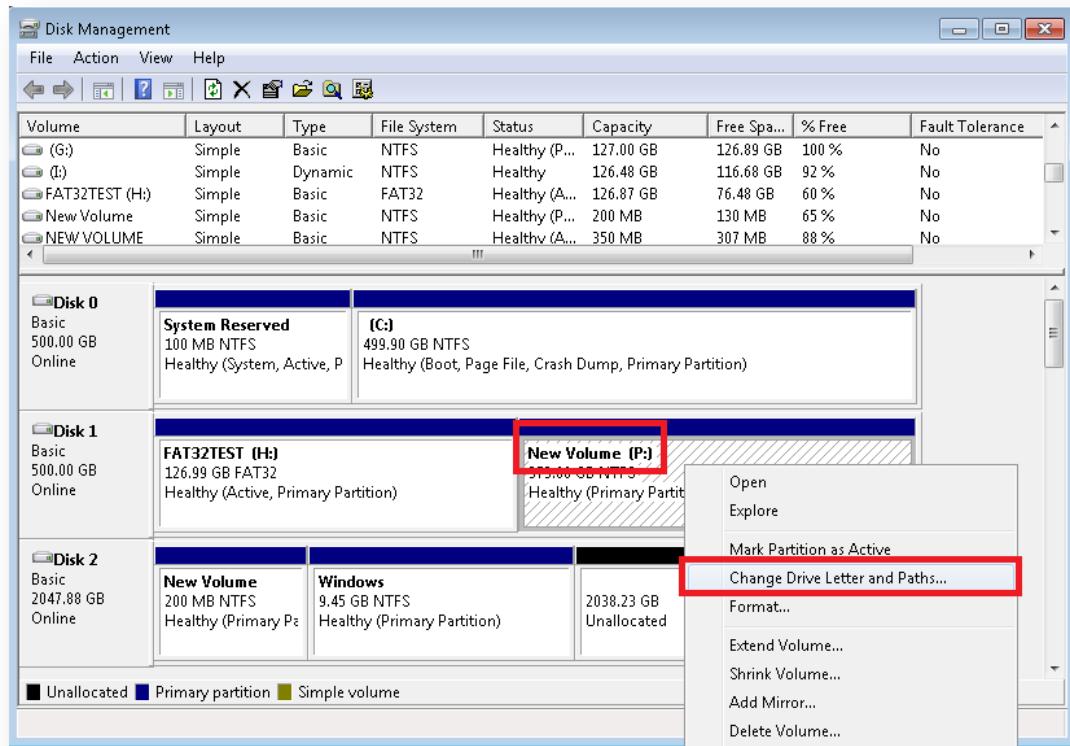
```
diskmgmt.msc
```

2. The DMC starts as shown below:

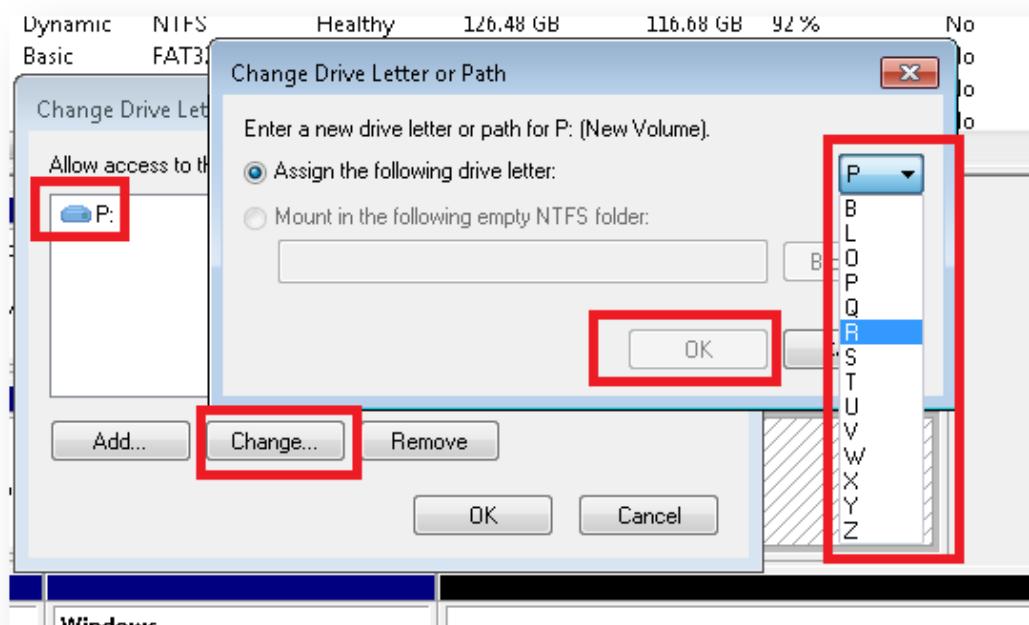


3. Right-click on the partition that you want to change in the lower pane and select **Change drive letters and paths**:

Macrium Reflect v8.0 User Guide



4. In the dialog that opens, **select** the original drive letter, click **Change**, choose a new drive letter and finally click **OK**.



See also:

[Restoring and browsing](#)

[Restoring an image from within Windows](#)

[Restoring a System image from Windows](#)

[Modifying restore destination partition properties](#)

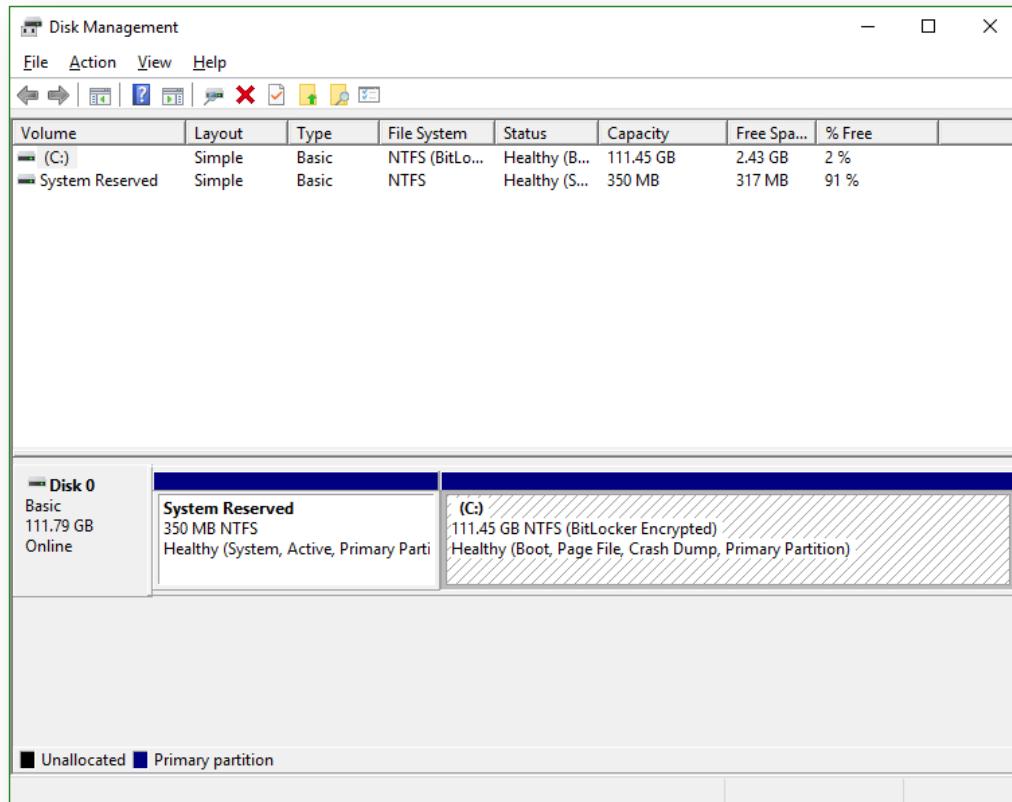
How to create a VHD and restore a backup to the VHD using Macrium Reflect.



This article applies to Windows 7 and higher versions of Windows.

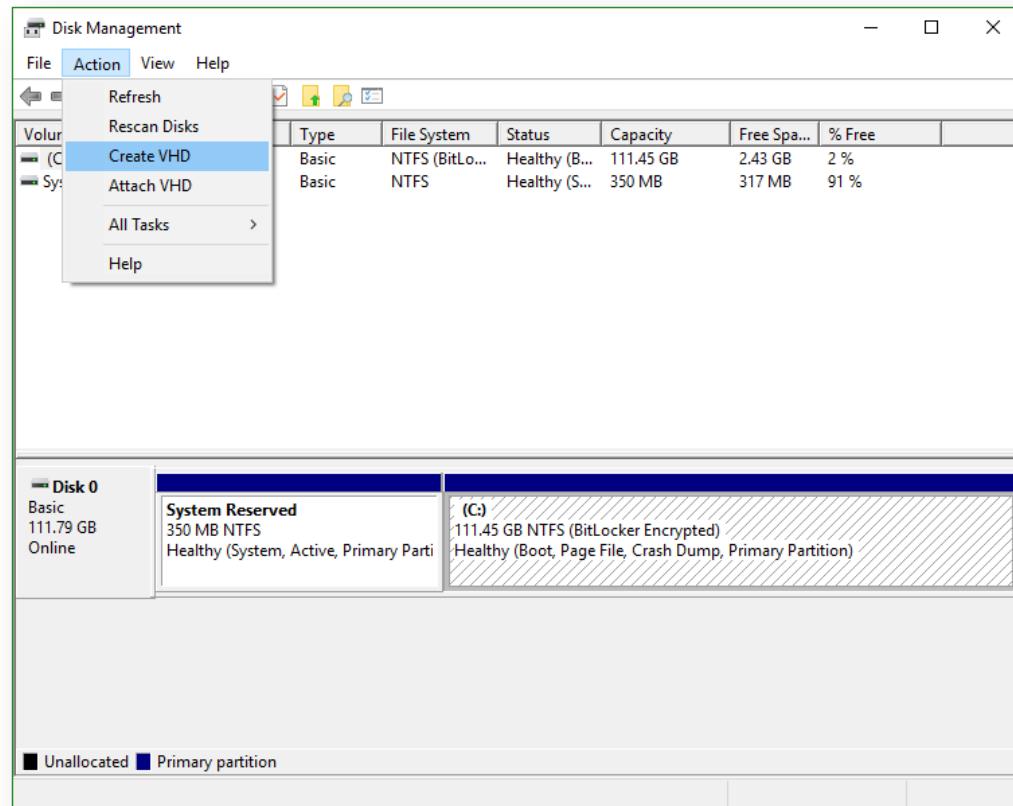
1. This section will take you through the creation of a VHD using the Windows Disk Management console and the mounting process.

- a. **Open Windows Disk Management console.**

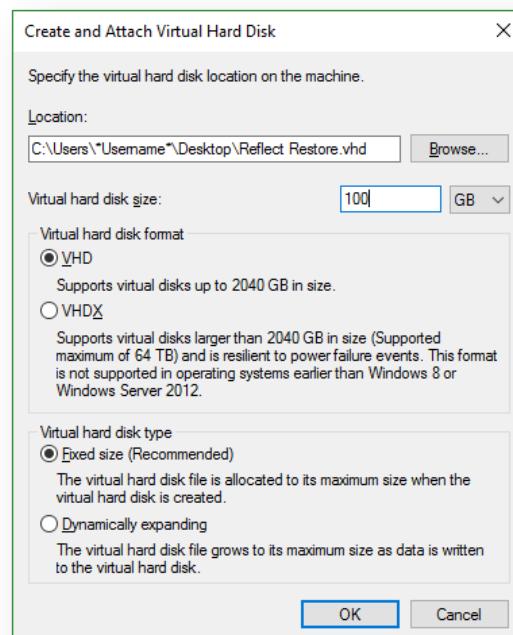


- b. **Click on Action followed by Create VHD.**

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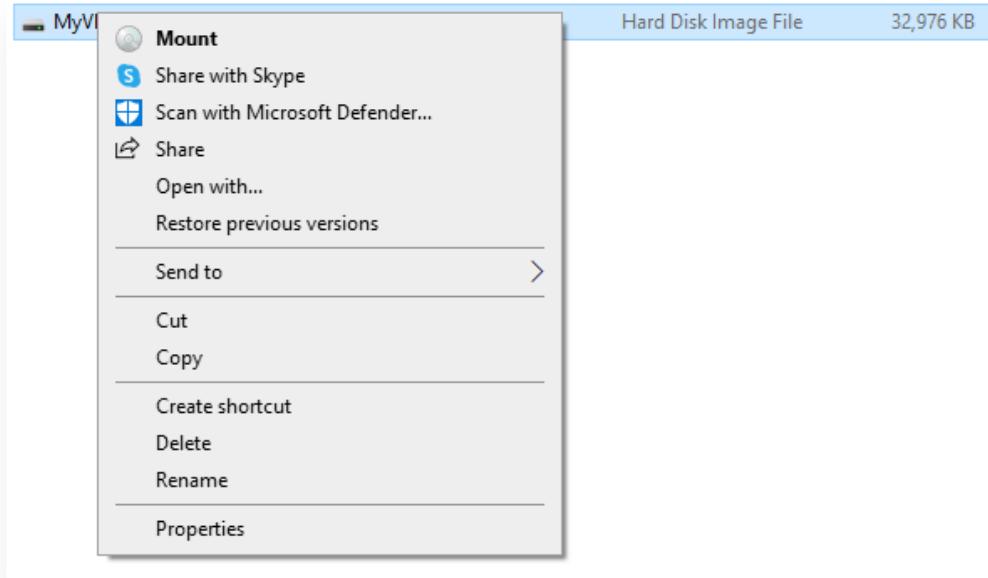


- C. Set your desired options and **click OK** to generate the VHD at the set location.



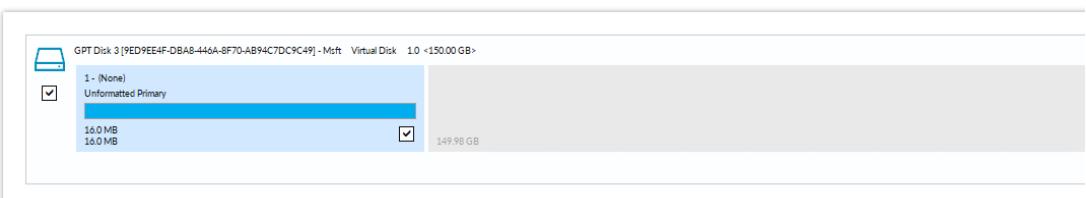
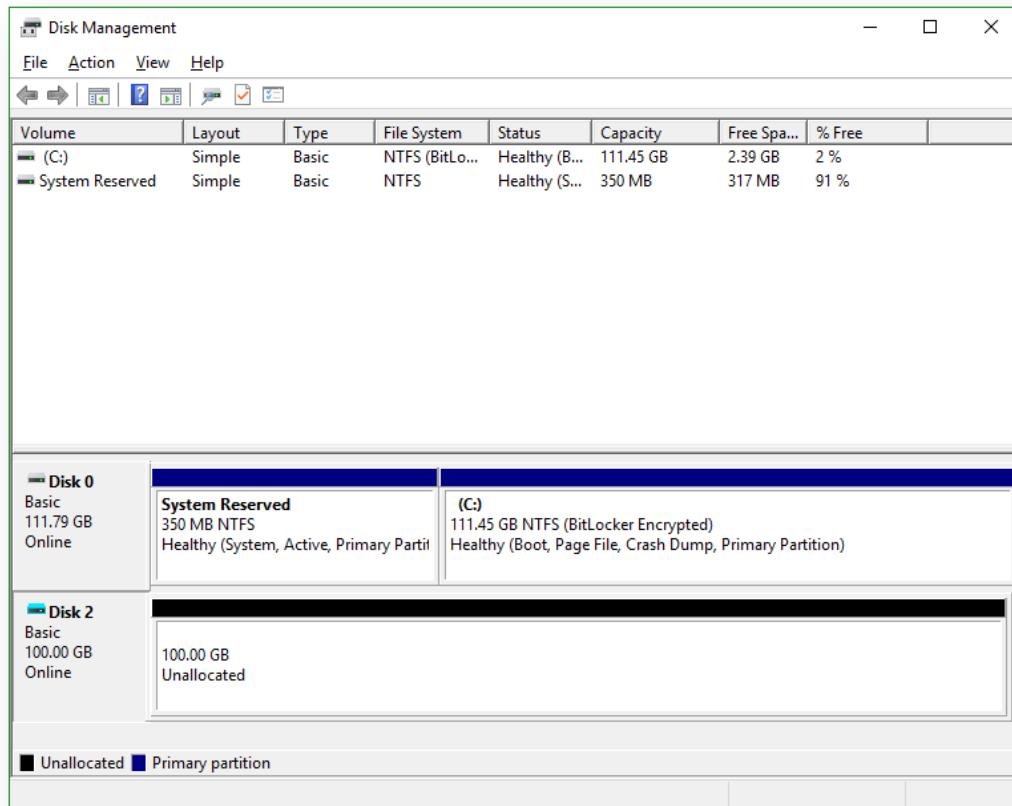
Macrium Reflect v8.0 User Guide

- d. Locate the VHD in Windows Explorer and mount it by right-clicking the icon and selecting the **Mount** option.



- e. Once Mounted, **Macrium Reflect Create Backups tab** and **Disk Management console** will now show the mounted VHD.

Macrium Reflect v8.0 User Guide



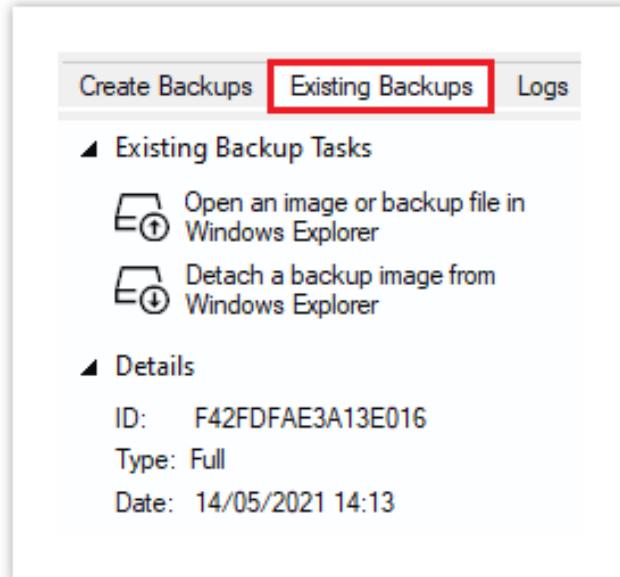
! If the **VHD** is not visible in Reflect after it has been mounted, please click the [Refresh](#) button.

-
2. This section will take you through the restore process of your image to the VHD.

Before you begin: You must have a backup image of the disk ready to restore.

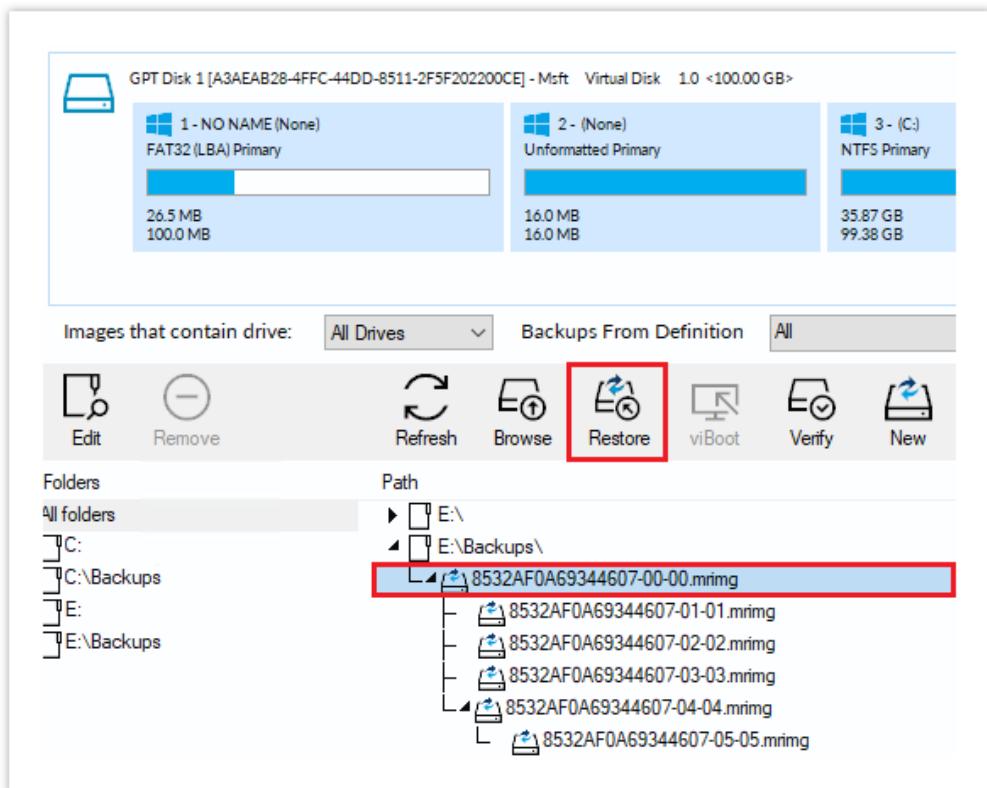
- a. On the main screen, select **Existing Backups** then select **Image**.

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Backup images available to be restored are shown in the main pane.

- b. Select the image you wish to restore and the **Restore** icon.



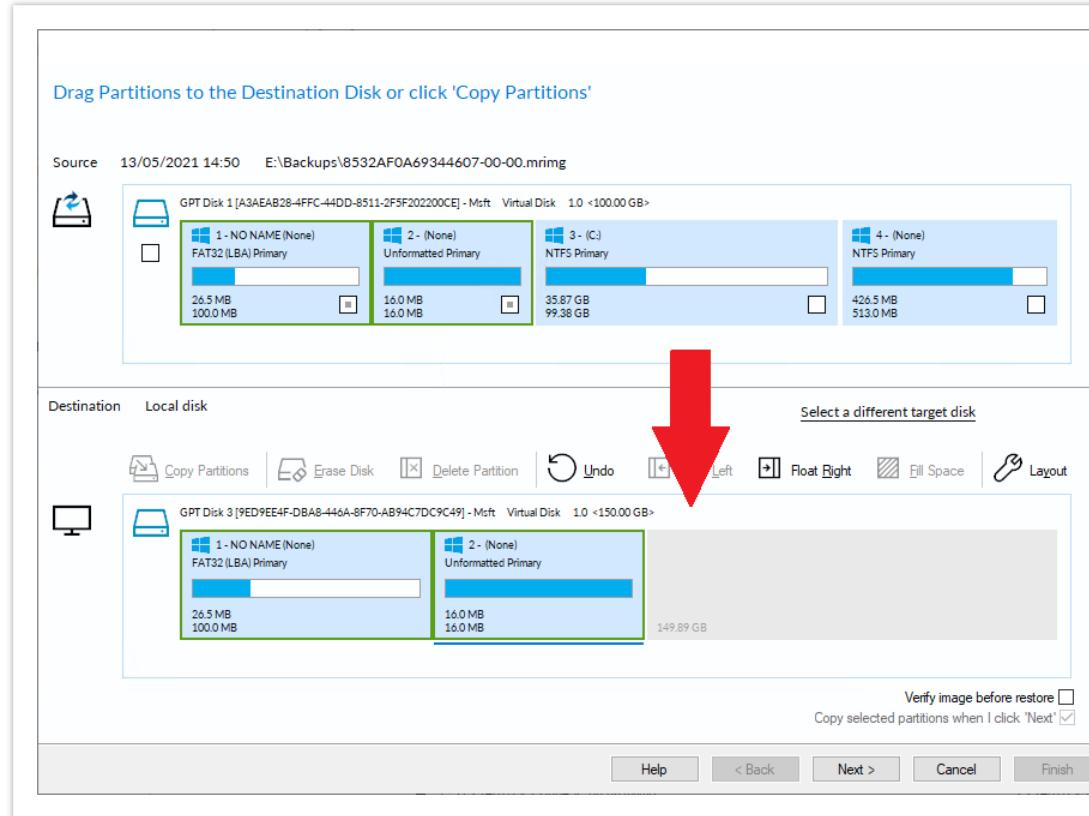
- c. The next dialog gives you the opportunity to modify the destination properties.

Moving and Resizing the restored partition

Macrium Reflect v8.0 User Guide

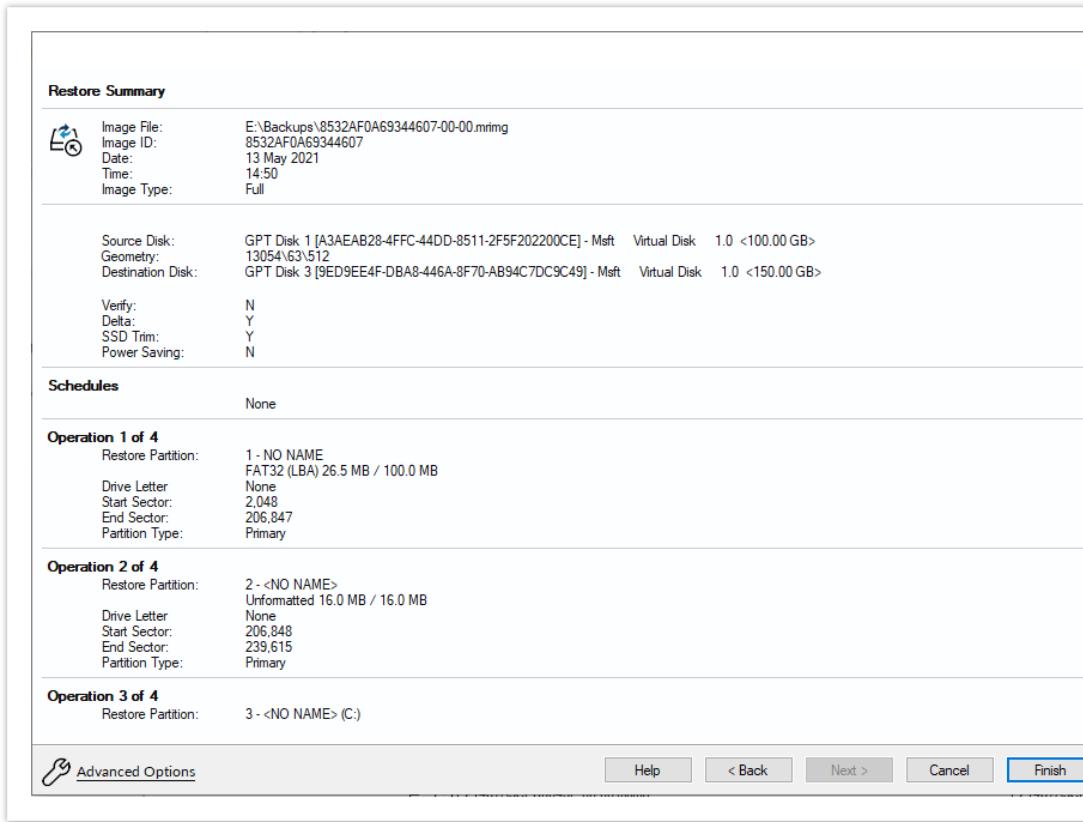
By default, partitions restore to their original locations if you click **Copy selected partitions**. However, to drag partitions to different locations and resize them to use the available space. Simply drag the source partition to any available partition or free space on the target disk. You can also delete partitions on the target disk to make space. For more destination options and further information, see [Modifying restored partition properties](#).

Drag and drop the disk partitions from the **Source** image to the **Destination VHD**.



- d. Click **Next** to restore the image onto the VHD.

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e. A summary screen is displayed confirming the choices that have been made, click **Finish**.



Note: You may need to run Macrium ReDeploy to enable a restored system image to boot into the Hyper-V VM. Please see [Re-deploying to new hardware](#) for more information.

Scheduling and Retention rules

Macrium Reflect provides multiple **Backup Plan** options to create backup cycles in days, weeks, or months that allow you to pick when you want your backup definitions to run and whether they should be Full, Differential or Incremental backups. Scheduled backups can run independently of whether anyone is logged into the computer.

Macrium Reflect provides an easy 3 step approach to editing backup plans for a backup definition:

1. First, optionally select a **Template** from a set that includes implementations of industry best practice like Grandfather, Father, Son (GFS), or Incremental Forever
2. Add, remove or change the schedules as needed for Full, Differential, and Incremental backups
3. Finally, define **Retention Rules** for each type of backup. Using the **Retention Rules**, you can retain a specific number of each type of backup or keep them for a number of days or weeks before cleaning up.

Macrium Reflect v8.0 User Guide

Options define whether to apply the retention rules to all the backups in the folder, whether to run the purge before backing up, and let you define a minimum amount of disk space to retain in gigabytes (GB) before automatically deleting the oldest *backup sets* in the destination folder to make space available for new backups.



Note: A backup set consists of a full backup and any Incrementals or Differentials with the same image ID. The image ID is the part underlined in the following example backup file name: 69B5FC3F39E0F9F5-00-00.mrimg

Further reading:

- Scheduling backups
- Configuring e-mail notifications
- Running continuous backup of SQL databases
- Which user name and password is used when scheduling a backup?
- Retention and consolidation

Scheduling backups

Creating and Editing a Backup Plan

The screenshot shows the 'Edit the Plan for this Backup' dialog box for a 'Disk Image'. The interface is divided into three main sections: 1. Select a Template for your Backup Plan (dropdown menu showing 'None'), 2. Add/Edit Schedules (table with columns 'Backup Type' and 'Schedule', showing rows for Full, Differential, and Incremental types), and 3. Define Retention Rules (checkboxes for Full, Differential, and Incremental backup types, with dropdowns for 'Keep' counts and 'Backups' type). Advanced options and navigation buttons are at the bottom.

Disk Image

Edit the Plan for this Backup

1. Select a Template for your Backup Plan
None

2. Add/Edit Schedules

Backup Type	Schedule
Full	
Differential	
Incremental	

(+) Add Schedule Edit Schedule (-) Delete Schedule

3. Define Retention Rules

Apply retention rules to matching backup sets in the target folder			
<input checked="" type="checkbox"/> Full	Keep	12	Backups
<input checked="" type="checkbox"/> Differential	Keep	4	Backups
<input checked="" type="checkbox"/> Incremental	Keep	10	Backups

Create a Synthetic Full if possible

Run the purge before backup.

Purge the oldest backup set(s) if less than GB on the target volume (minimum 1GB)

Advanced Options Help < Back **Next >** Cancel Finish

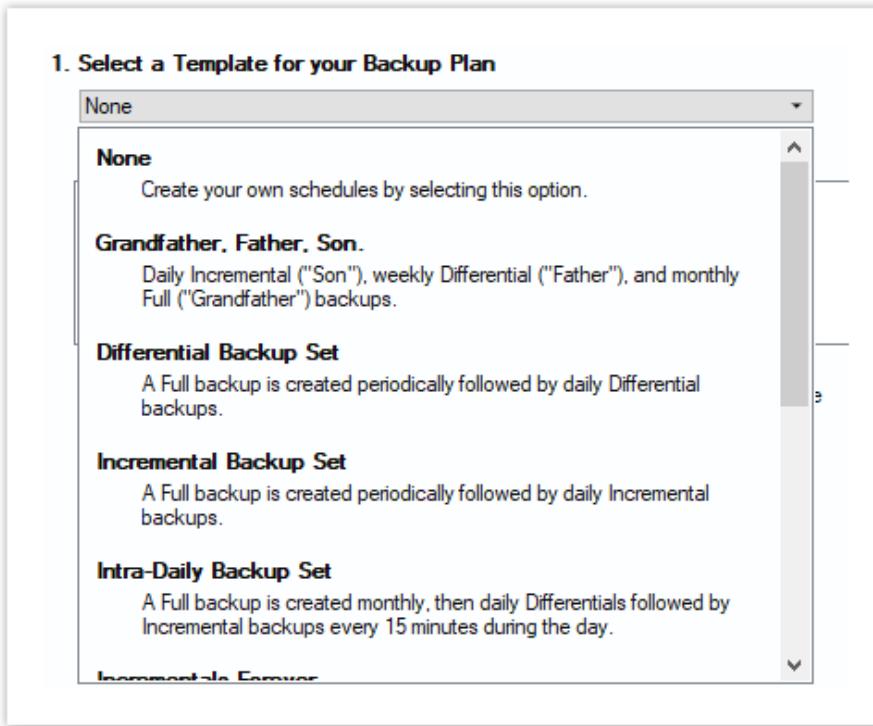
Macrium Reflect v8.0 User Guide

The wizard splits the task of scheduling backups and setting retention rules into 3 steps as follows:

Select a Template for your Backup Plan

1. Click the drop-down box and chose an applicable template.

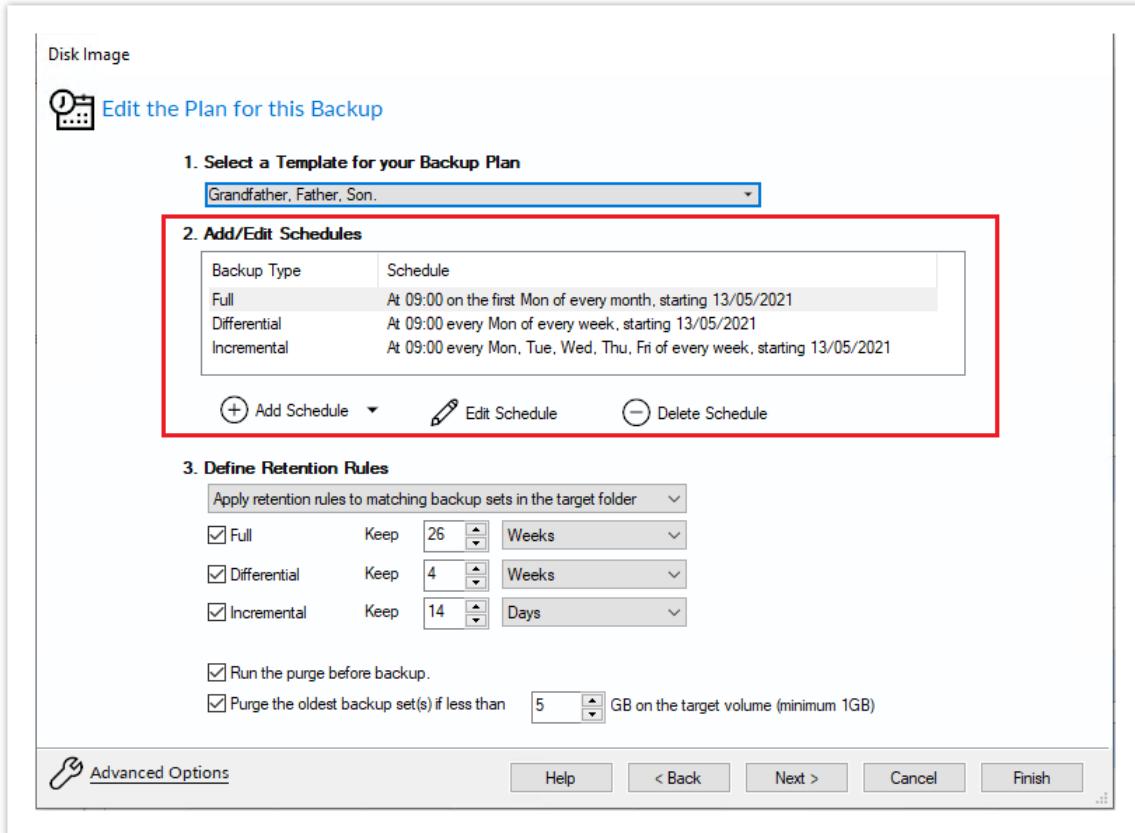
A summary is given for each template to help you select the template you require.



Add/Edit Schedules

When you have selected the template you want to use you can view the planned schedule.

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i Resolving Scheduling Conflicts

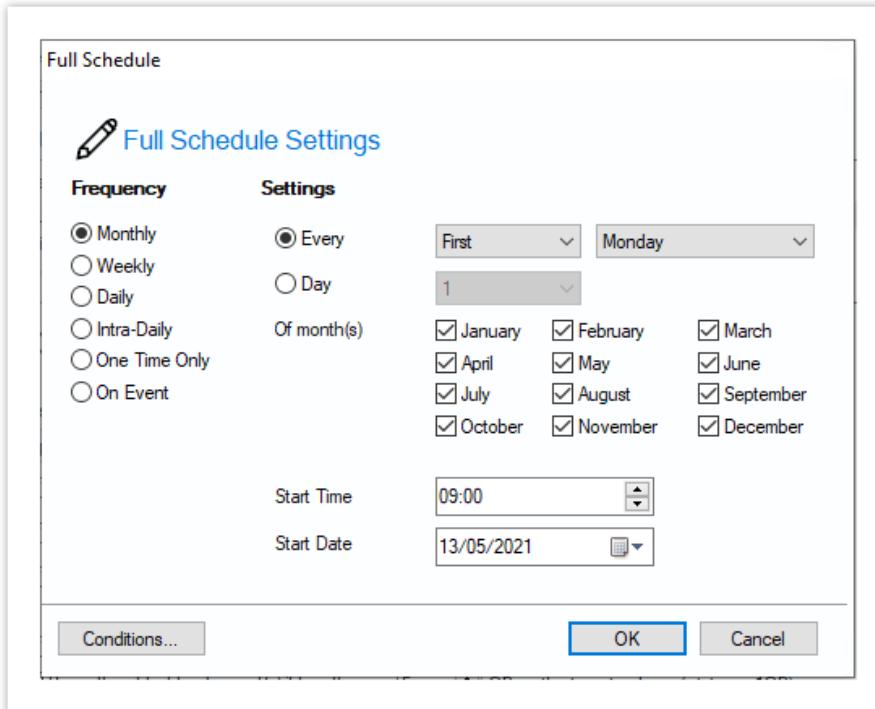
If multiple backup types are scheduled to run at the same time on the same day then only one backup will run. For example, when scheduling a **Full backup on the first Monday** of each month and scheduling a **Differential for every Monday**, on the first Monday a Full and Differential are both scheduled to run at the same time. In this scenario, **only the Full backup will run**.

- Full backups take precedence over Differentials and Incrementals
- Differential Backups take precedence over Incrementals.

To add to this schedule:

1. Click **Add Schedule** and select either Full, Differential, or Incremental.
2. Set the frequency for the backup schedule.

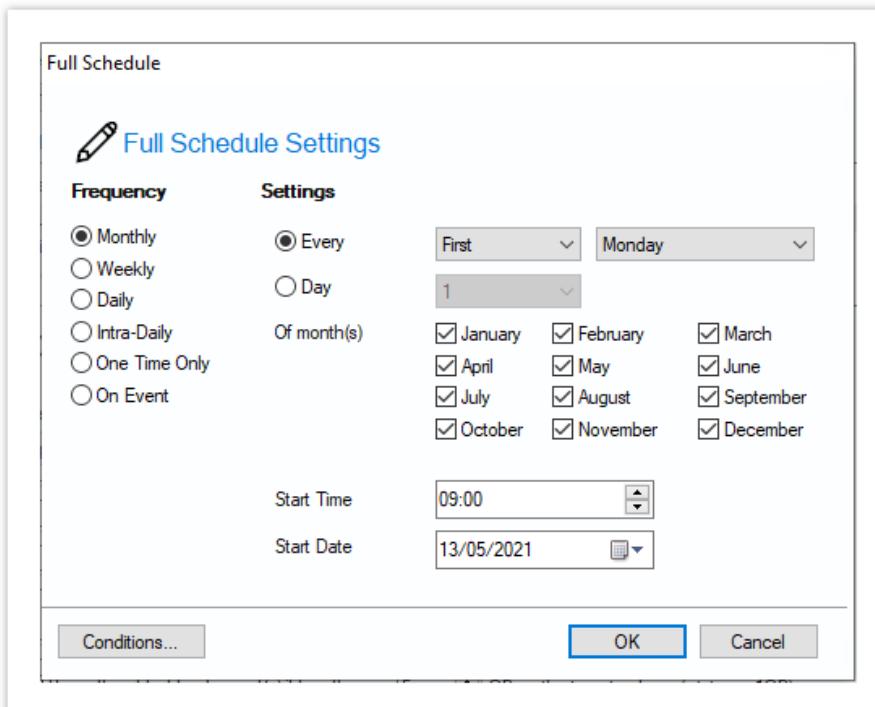
Macrium Reflect v8.0 User Guide



3. Click **OK**.

To Edit the schedule:

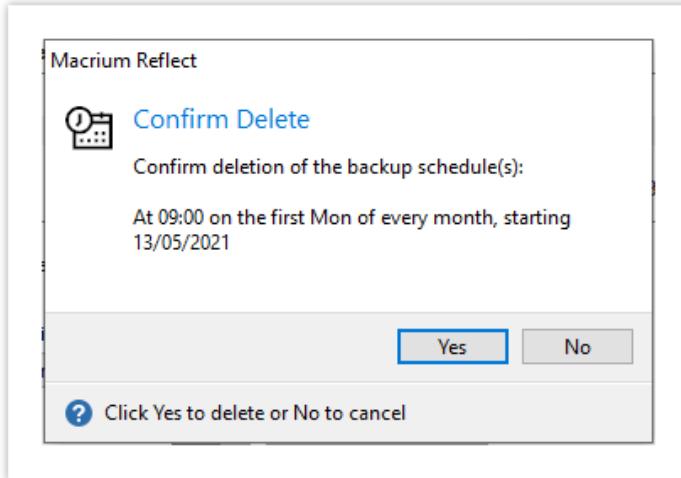
1. Select the schedule you want to edit and click **Edit Schedule**.
2. Change the schedule to meet your needs and click **OK**.



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To delete a schedule:

1. Select the schedule you want to delete and click **Delete Schedule**.
2. A confirmation box appears, click **Yes**.



Define Retention Rules

1. Establish how long each type of backup in the schedule should be kept. It is advisable to keep backups for the recommended period, however, you can de-select the backup type if you do not want to retain it.

The dialog box has sections for 'Disk Image', 'Edit the Plan for this Backup', and '3. Define Retention Rules' (which is highlighted with a red border).

1. Select a Template for your Backup Plan
Grandfather, Father, Son.

2. Add/Edit Schedules

Backup Type	Schedule
Full	At 09:00 on the first Mon of every month, starting 13/05/2021
Differential	At 09:00 every Mon of every week, starting 13/05/2021
Incremental	At 09:00 every Mon, Tue, Wed, Thu, Fri of every week, starting 13/05/2021

3. Define Retention Rules

Apply retention rules to matching backup sets in the target folder		
<input checked="" type="checkbox"/> Full	Keep	26 Weeks
<input checked="" type="checkbox"/> Differential	Keep	4 Weeks
<input checked="" type="checkbox"/> Incremental	Keep	14 Days

Run the purge before backup.
 Purge the oldest backup set(s) if less than 5 GB on the target volume (minimum 1GB)

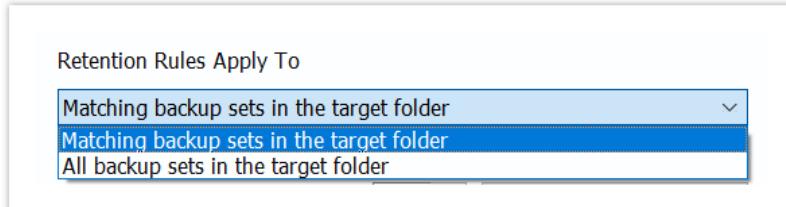
Advanced Options Help < Back Next > Cancel Finish

Macrium Reflect v8.0 User Guide

Macrium Reflect retention rules provide a powerful and flexible way to manage the lifetime and storage space used by your backups.

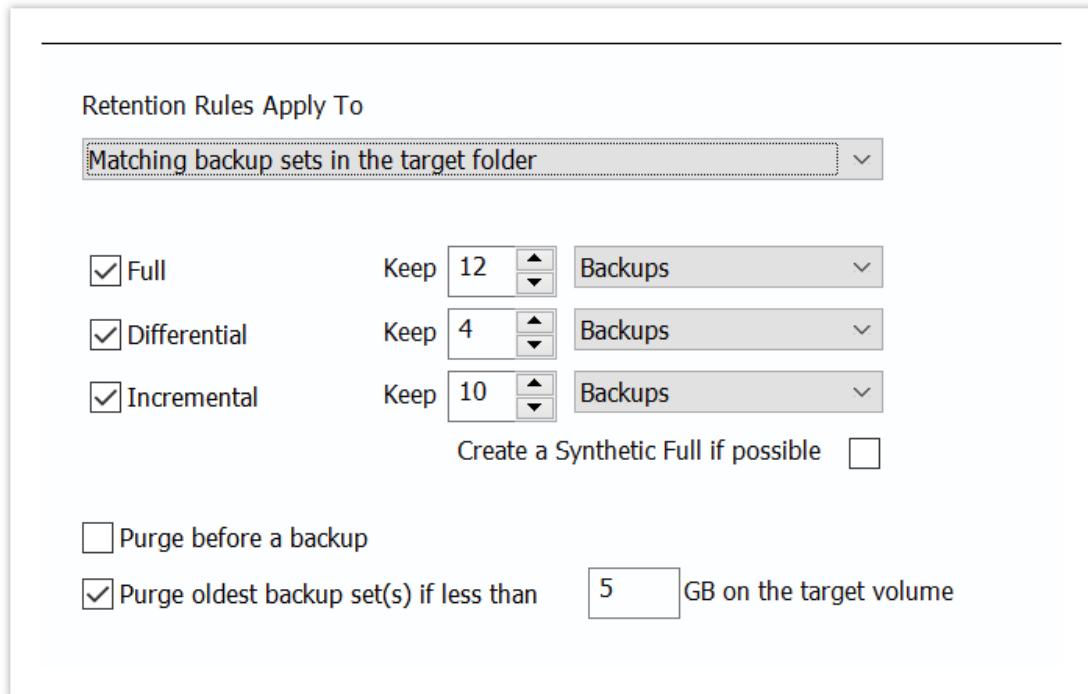
Choose how backups are matched, and how retention rules are applied to the target folder

Retention rules are applied to the target folder of the backup by selecting one of two options:



Similar backup sets in the target folder.	<p>Disk Images are purged if they contain exactly the same Partitions as the current Image. Partitions are identified using the unique Disk ID stored in sector 0 of the disk and the Partition sector offset. Note: For GPT disks the unique GPT disk GUID is used instead of the Disk ID</p> <p>For File and Folder backups retention rules are applied according to the File and Folder 'Backup Set Matching' selection.</p>
All backup sets in the target folder.	All backup sets in the target folder of the same type (Disk Image or File and Folder) are purged according the retention rules.

Select the age or number of backup types that you wish to keep



Macrium Reflect v8.0 User Guide

Option	Description																																													
Full	When deleting Full backups all linked incremental and Differential backups in the same backup chain (set) are also deleted. This operation will delete the entire backup set.																																													
Differential	When deleting Differential backups all linked incremental backups in the same backup chain (set) are also deleted.																																													
Incremental	<p>When deleting Incremental backups the integrity of the backup set is maintained by ensuring that the chain is never broken. This is achieved by merging older Incremental backups when required.</p> <p>In the example below, before retention, there is 1 Full backup, 1 Differential backup and 6 Incremental backups. The retention rules are set to retain 4 incremental backups. After retention, the most recent 4 incremental backups are retained. Deleting the oldest 2 incrementals would cause the backup chain to be invalid as the oldest retained incremental requires the previous 2 incremental backups to complete the chain. To ensure backup integrity the 2 older incremental backups are consolidated with it to create a new incremental backup.</p> <p>F = Full D = Differential I = Incremental</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>M</td><td>T</td><td>W</td><td>T</td><td>F</td><td></td><td>M</td><td>T</td><td>W</td><td>T</td><td>F</td><td></td><td>M</td><td>T</td><td>W</td></tr> <tr> <td>F</td><td></td><td></td><td></td><td></td><td></td><td>D</td><td>I</td><td>I</td><td>I</td><td>I</td><td></td><td>F</td><td>I</td><td>I</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td>--</td><td>-></td><td>I</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>	M	T	W	T	F		M	T	W	T	F		M	T	W	F						D	I	I	I	I		F	I	I							--	->	I						
M	T	W	T	F		M	T	W	T	F		M	T	W																																
F						D	I	I	I	I		F	I	I																																
						--	->	I																																						
Create a Synthetic Full if possible	When purging Incremental backups, if the backup set only contains a Full backup followed by Incremental backups , then this option causes the Full backup to be 'rolled forward' to create a Synthetic Full backup . This is also known as Incremental Forever .																																													
Run the purge before the backup	Select this option to run the retention rules before the current backup. Note: in Macrium Reflect v5 the current backup set wasn't included in the purge calculation when purging before the current backup. In v6 the current backup set IS included. This means that if you set the retention count to 1 Full backup then all of your backups will be deleted and a new Full backup created.																																													

Macrium Reflect v8.0 User Guide

Option	Description
Delete oldest backup set (s) if less than n GB	Automatically remove the oldest backup set(s) in the target folder if the free space on the drive drops below the GB threshold. Note: The free space threshold is actioned dynamically. If the free space available drops below the threshold then the running backup is temporarily paused while older backup sets are purged.

Advanced options

If required, set Advanced Options as follows:

- **Compression** to reduce the file size. Select level of compression and whether to make an intelligent sector copy, that copies only disk sectors used by the file system or make an exact copy of the partitions, that includes unused sectors.
Note: reducing the file size may increase the total backup time.
- **File Size** to enter a fixed file size for the image, this is useful for manually copying the image file to CD/DVD.
- **Password** to select whether to password protect the image.
- **Auto Verify Image** to select to verify image or backup file directly after creation.
Note: This can add a significant amount of time to the backup process.
- **Comments** to set comments for the image or backup.
- **Shutdown** to set whether the computer should be shutdown after a backup task has completed.

Configuring e-mail notifications

For many users, email notification of success or failure of a backup helps them keep on top of the status of their backups, particularly with scheduled backups which take place in the background.

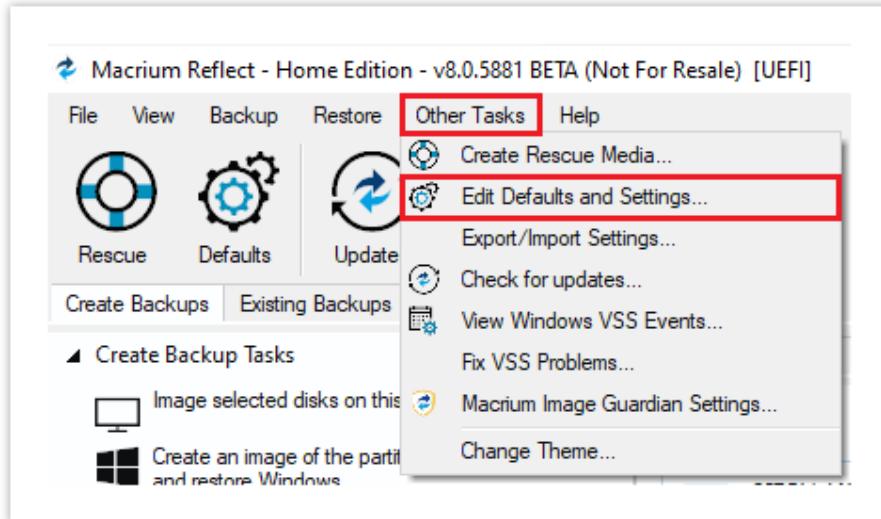
- Program Defaults and SMTP Server settings
- Custom SMTP Server
- Google - Gmail and Microsoft Outlook 365
- Default Email Success, Warning and Failure
- Email notification for existing individual backups

Program Defaults and SMTP Server settings

The default settings are used when creating new backup definitions

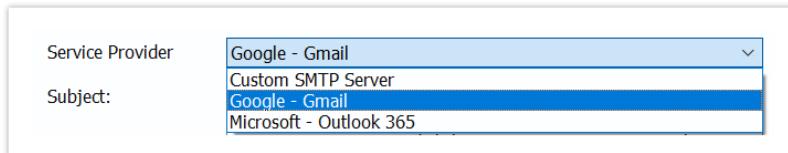
- From **Other Tasks** select **Edit Defaults and Settings...**

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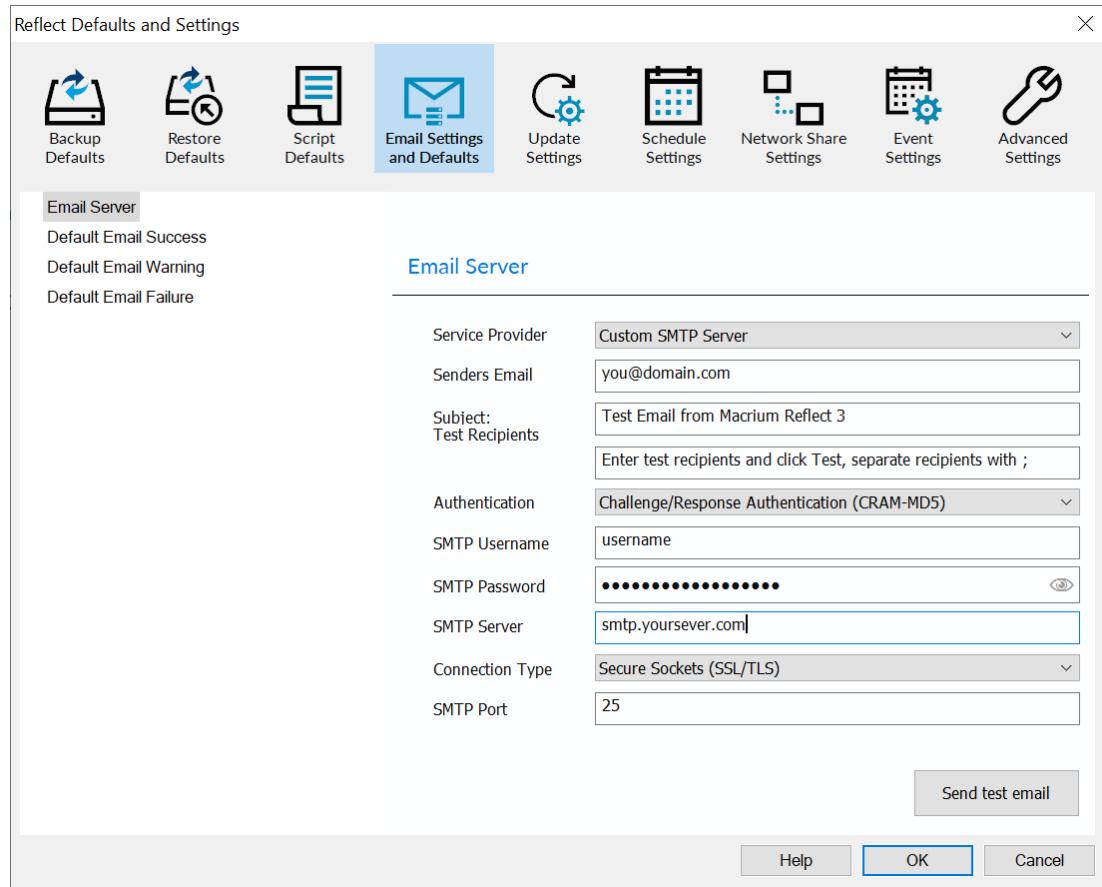
Emails can be sent for backup completion notifications, software update notifications and for add-hoc emails of logs and support contact.

You can choose to manually configure your Email SMTP server, or use your Google or Microsoft account to send Emails using Gmail or Outlook 365



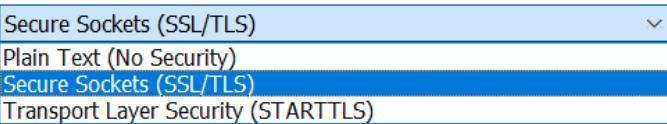
Macrium Reflect v8.0 User Guide

Custom SMTP Server



Option	Description
Senders Email	The Email address of the sender. This is normally required to be the same domain as your ISP.
Authentication	Authentication options are set by your email provider/server. <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> Challenge/Response Authentication (CRAM-MD5) None Auto Detect Challenge/Response Authentication (CRAM-MD5) Secure Username/Password login (AUTH LOGIN) Username/Password login (AUTH PLAIN) Microsoft NT Lan Manager (NTLM) </div> <p>Note: If you do not know your authentication settings, try Auto Detect.</p>
SMTP Username	The user name associated with your e-mail account. This is essentially your email address.

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Option	Description
SMTP Password	This is the password for your e-mail Server.
SMTP Server	This is the outgoing / SMTP Server setting or IP address.
Connection Type	Contact your ISP for the correct setting  <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;">i Note: These settings can be found from your email provider.</div>
SMTP Port	This is associated with Connection Type and is the port number that the SMTP server is listening on. <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;">i Note: These settings can be found from your email provider.</div>
Test Recipients	This option is used to test the configured settings; enter your e-mail address in that field and click Test to send a test message to your email.

Google - Gmail and Microsoft Outlook 365

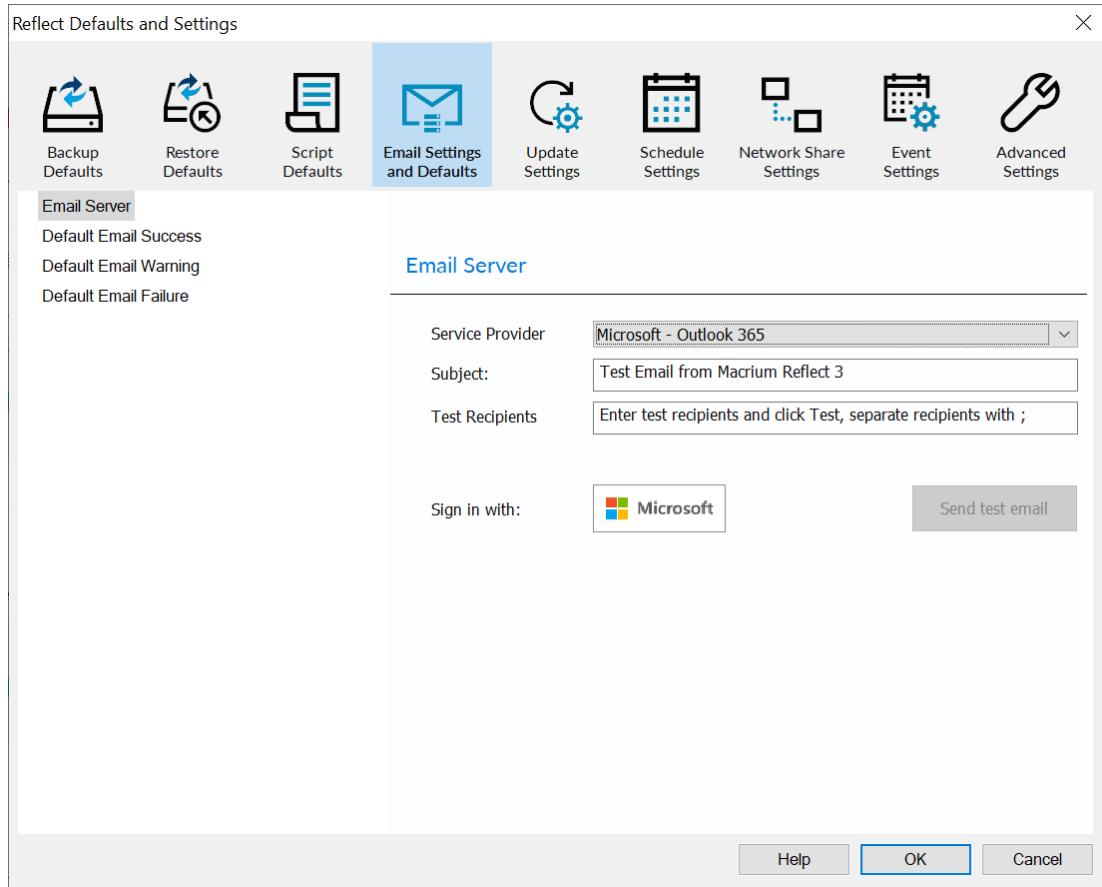
Macrium Reflect v8.0 includes OAuth 2.0 to authenticate Macrium Reflect to send emails using your **Microsoft** or **Gmail** account. It's easy to setup and uses your account sign in, including two factor if enabled, to securely authenticate.



Note: OAuth 2.0 authentication tokens are stored locally. **We don't see or store any authentication information on our servers.**

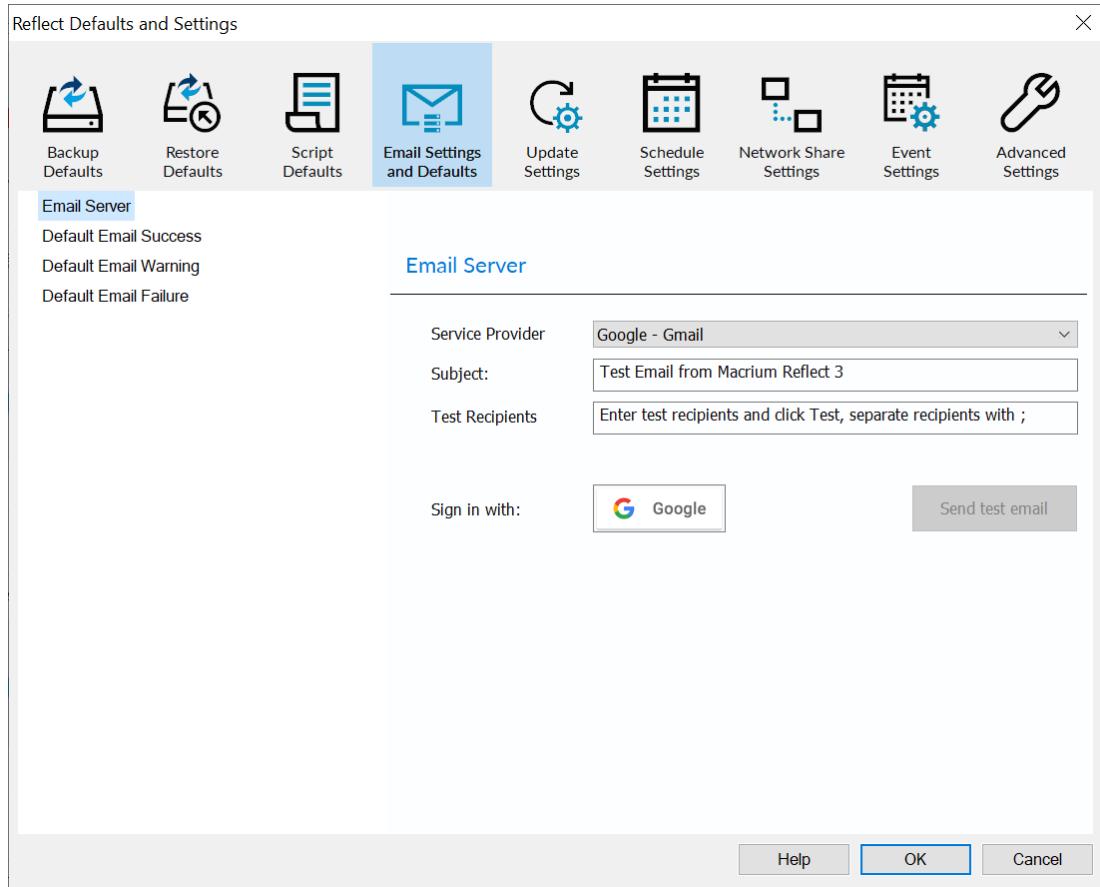
Microsoft - Outlook 365

Macrium Reflect v8.0 User Guide



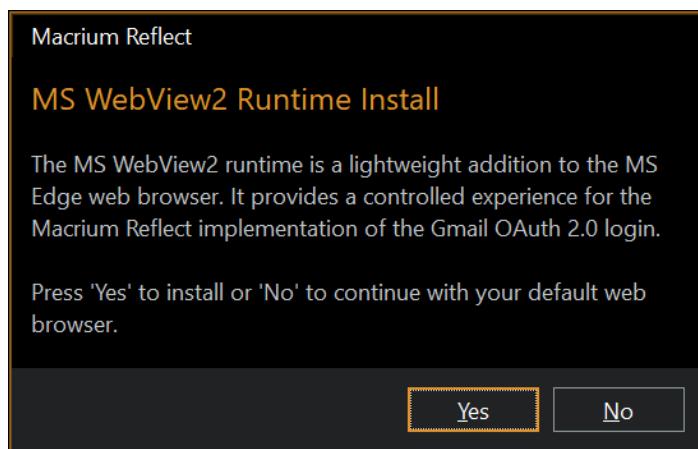
Google - Gmail

Macrium Reflect v8.0 User Guide



The first time you sign in you will be prompted for a one time download and install of the [WebView2 distribution installer](#).

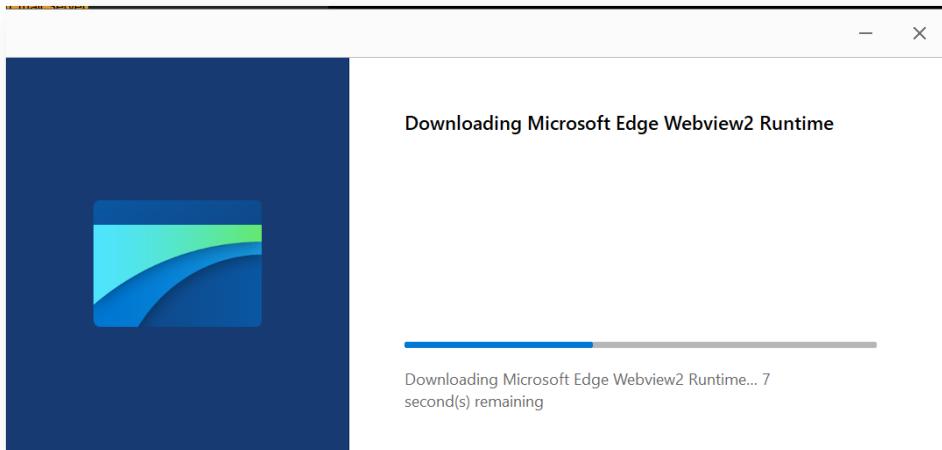
This is a lightweight MS Edge Chromium web browser that provides a controlled experience for the Macrium Reflect implementation of the OAuth 2.0 login.



Click 'Yes' to install or 'No' to continue with your web browser.

If you click 'No' you will be taken out of Macrium Reflect to continue in your default web browser.

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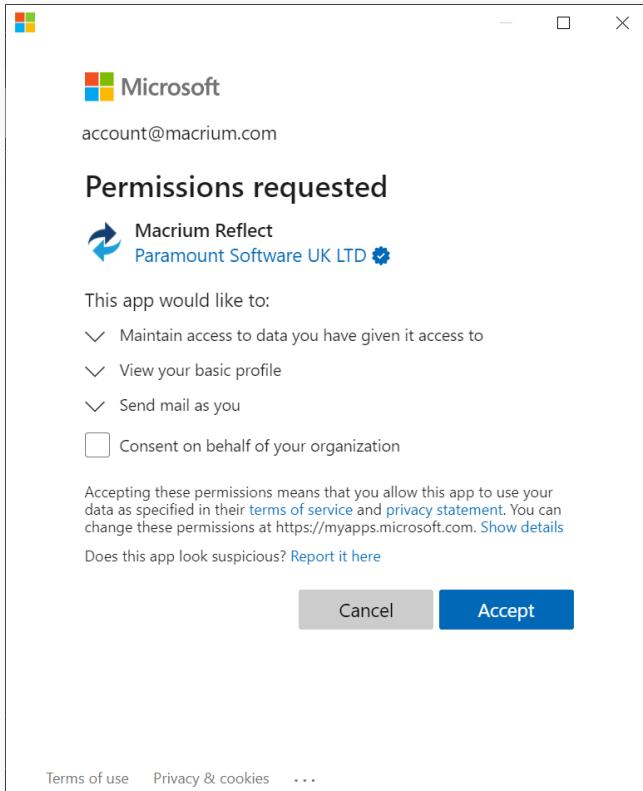
Once WebView2 installation is complete a web sign in dialog opens. **Follow the normal sign in procedure for either Microsoft or Google**, completing two factor authorization as necessary.

You'll be prompted to accept permissions to allow Macrium Reflect to send emails on your behalf.



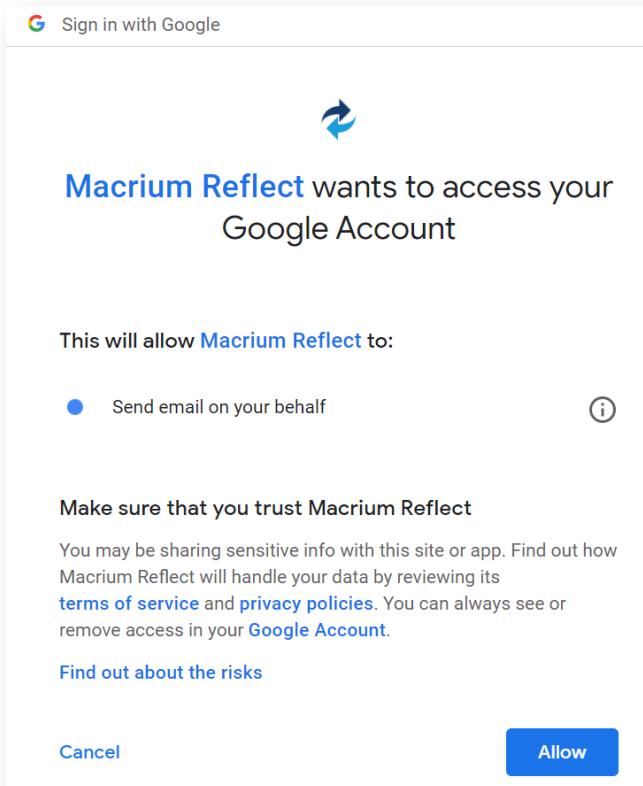
Note: These are the absolute minimum permissions required to send emails. We don't require or request anything else

For Microsoft Click 'Accept'



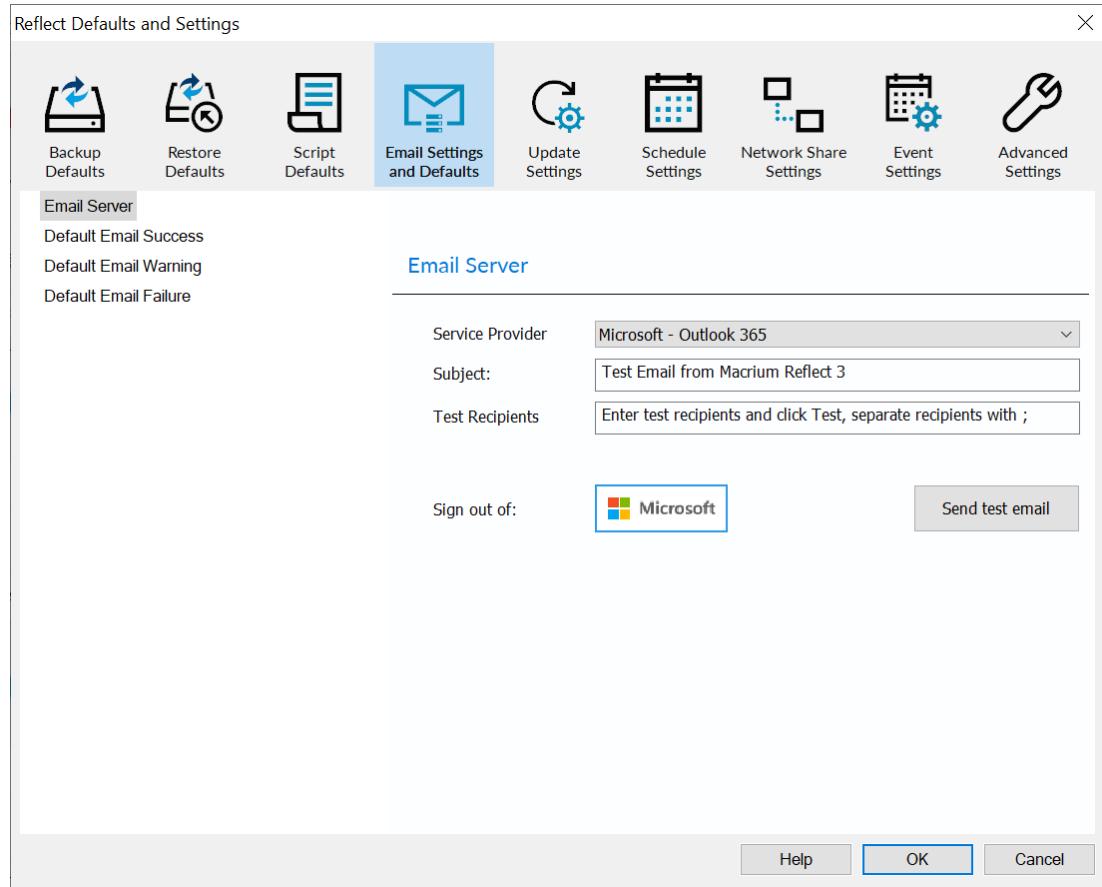
Macrium Reflect v8.0 User Guide

For Google click 'Allow'

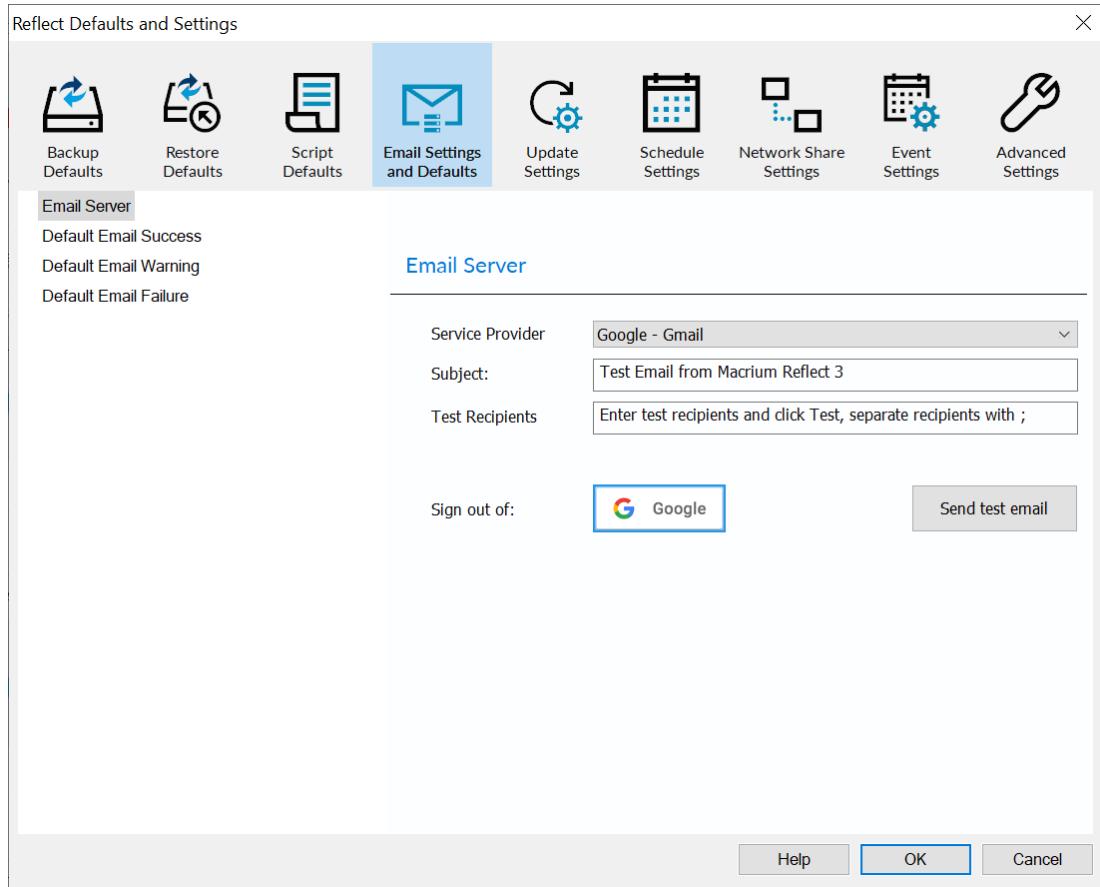


That's it! You're now setup to use Gmail or Microsoft as the service provider to send your backup completion emails.

Macrium Reflect v8.0 User Guide

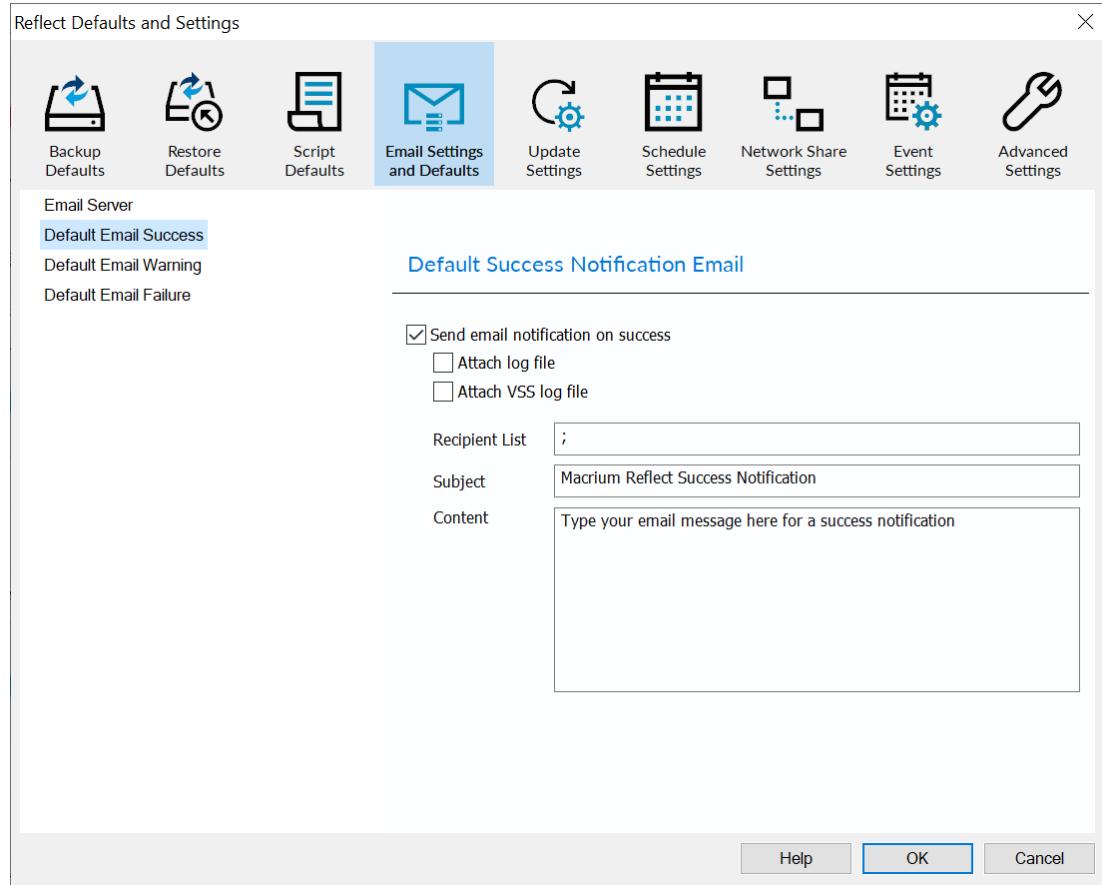


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Macrium Reflect v8.0 User Guide

Default Email Success, Warning and Failure

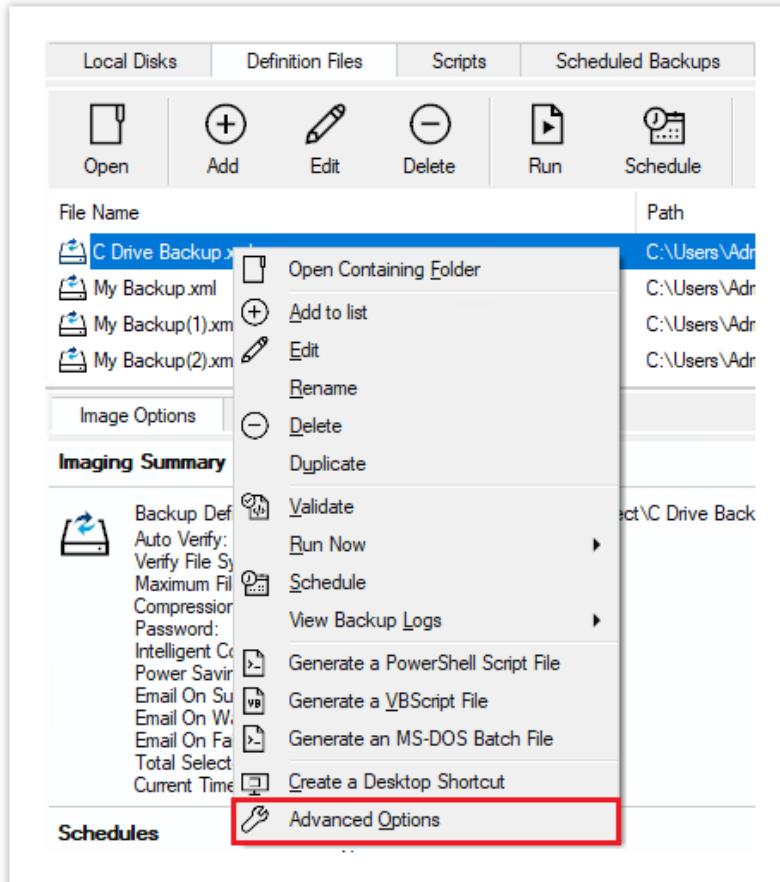


Option	Description
Attach log file	Attach the HTML backup log file.
Attach VSS log file	Attach the VSS log if VSS was involved in the backup.
Include Cancellations	Email Failure setting. Also send an Email for cancelled backups.
Recipient List	Separate multiple Email addresses with ';' name@domain.com; name2@domain.com
Subject	Enter your own text in these fields to identify the backup job.
Content	

Email notification for existing individual backups

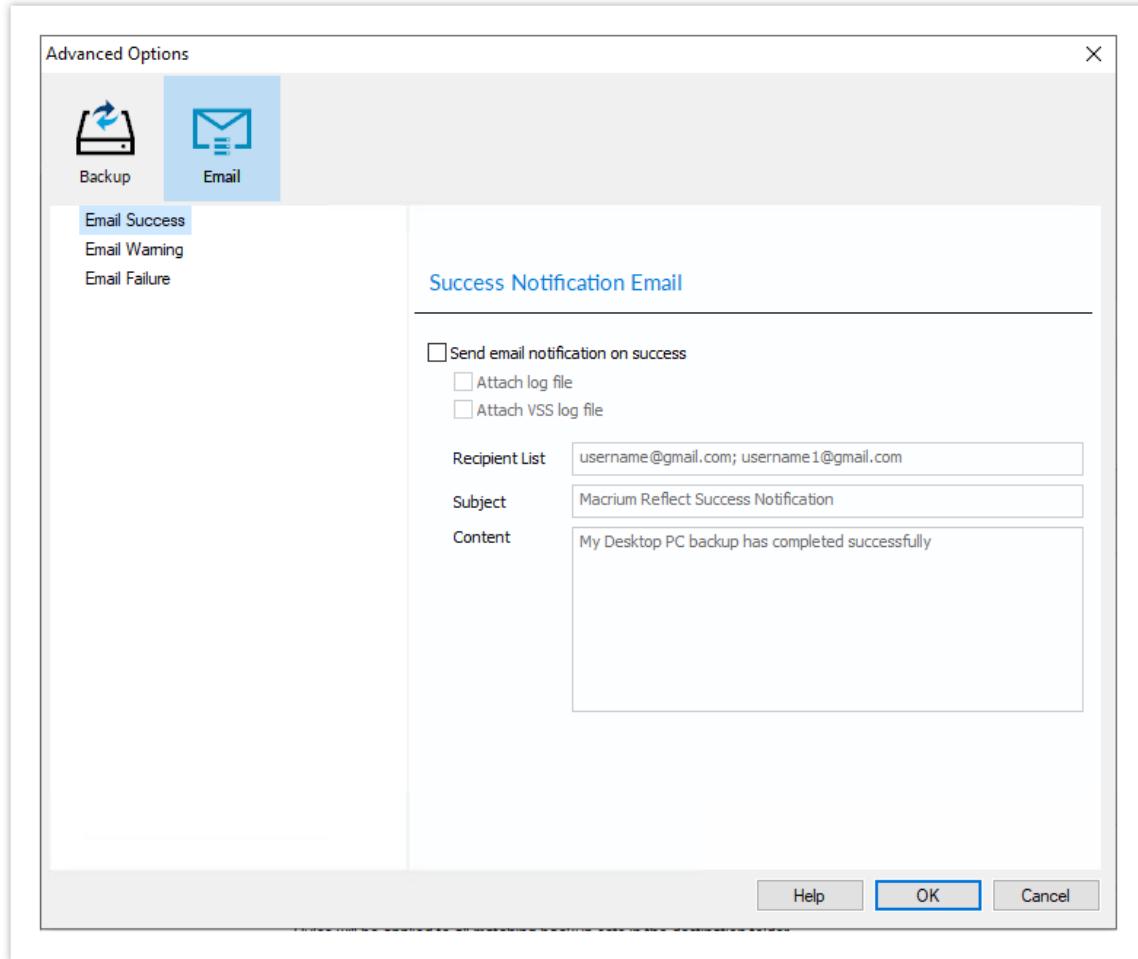
Macrium Reflect v8.0 User Guide

- Click **Definition Files**, right-click on the backup definition and select **Advanced Options**.



- Click the **Email** icon.

Macrium Reflect v8.0 User Guide



- Set your e-mails for **success** and **failure** of a backup as described above.
- Click **OK**.

Running continuous backup of SQL databases

Running continuous backups of SQL databases ensures that frequent backups of your databases are taken at required time intervals. It is always possible, therefore, to restore your data to a point as close as possible to the failure point.

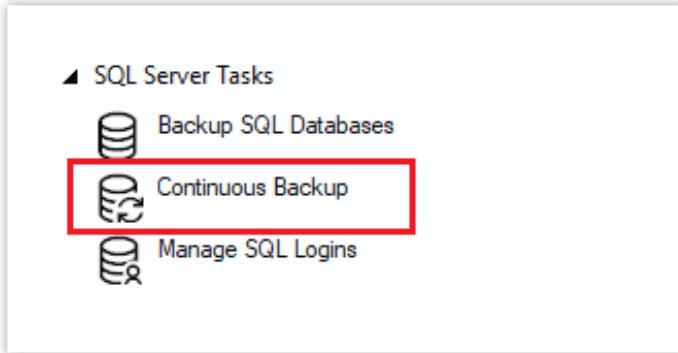
Continuous backups run separately from normal backups and imaging functions. A new Macrium Reflect SQL backup file is made each day and has its own email notification, disk space management, compression, and password settings.

If an additional backup of a database under continuous backup is made, Macrium Reflect automatically creates a new full backup to ensure consistency of backed up logs.

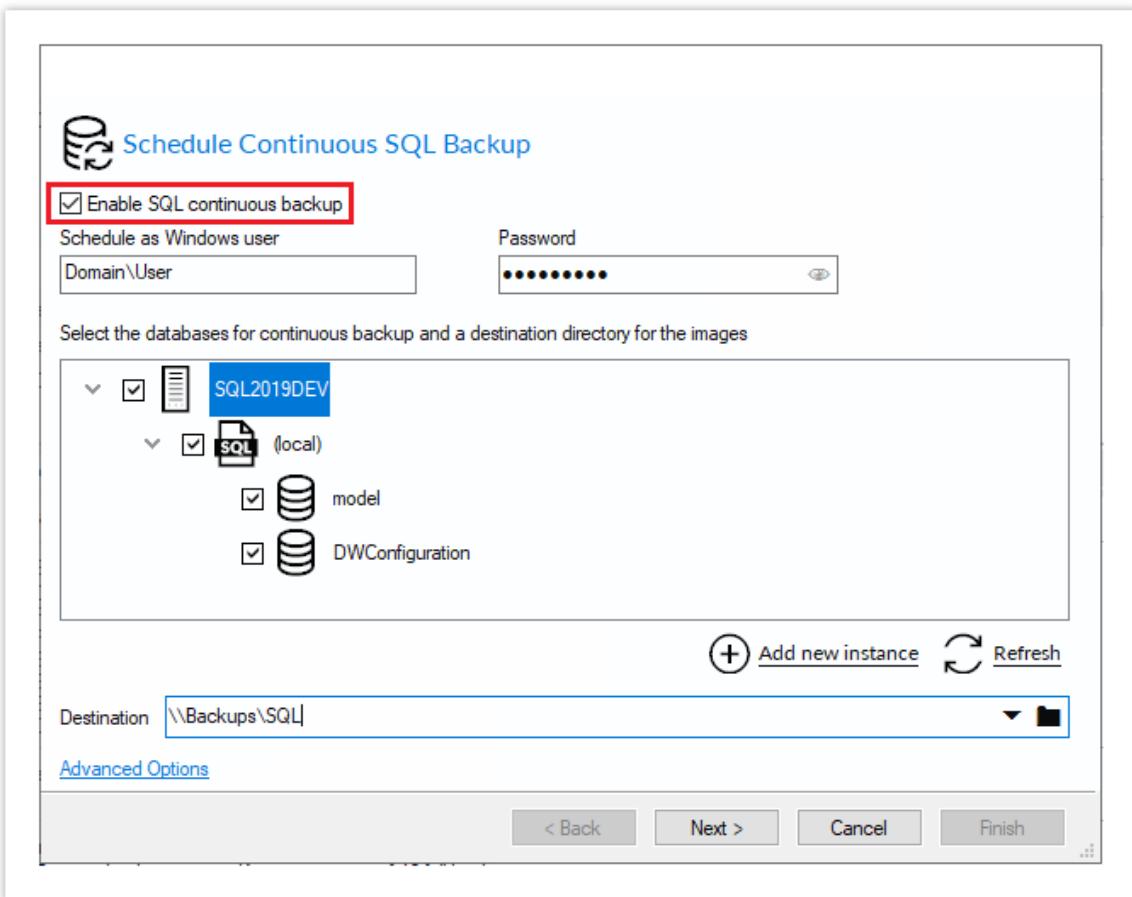
You can not run continuous backups on databases that are not running the Full Recovery Model.

1. Select **Continuous Backup** from **SQL Server Tasks**.

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2. The first time a reminder box displays, check **Don't ask me again**, if appropriate, and click **OK**.
3. A dialog showing databases running the *Full*/recovery model appears, select **Enable SQL continuous backup**.



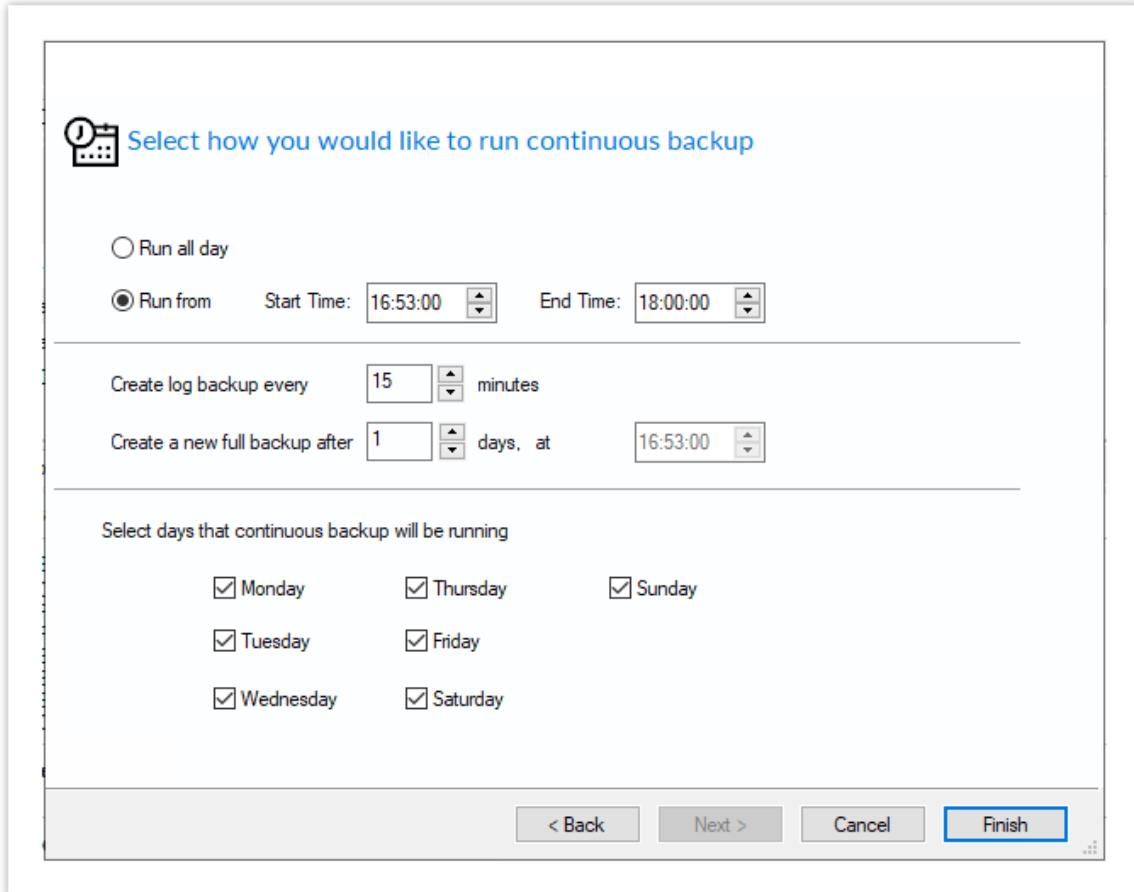
4. Select the databases you wish to add to continuous backup.

You can select databases from multiple SQL instances.

5. If required, click **Advanced** Settings to change the compression, password, and email option.
6. Click **Next**.

The dialog **Select how you would like to run continuous backup** appears.

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By default, **Run all day** is selected.

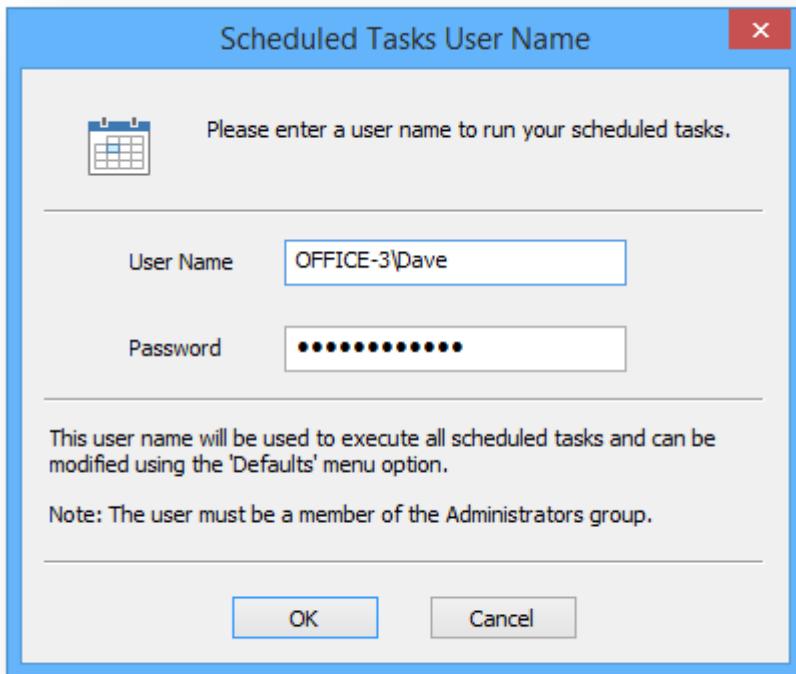
7. Select **run from** and specify a time range when you want to have the continuous backup running.
8. If required, select the frequency for log backups.
9. Specify; how many days between full backups and what time of day you want them to start.
10. When you are happy with your selection, click **Finish**.

Continuous backup runs in the background. You can run and create backups of the system or of SQL databases without interfering with continuous backup. Only log files for failed continuous backups are stored.

Which user name and password is used when scheduling a backup?

Macrium Reflect uses the standard Windows task scheduler to schedule backup jobs. To ensure that tasks can run when no users are logged on to the computer it is necessary to supply a Windows user account and login password. These are the same details that are used when you login to Windows:

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How do I see what my actual user account name is?

The actual account name can be different to the name used at the Windows login screen. If you are having difficulty finding your user account name then:

1. Click the Windows start button and type:



For more information on starting a command prompt please see [Running an elevated command prompt](#)

2. In the command prompt window, type:



```
cmd
whoami
Command Prompt
Microsoft Windows [Version 6.4.9879]
(c) 2014 Microsoft Corporation. All rights reserved.

C:\Users\Richard>whoami
win-71vi3irnfoe\richard

C:\Users\Richard>
```

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The screen-shot shows that the user account currently logged on is Richard.

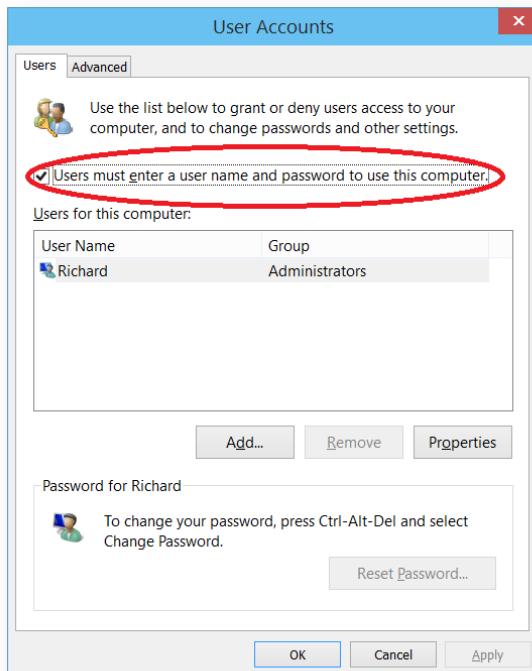
Note: for Windows XP, the command is:

```
Windows XP  
echo %username%.
```

I don't use a password but the scheduler is prompting for one

If you don't use a password when logging into Windows your system might have been set to automatically log you in with a saved password. To reset your password:

1. Click **Windows key**
2. Type **netplwiz** and press **Enter**.
3. Check **Users must enter a user name and password to use this computer** and click **Apply**.



3. To manage/change your user account password press **Ctrl+Alt+Del**.

Retention and consolidation

Scheduling full, incremental and differential images as part of a regular backup cycle is essential for optimising the use of available storage space, protecting your computer from sudden failure and giving you the ability to recover historical data.

Retention types

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Retention and consolidation of full, differential and incremental backups combined with deletion logic maintains backup set integrity by ensuring the backup chain is never broken.

The following are examples to show how retention rules operate on your backup sets....

Full backup retention

In Full backup retention, a specified number, or age, of full backups are retained. When full backups are purged, the entire backup set is also deleted.

F = Full

D = Differential

I = Incremental

M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W
F I I I I	D I I I I	D I I I I	D I I I I	D I I I I	F I I

e.g, Retain 1 Full backup.

After retention, the entire previous backup set is deleted

M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W
F I I I I	D I I I I	D I I I I	D I I I I	D I I I I	F I I

Differential retention

Specify a number of differential backups to retain by age or number,

M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W
F I I I I	D I I I I	D I I I I	D I I I I	D I I I I	F I I

For example, Retain 2 differential backups.

After retention, the most recent 2 differential backups are retained. Incremental backups that are linked to previous differential backups are deleted along with the deleted differentials.

M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W
F I I I I	D I I I I	D I I I I	D I I I I	D I I I I	F I I

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Incremental retention

Specify the number of incremental backups to retain. If by deleting an incremental the backup chain is broken this causes consolidation of the oldest retained Incremental.

```
M T W T F M T W T F M T W T F M T W T F M T W  
F I I I I I D I I I I D I I I I D I I I I F I I
```

For example, Retain 4 incremental backups.

After retention, the most recent 4 incremental backups are retained. The oldest retained incremental is not valid on its own as it requires the previous 2 incremental backups to complete the chain. To ensure backup integrity the 2 older incremental backups are consolidated with it to create a new incremental backup.

```
M T W T F   M T W T F   M T W T F   M T W T F   M T W T F   M T W  
F I I I I   D I I I I   D I I I I   D I I I I   D I I I I   F I I  
--->I I F I I
```

Synthetic Full / Incrementals forever

Incrementals forever optimises backup space and time by only ever creating a single full backup. After this, incremental backups are created forever and, once the specified number of incremental backups is reached, Macrium Reflect consolidates the incremental backup into a new 'synthetic' full backup. This is also known as a Synthetic Full backup.

For example, Incrementals forever with retain 4 incrementals. For the first week,

```
M T W T F  
F I I I I
```

The next Monday, to retain 4 Incrementals, the Full is consolidated with the first incremental to create a new Synthetic Full.

```
M T W T F   M  
F I I I I   I  
->F I I I   I
```

On Tuesday the consolidation step is repeated again on the next incremental image.

```
M T W T F   M T  
F I I I I   I I  
-->F I I   I I
```

This process is repeated forever. After the first Full only Incremental backups are required.

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Consolidation is performed non destructively and ‘In Place’. Therefore, very little additional disk space is required during consolidation and failed consolidations will automatically revert to the pre-consolidation state. For example, a consolidation could fail mid process due to a hardware malfunction such as a dropped network connection. In this circumstance the consolidation would automatically begin again the next time the backup is run without any loss of backup integrity.

Backup Plans

Backups schedules and retention rules are saved in a **Backup Plan** with each backup definition. You can even define your own **Backup Plan Templates** for easy reuse. The following are default templates:

Grandfather, Father, Son.

Daily Incremental ("Son"), weekly Differential ("Father"), and monthly Full ("Grandfather") backups. Retention for each backup type can be set based on data history and space requirements. e.g,

Backup Type	Schedule	Retention
Monthly Full Backup	Run on the 1st Monday of every month	26 Weeks
Weekly Diff Backup	Run on every Monday (except 1st Monday)	4 Weeks
Daily Inc	Run Tues, Wed, Thu, Fri	14 Days

Differential Backup Set

A Full backup is created periodically followed by daily Differential backups.

Backup Type	Schedule	Retention
Monthly Full Backup	Run on the 1st Monday of every month	26 Weeks
Daily Diff Backup	Run on Mon, Tues, Wed, Thu, Fri (except 1st Monday)	30 Days

Incremental Backup Set

A Full backup is created periodically followed by daily Incremental backups.

Backup Type	Schedule	Retention
Monthly Full Backup	Run on the 1st Monday of every month	26 Weeks
Daily Inc Backup	Run on Mon, Tues, Wed, Thu, Fri (except 1st Monday)	30 Days

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Incrementals Forever

An initial Full backup is created followed by daily Incremental backups.

Backup Type	Schedule	Retention
Initial Full Backup	Initially created when the first Incremental is scheduled to be created	A Synthetic Full is created after the first 30 Incrementals
Daily Inc Backup	Run Every Mon, Tues, Wed, Thu Fri	30

The Macrium Rescue Environment



Caution

The first thing you need to do after installing Macrium Reflect is create Rescue Media

If you lose your Windows operating system, you can start your PC using Macrium Reflect rescue media on CD, DVD, or USB stick. This makes creating rescue media the first thing you need to do with Macrium Reflect. It contains a bootable, lightweight version of Windows and a full version of Macrium Reflect.

This lightweight version of Windows is called the Windows Recovery Environment (also known as Windows RE or WinRE) and is supplied with Windows 7 and later operating systems. For Windows XP, Vista and systems without WinRE, Reflect will download the Windows Pre-installation Environment (also known as Windows PE or WinPE) directly from Microsoft.

You have the option of restoring to a new system or virtual machine using **Macrium ReDeploy** to reconfigure your Windows installation for the new hardware.

Windows PE hardware support

The Macrium Rescue Environment needs to include support for your hardware such as USB ports, network interfaces, and in particular for your storage device if for example you use RAID disks. The default Windows PE environment supports a good selection of hardware and you can add support for further devices. When Macrium Reflect creates a rescue CD or USB, it analyses your system hardware and tries to locate drivers for unsupported devices by looking on your system. If it can't find appropriate drivers, Macrium Reflect prompts you to provide drivers. You can provide drivers by finding driver packages on the local hard drive, looking for driver CDs supplied with the system, or downloading drivers from the web. After you provide these additional drivers, Macrium Reflect adds them to the Windows PE environment.



Note: You cannot add support for booting media because booting takes place before drivers are loaded. For example, if your CD drive is connected via an unsupported SCSI interface card or your boot menu lies on an unsupported RAID array, then the Windows PE cannot boot. Booting using a USB stick is a good workaround in this case as all USB 2/3 interfaces are supported by default.

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CD, DVD and USB rescue media

You can boot your computer into Windows PE from a CD, DVD, USB stick or USB attached external hard disk. For convenience or for automated restores to your system disk, you can add Windows PE to a boot menu that's displayed when your system first starts. Although, do not rely upon this local copy as a rescue mechanism because it could be lost if you suffered hard disk failure or corruption leaving you without a method for rescuing your system.

Macrium Reflect creates custom Windows PE systems for each installation type by downloading the required components from Microsoft.

Further reading:

- [Rescue Media Builder - How It Works](#)
- [Creating rescue media](#)
- [Adding a Boot Menu option for system Image recovery](#)
- [Technicians portable application support](#)
- [About Adding Drivers to WinPE Rescue Media](#)
- [Fixing Windows boot problems](#)
- [Updating rescue media to include additional hardware drivers](#)
- [Adding iSCSI support to Windows PE](#)
- [Adding BitLocker support to Windows PE](#)
- [Restoring an image from within the Rescue Media](#)

Rescue Media Builder - How It Works

RMBuild.exe

The Rescue Media Builder executable '**RMBuild.exe**' is located in the Macrium Reflect installation folder, usually 'C:\Program Files\Macrium\Reflect'. **RMBuild.exe** can be launched independently or by taking the Rescue Media build menu option in **Macrium Reflect**.

RMBuild.exe depends on the following files:

Description	Architecture	File name
DVD/CD Support	32 Bit	PrimoBurner.dll
	64 Bit	PrimoBurnerx64.dll
Free Edition	32 Bit	WaikFiles00x86.exe
	64 Bit	WaikFiles00x64.exe

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Description	Architecture	File name
Home/Workstation Edition	32 Bit	WaikFiles15x86.exe
	64 Bit	WaikFiles15x64.exe
Server Edition	32 Bit	WaikFiles20x86.exe
	64 Bit	WaikFiles20x64.exe
Server Plus Edition	32 Bit	WaikFiles25x86.exe
	64 Bit	WaikFiles25x64.exe



Note: RMBuild.exe requires Macrium Reflect to be installed.

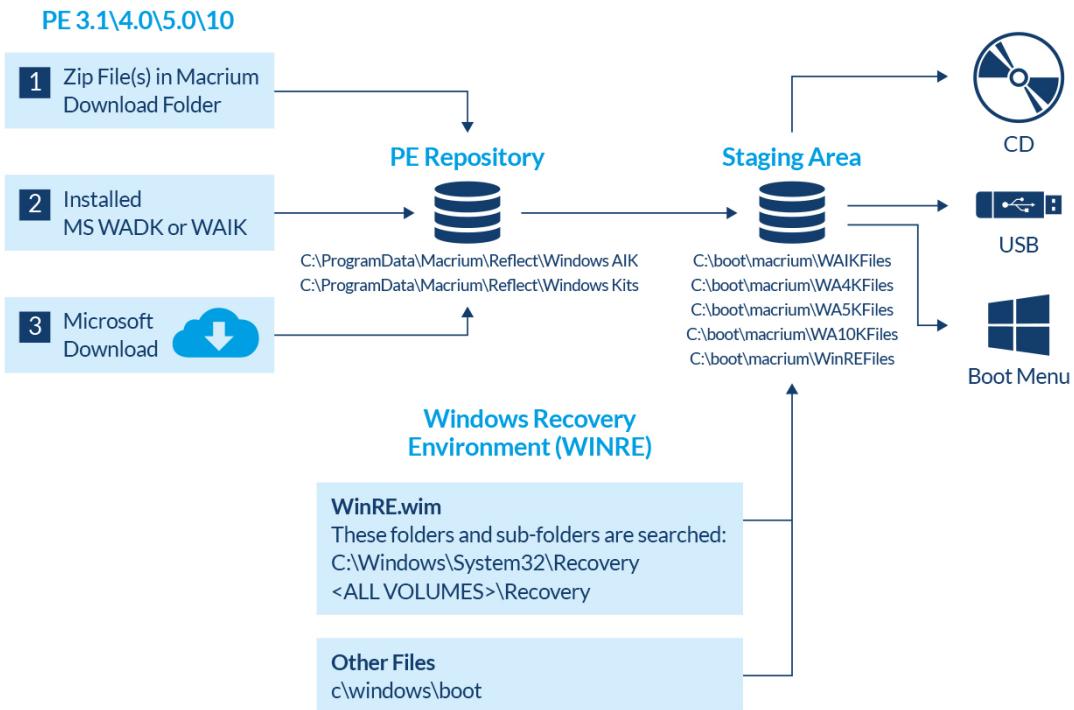
Windows Image File (WIM) and toolset files location

For **Windows PE 3.1/4.0/5.0/10** the files required to build the Macrium Rescue media are copied from the **Input location** to the **Repository**. The **Repository** is then used to populate the **Staging Area** when rescue media is built from scratch or stale.

For the **Windows Recovery Environment (WinRE)** the required files are located on the current system and copied to the **Staging Area** when rescue media is built from scratch or stale.

The **Staging Area** provides the files for the **Boot Menu** and for creating **ISO/DVD/CD and USB** boot media.

Macrium Rescue Environment



Windows PE 3.1/4.0/5.0/10

Required files to populate the **PE Repository** are searched for in the following sequence...

- PE Zip files**: - PE zip files(s) containing the Windows Image (WIM) file and toolset files are saved to the Macrium download folder by the Reflect download manager ReflectDL.exe.

The default location is '`C:\users\<USER>\Downloads\Macrium`'

Windows PE	File Name
PE 3.1	pe3x64.zip pe3x86.zip
PE 4.0	pe4x64.zip pe4x86.zip
PE 5.0	pe5x64.zip pe5x86.zip
PE 10	

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	pe10_1709x64.zip pe10_1709x86.zip
--	--------------------------------------

2. **WAIK/WADK** - Windows is searched for installations of the **Windows® Automated Installation Kit (AIK)** for PE 3.1 or the **Windows® Assessment and Deployment Kit (Windows ADK)**. These products contain the Windows Image File (WIM) and tools to create the rescue media.

<https://docs.microsoft.com/en-us/windows-hardware/get-started/adk-install>

<https://www.microsoft.com/en-us/download/details.aspx?id=5753>

i **Note:** The **WADK** and **WAIK** download is several GB. It isn't necessary to manually install these products unless you are having problems with the automated download.

3. **Automated Download** - Finally, any missing files are automatically downloaded directly from Microsoft and copied to the **PE Repository**.

i **Note:** If there is no Internet connection at this stage then the build process will fail.

PE Repository

Files located in 1. above are copied to the PE repository in the following folders.

PE Version	Location
3.1	C:\ProgramData\Macrium\Reflect\Windows AIK
4.0	C:\ProgramData\Macrium\Reflect\Windows Kits\8.0
5.0	C:\ProgramData\Macrium\Reflect\Windows Kits\8.1
10	C:\ProgramData\Macrium\Reflect\Windows Kits\10

Windows Recovery Environment (WinRE)

Files for the **Windows Recovery** rescue environment are pre-existing and located on the local file system.

The following **folders, and sub-folders** are searched for file **WinRE.wim**

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C:\Windows\System32\Recovery
<ALL VOLUMES>\Recovery

If multiple copies of **WinRE.wim** are found then each WIM is examined and the WIM that contains the most recent Windows OS is copied to the **Staging Area**.

Additional toolset files are copied from folder '**C:\Windows\Boot**'

Staging Area

The Staging Area is re-populated each time the rescue media is re-built. Immediately after the Windows Image (WIM) file is copied to the Staging Area, it is mounted and the current version of Macrium Reflect is copied to the WIM file system along with required components and additional files extracted from **WaikFilesxNNnnn.exe**.

PE Version	Location
3.1	C:\boot\macrium\WAIKFiles
4.0	C:\boot\macrium\WA4KFiles
5.0	C:\boot\macrium\WA5KFiles
10	C:\boot\macrium\WA10KFiles
WinRE	C:\boot\macrium\WinREFiles

Output

When the **'Build'** button is clicked files are copied from the **Staging Area** to the rescue media target. For the **Boot menu**, the **Windows Boot Configuration Data (BCD)** is updated to add a '**Macrium Reflect System Recovery**' menu option which loads the Windows Image File (WIM) directly from the Staging Area.

For more information on the Windows BCD please see here: https://en.wikipedia.org/wiki/Windows_Vista_startup_process

Creating rescue media

- Main User Interface
- Boot Menu Options
- USB Rescue Media Options

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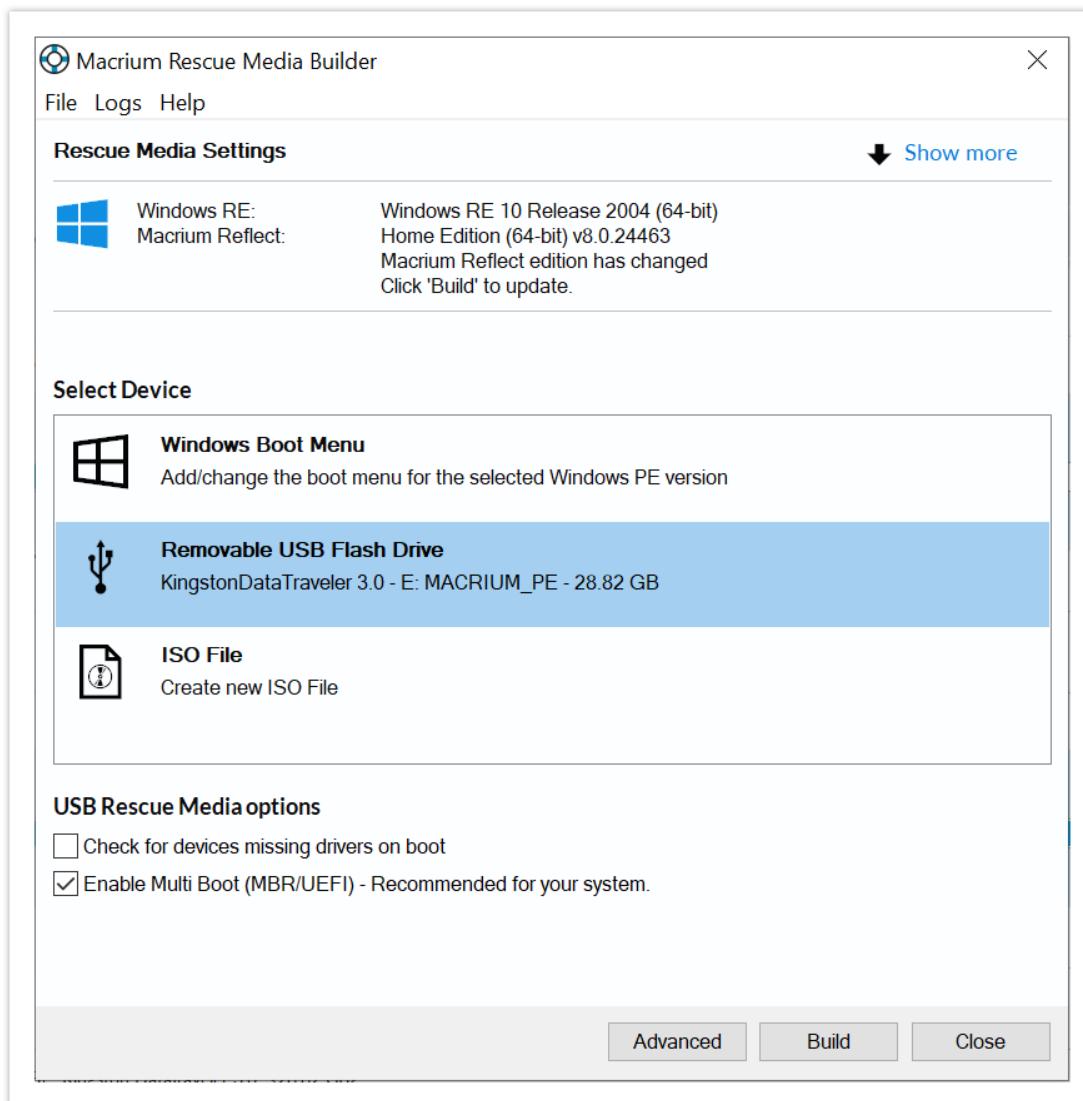
- ISO/CD/DVD Rescue Media Options
- Advanced Options
- USB Flash Drive Formatting

Main User Interface

Macrium Rescue Media Builder provides a simple interface to allow for quick rescue media generation by selecting where the rescue media will be generated and then clicking the **Build** button.

All options for the rescue media will be suitably defaulted based on existing rescue media builds and a scan of the operating system environment.

1. Choose a rescue media target under **Select Device**
2. Click **Build**



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The 'Header' area shows the currently selected Windows PE/RE version and settings. '[Show more](#)' expands the view to show the selected Advanced options.

Rebuilding the Windows Image File (WIM)

If the Rescue media needs rebuilding then this will be indicated in the header area. Reasons for rebuilding:

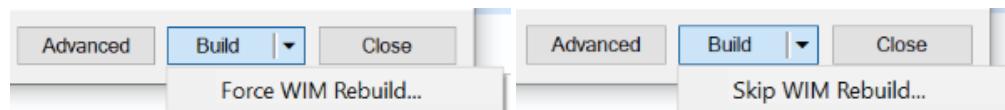
- A later version of Macrium Reflect is available and needs to be added to the build.
- A later version of Windows RE is available. A Windows update can cause the installed version of Windows RE to be updated.
- Any 'Advanced' settings that have changed since the rescue media was last built. If you click 'Show more' these settings will be highlighted in blue text.
- A 'Custom WIM' file has changed since the last build.
- The '\Boot\Macrium\Drivers' sub folder contains new or changed driver files.

Clicking **Build** will re-populate the Staging Area, mount the WIM and copy the relevant files before dismounting the WIM and continuing with the build target operation.

WIM Rebuild Override

Overriding the default WIM rebuild behaviour may be useful to create rescue media without updating to a later release of Macrium Reflect, or, to force a rebuild to troubleshoot corrupt or non-booting rescue media or boot menu option.

The default WIM rebuild action can be overridden by **pressing the Ctrl key**. Once pressed, and if appropriate, the Build button becomes a 'split' button showing either a **Skip WIM Rebuild...** or a **Force WIM Rebuild...** menu option, the opposite of the default 'Build' button behaviour.



The override menu is not displayed in the following scenarios:

1. The '**Remove boot menu**' option is selected. WIM operations are not relevant in this case.
2. The **WIM needs rebuilding** and the '**Current boot menu**' option is selected. In this case, the default operation of rebuilding the WIM is the only operation relevant and available.

The 'Select Device' area shows a list of possible ways the rescue media can be created.

Target	Description
Windows Boot Menu	Will either add, update or remove an entry from the Windows Boot Menu, select from the ' Boot Menu Options ' for the desired action.

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Target	Description
USB Flash Drive	Creates the rescue environment on an external USB flash drive. At least one partition is required on the drive with enough space for the rescue media files or the disk should be empty of partitions but be large enough for a new partition to accommodate the rescue media files.
USB HDD	Creates the rescue environment on an external USB HDD. As with the USB Flash Drive option a partition must be available with enough space or there should be enough space to create a new partition.
ISO File	Creates an ISO file suitable for either burning with third party software or booting a virtual machine from.



Note: In the case of external USB Flash/HDD the creation process is non destructive. No existing partition will be removed from the disk, only files added to an existing partition or a new partition created.

Boot Menu Options

Selecting the '**Windows Boot Menu**' device will offer the following options

Option	Description
No boot menu	Do not add a boot menu option to the Windows boot menu. <div style="border: 1px solid #ccc; padding: 5px;"> Note: This option is not visible if a Macrium Reflect rescue environment exists in the Windows boot menu</div>
Remove boot menu	Remove the currently configured Macrium Reflect rescue environment Windows boot menu item.
Set boot menu	Add the currently selected WinPE/WinRE environment as a Windows boot menu item. A description of the current environment can be seen to right of this option. Also, review the ' Header ' area further up in this document.
Current boot menu	Retain the currently configured Macrium Reflect rescue environment Windows boot menu item.

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USB Rescue Media Options

Selecting either '**Removable USB Flash Drive**' or '**Removable USB Hard Drive**' device will offer the following options

Option	Description
Check for devices missing drivers on boot	Scans for Mass storage or network controllers that do not have driver support and show a dialog to assist with adding and loading drivers.
Enable Multi Boot (MBR /UEFI)	Enables USB media to boot on both MBR and UEFI systems.
Create Portable Technicians Rescue Media	Adds support for running the 'Technicians Portable' form of Macrium Reflect rescue environment. <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;">i Note: This will require a valid Technicians license key</div>

ISO/CD/DVD Rescue Media Options

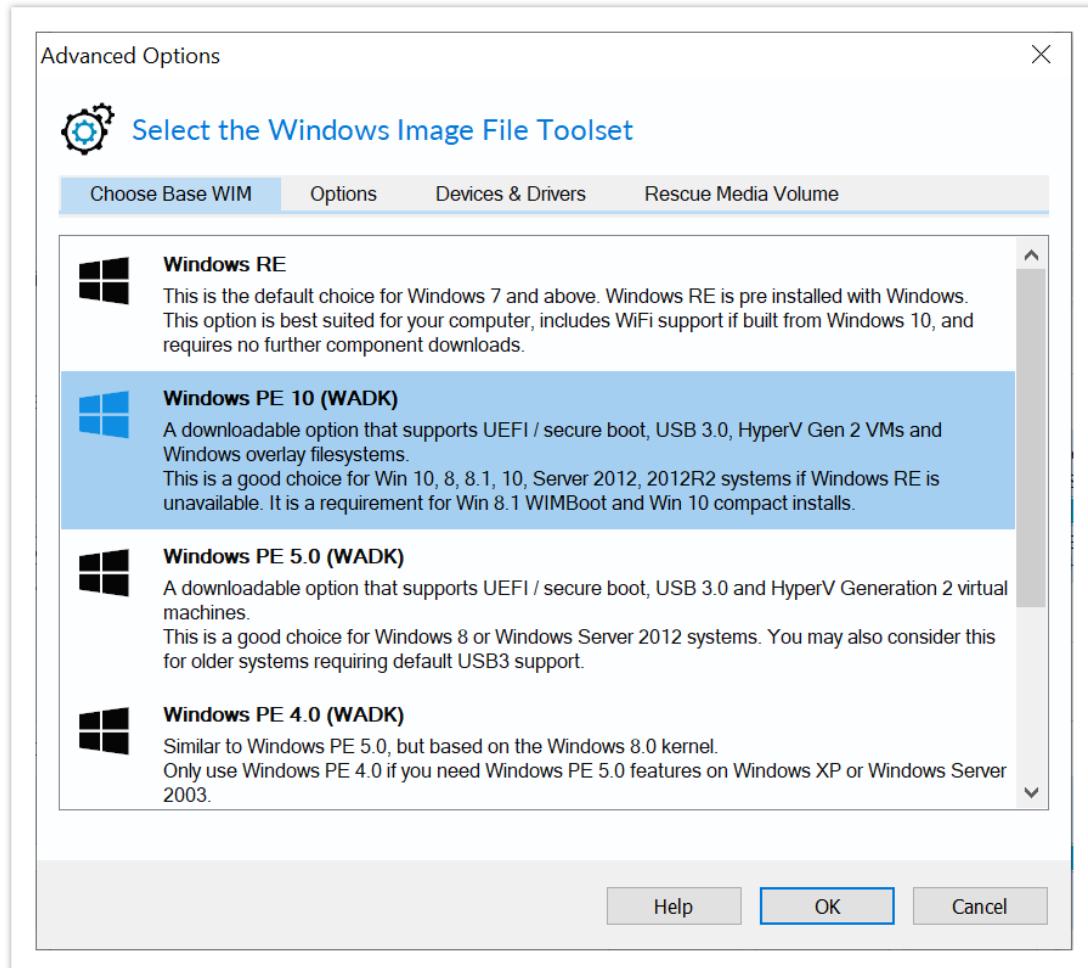
Selecting '**ISO File**' or '**CD/DVD Burner**' device will offer the following options

Option	Description
Check for devices missing drivers on boot	Scans for Mass storage or network controllers that do not have driver support and show a dialog to assist with adding and loading drivers.
Prompt for key press to continue boot sequence	Shows a simple prompt during boot, pressing any key will boot from the ISO media and not pressing any key will boot from the normal volume.

Advanced Options

The '**Advanced**' button opens options to change PE version and choose additional features for the rescue media build.

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What version of Windows PE should I choose?

The default Windows PE version selected on a fresh installation:

OS	Default Rescue Environment
Windows XP/Server 2003	Windows PE 3.1
Windows 7/Server 2008	Windows RE if available otherwise Windows PE 3.1
Windows 8.0/8.1/Server 2012/R2	Windows RE if available otherwise Windows PE 5
Windows 10/Server 2016/17	Windows RE if available otherwise Windows PE 10

You should ensure that your rescue media can access your System drive and also your backup location. The default option selects **Windows RE** if available. If Windows RE is not supported or cannot be located then the Windows PE version is selected that is the best match for your Windows operating system (*see table above*). This enables the rescue media wizard to automatically copy any required drivers for Network, USB or SATA controllers. However, versions of Windows PE that are more recent than your Windows OS may already contain compatible drivers and also offer additional support for USB 3.0.

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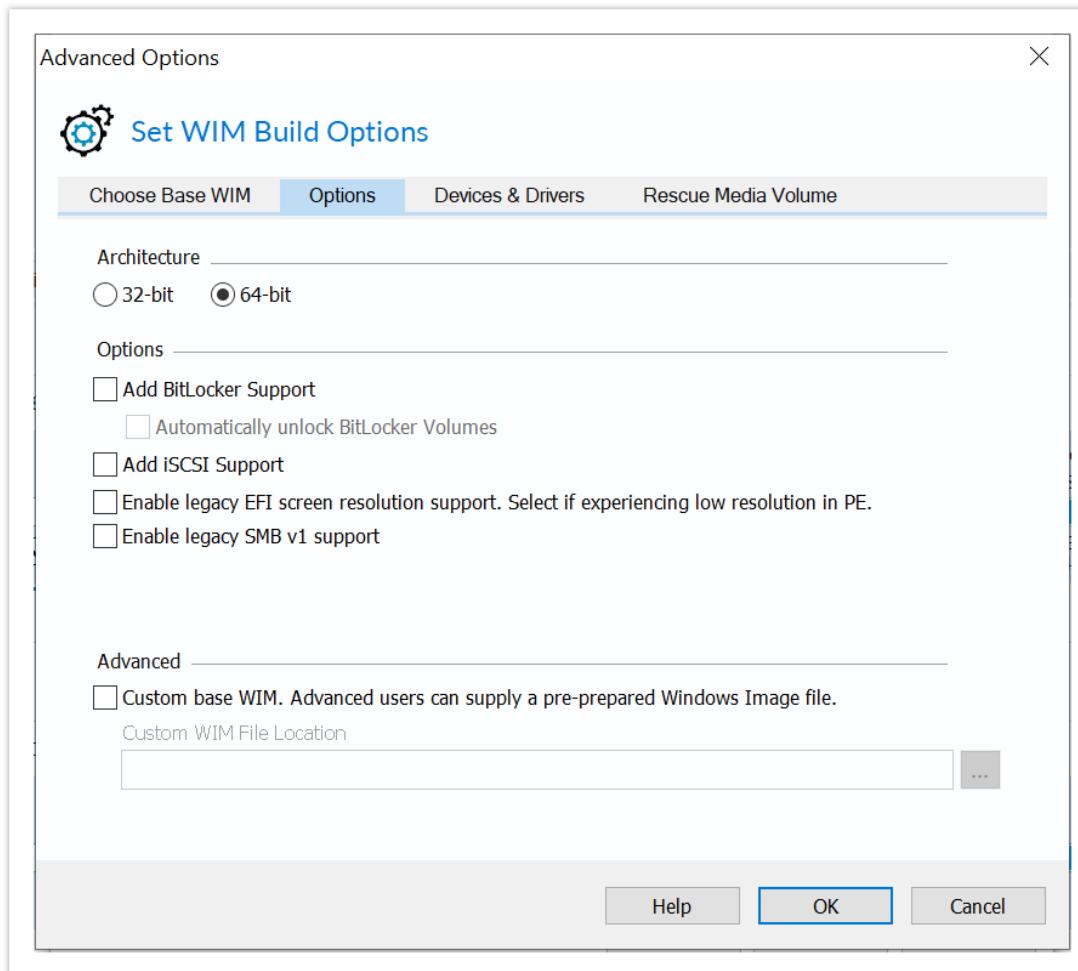


Note: For Windows 7 systems with USB 3.0 ports it may be necessary to use PE 5.0 or PE 10.0 to enable USB 3.0 in the rescue media

PE version	Description
Windows RE	<p>This is the default choice for Windows 7 and above. Windows RE is pre installed with Windows. If available, this option is best suited for your computer, includes WiFi support if built with Windows 10 and requires no further component downloads.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"><p> Note: Not available for Windows XP/Vista or for later Operating Systems if Windows RE cannot be located.</p></div>
Windows PE 10.0	<p>Based on Windows 10. Supports UEFI / secure boot, USB 3.0, Hyper-V Gen 2 VMs and Windows overlay file systems.</p> <p>This is a good choice for Win 8, 8.1, 10, Server 2012, 2012R2 systems if Windows RE is unavailable. Windows PE 10 supports Windows 8.1 WIMBoot technology and Windows 10 'Compact Install'. Both of these installation types are rare but may be used on Windows Tablet PCs with limited disk space.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"><p> Note: The Windows PE 10.0 download option is not available if you are running Windows XP, Vista or Server 2003/2008</p></div>
Windows PE 5.0	<p>Based on Windows 8.1. Supports UEFI / secure boot, USB 3.0 and Hyper-V Generation 2 virtual machines.</p> <p>This is a good choice for Windows 8/8.1 or Windows Server 2012 systems if Windows RE is unavailable. You may also consider this for older systems requiring default USB3.0 support.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"><p> Note: The Windows PE 5.0 download option is not available if you are running Windows XP or Server 2003.</p></div>
Windows PE 4.0	<p>Based on Windows 8. Similar to Windows PE 5.0, but based on the Windows 8.0 kernel.</p> <p>This is a legacy option that is provided if you have used previous versions of Macrium Reflect before PE 5.0 was included. Includes support for USB 3.0. We recommend that you use PE 5.0/10 unless you require PE 5.0 features on Windows XP or Server 2003.</p>

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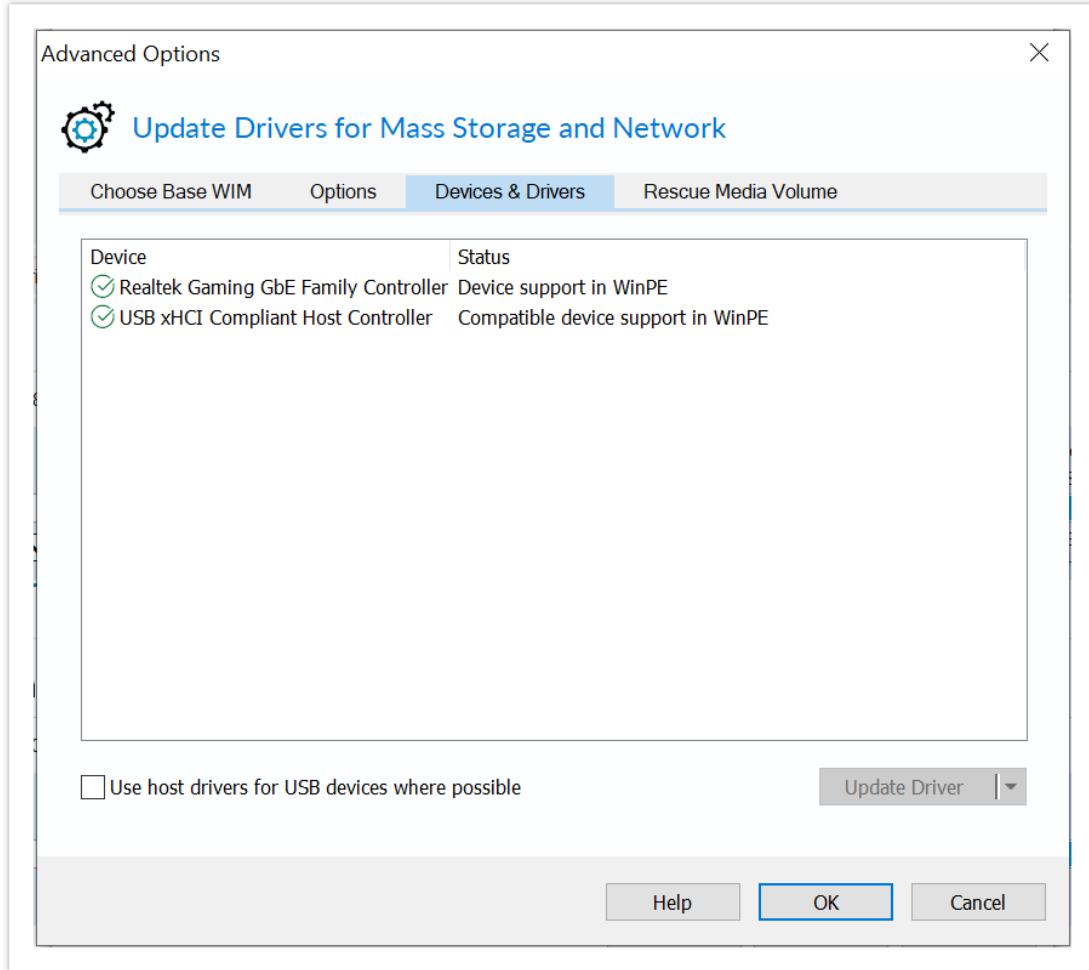
PE version	Description
Windows PE 3.1	<p>Based on Windows 7. This is the best option for Windows XP, Vista, Windows 7, Server 2003, Server 2008, 2008R2 operating systems if Windows RE is unavailable.</p> <p>Note: USB 3.0 support is not included.</p> <p>Note: Some very early Windows XP systems may not meet the minimum requirements to boot Windows PE.</p>
<p>Note: If you have already built rescue media with an earlier version of Macrium Reflect then that PE version will be defaulted</p>	



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Option	Description	
Architecture	<p>Choose from 32 or 64 bit. WinRE is only available for the same architecture as the current Windows OS.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> i It's only necessary to choose an alternative architecture when creating rescue media to boot a different PC. </div>	
iSCSI Support	<p>Enables restoration and clones to iSCSI connected disks. Please note that adding these components may several minutes to the creation process. See Adding iSCSI support to Windows PE for more information on using iSCSI in Windows PE</p>	
BitLocker	Add Support	Add the components required to run 'managebde.exe' and unlock BitLocked drives to Windows PE.
	Auto Unlock	Automatically unlocked BitLocked drives when the rescue media starts.
<p>Also see: Adding BitLocker support to Windows PE and BitLocker Restore/Clone Outcomes</p>		
Legacy EFI Screen Resolution	<p>Select this option if you are experiencing very low, less than 1024 x 768, screen resolution in PE 10 or WinRE. Some early UEFI BIOS chipsets are incompatible with Windows 10 Pre-Installation Environment graphics output. Selecting this option will cause the PE 5.0 EFI microcode to be used instead of PE 10 when starting the rescue environment.</p>	
Copy WiFi Profiles	<p>Select this option to copy WiFi profiles, including passwords, to the rescue media. If possible a WiFi connection will be automatically established when Windows RE starts.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> i Note: This option, and WiFi support, is only available in Windows RE 10. WiFi profiles are encrypted to prevent unauthorised access. </div>	
Custom base WIM	<p>Use your own customized WIM for the rescue media. This is an advanced topic not covered in this help.</p>	

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Mass Storage and Network devices will be listed showing the current state of driver support. Drivers can be added for devices missing driver support as well as updating drivers previously added to the rescue media.

The status of a device can be one of the following

Device Status	Meaning
Device Detected	The device has no drivers and will not function in WinPE/WinRE. If you require this device then drivers should be added.
Device support in WinPE	The device has a supporting driver in WinPE/WinRE. Generally you do not need to update this form of driver.
Compatible device support in WinPE	The device has a compatible driver in WinPE/WinRE. Again, this driver generally does not require updating.
	A driver has been previously added to the Macrium Reflect rescue media for this device.

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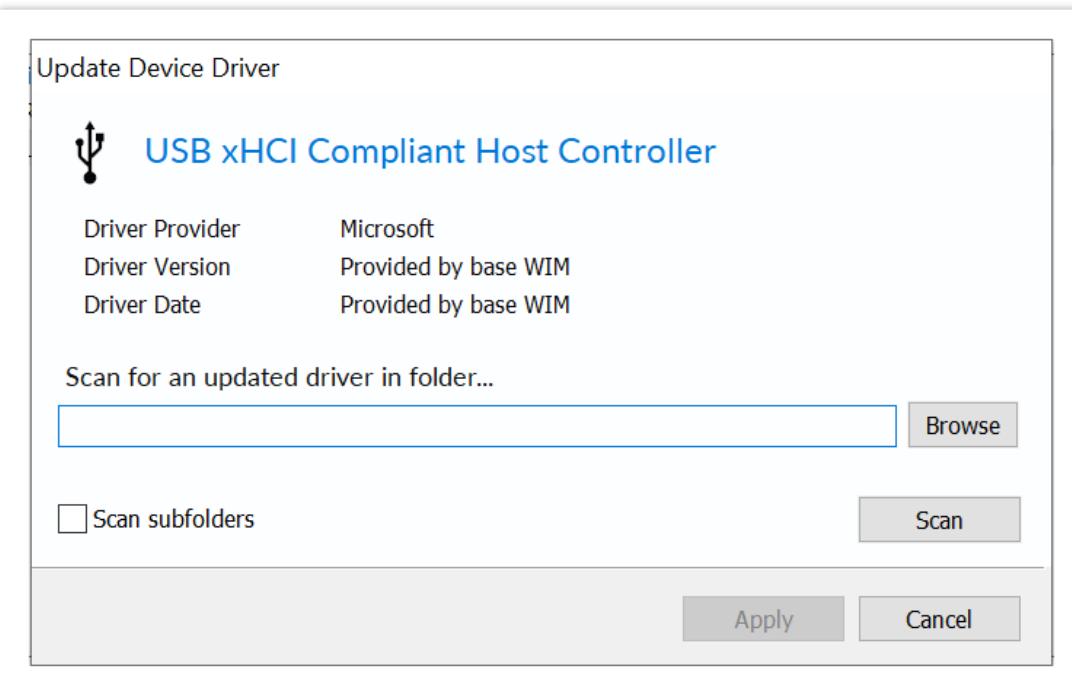
Device Status	Meaning
Driver already present in Drivers folder	
Copy host driver	For Vista based and later operating systems if a device is found without driver support then the operating system will be scanned for a compatible driver. If discovered the host OS driver will be added to the rescue media.  Note: If no compatible device is found then the status will remain at Device Detected

ⓘ How To Update Drivers

Note: Click Update or double click a device to add or update a driver for a device.

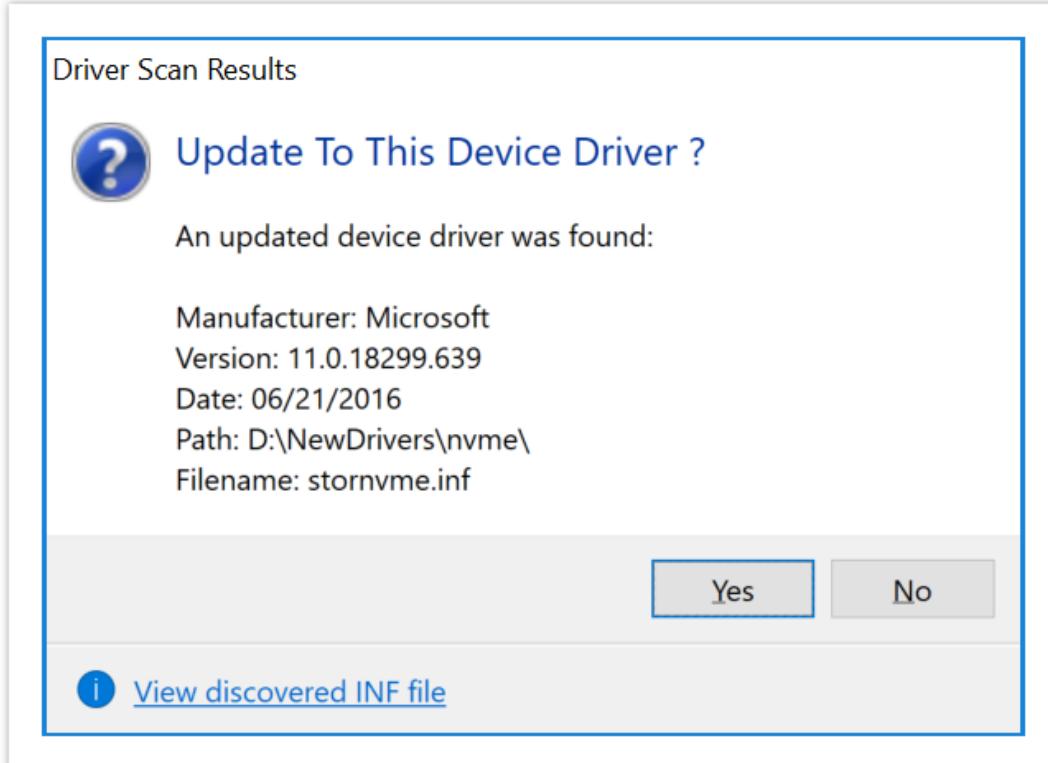
ⓘ WiFi Device Support

Note: WiFi device support will only be available in WinRE based rescue environments, even if drivers are added for the device.



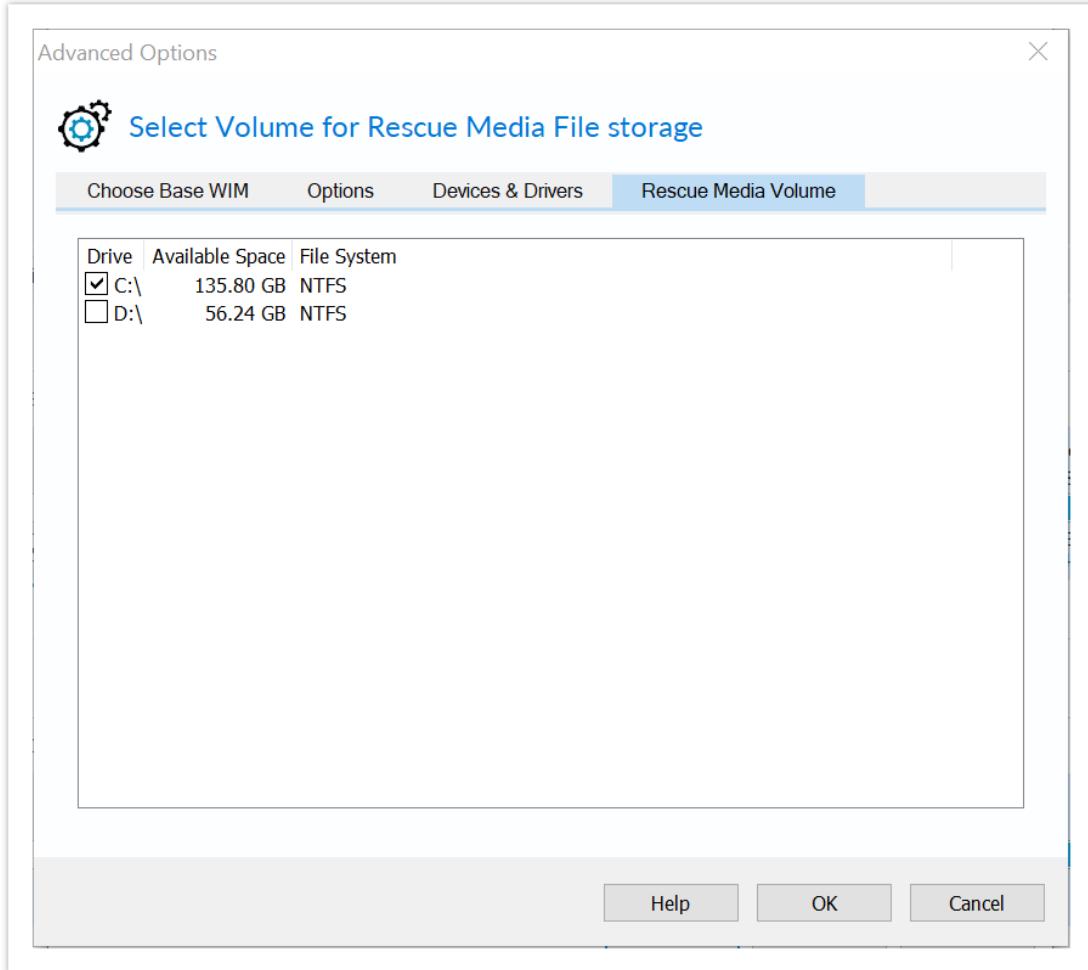
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This dialog will show the current driver information for a device. To update the driver, click Browse, select a folder and click the Scan button (optionally select to scan subfolders before starting the scan). The folder will be checked for an updated driver based on either version number or date and if discovered, a prompt will be shown for update confirmation.



Once an updated driver has been found and selected, click Apply to save the updated driver or Cancel to retain the current driver.

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Macrium Reflect Rescue Media files can be stored on a different volume, this tab allows for selection of the preferred volume. Select a volume by clicking the check box and then Click OK. Rescue media files will now be stored on that volume, any existing Macrium Reflect rescue media files from previous builds will be moved to a newly selected volume.



Note: This option is not available in Windows XP

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USB Flash Drive Formatting

	The following partition is required on the USB flash drive for booting the Macrium Reflect rescue media:		
Boot	Type	Min	Partition Size
Multi-Boot MBR / UEFI	FAT32	1.2 x	Size of Rescue Media PE files
MBR Only	FAT32 or NTFS	1.2 x	Size of Rescue Media PE files

The Rescue Media PE files vary in size dependant on PE/RE version. 1GB will be sufficient for all PE and RE versions as of May 2018. If there is insufficient free space then the build may fail.

Rescue Media Builder will first attempt to non-destructively copy the PE/RE files to an existing partition, then non-destructively create a new partition if necessary. If this is not possible then you will be prompted to destructively format the drive.

The Flash drive is prepared and files copied according to the following steps...

1. The flash media is first searched for a partition of sufficient size and the required file system type as defined in the above table. If found then the **PE/RE files are copied to the Flash drive**.



Note:

For **Multi-Boot** (MBR/UEFI) rescue media the suitable partition is determined in the following sequence:

The current '**Active**' partition is checked for suitability.

If not found, the first suitable FAT32 partition is used. This partition is then marked '**Active**'

For **non Multi-Boot** (MBR) rescue media the suitable partition is determined in the following sequence:

The current '**Active**' partition is checked for suitability.

If not found, the first suitable FAT32 partition is used. This partition is then marked '**Active**'

If not found, the first suitable NTFS partition is used. This partition is then marked '**Active**'

2. If no suitable partition/file system is found and the rescue media creation is **Multi-Partition Aware** then the flash drive is searched to locate unallocated space to create a **1GB FAT32 partition**.

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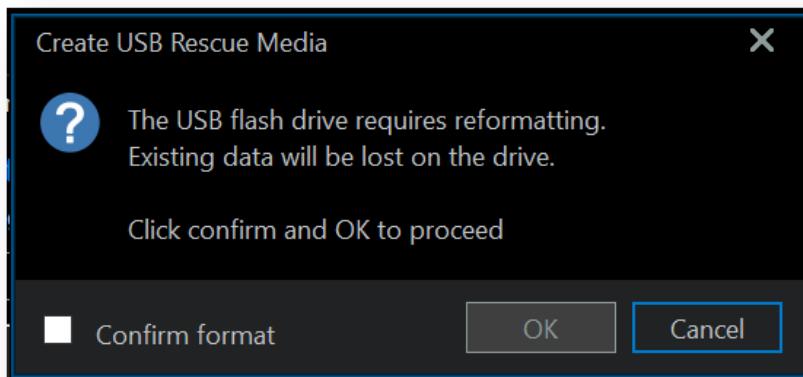


USB flash Rescue media is considered **Multi-Partition Aware** if the host OS is **Windows 10 Release 1709 or later** and the target **Win PE/RE WIM** is also **Windows 10 Release 1709 or later**. In all other cases only a single partition will be allowed on flash media.

There can be a maximum of 4 primary partitions on the drive.

If a partition is successfully created and formatted then it is marked '**Active**' and the **PE/RE files are copied**.

3. If the rescue media creation is **not** Multi-Partition Aware or if the partition in step 2 cannot be created then **Rescue Media Builder** will prompt to format the Flash Drive. This is destructive and **all existing data will be lost on the drive**:



Partition and File System Created

Multi-Partition Aware	Type	Size
Y	FAT32	1GB
N	FAT32	32GB or the maximum size of the flash drive

If a partition is successfully created and formatted then it is marked '**Active**' and the **PE/RE files are copied**.

Adding a Boot Menu option for system Image recovery

Adding a Macrium Reflect Windows boot menu enables direct access to the Macrium Windows PE recovery environment without the need to burn a DVD or USB Flash drive.

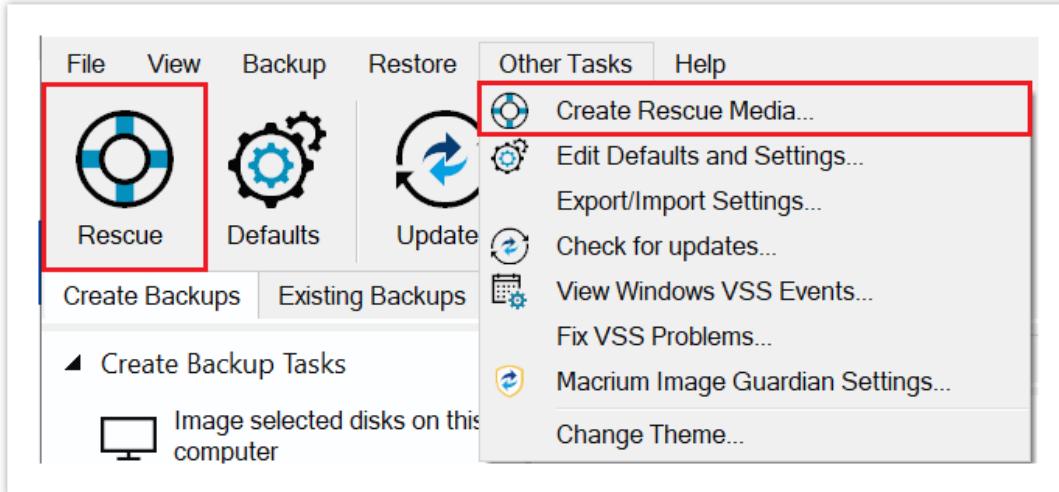


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Note: You are advised to create physical boot media, USB or DVD, that can be used if your OS system disk fails.

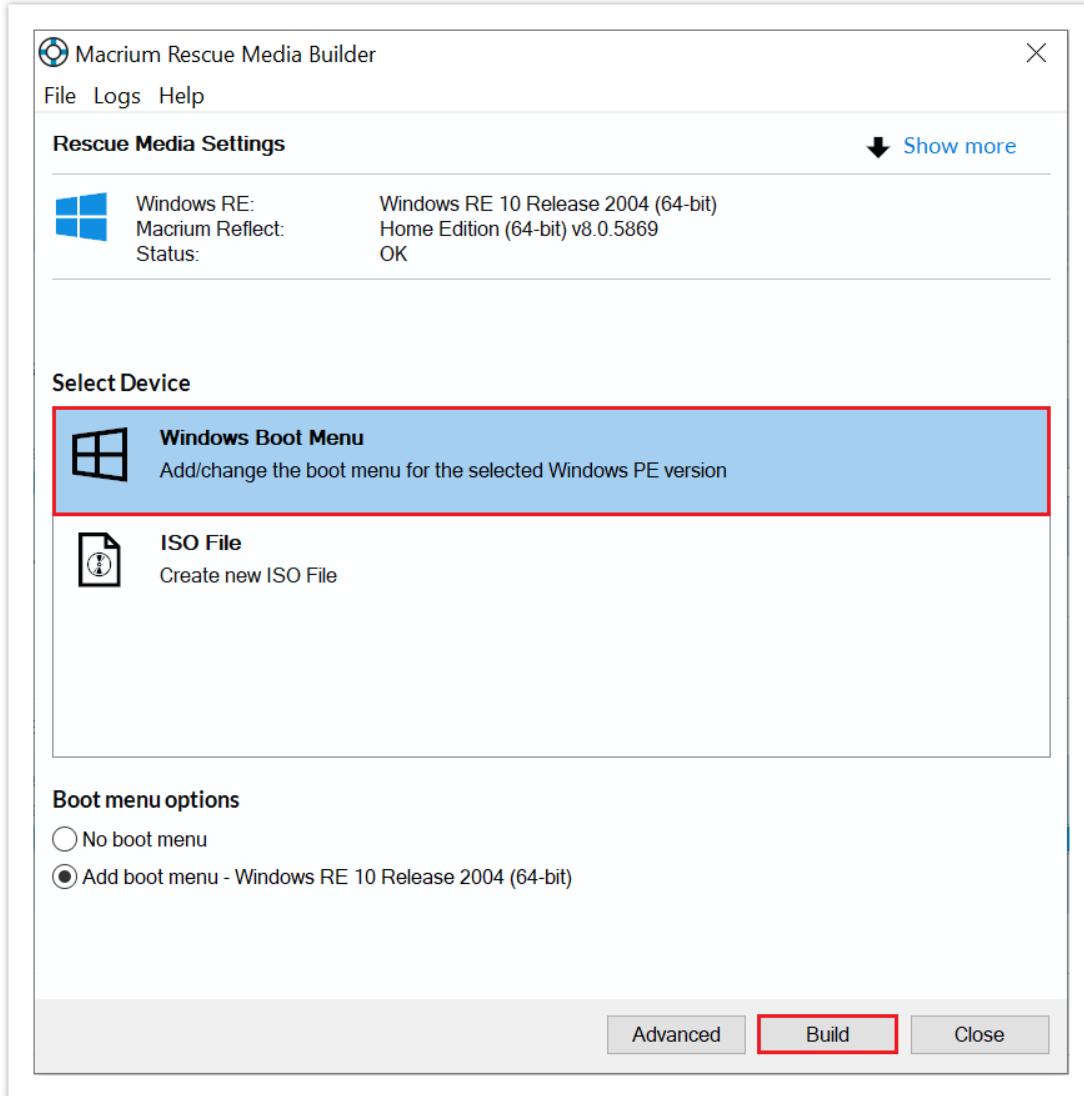
You can add a **Macrium Reflect System Recovery** menu option to your PC boot menu. By doing this you can restore a system image (the C drive) without a recovery CD.

1. To open the Macrium Rescue Media Builder, Select **Other Tasks** then **Create Rescue Media...** or select the **Rescue** icon.



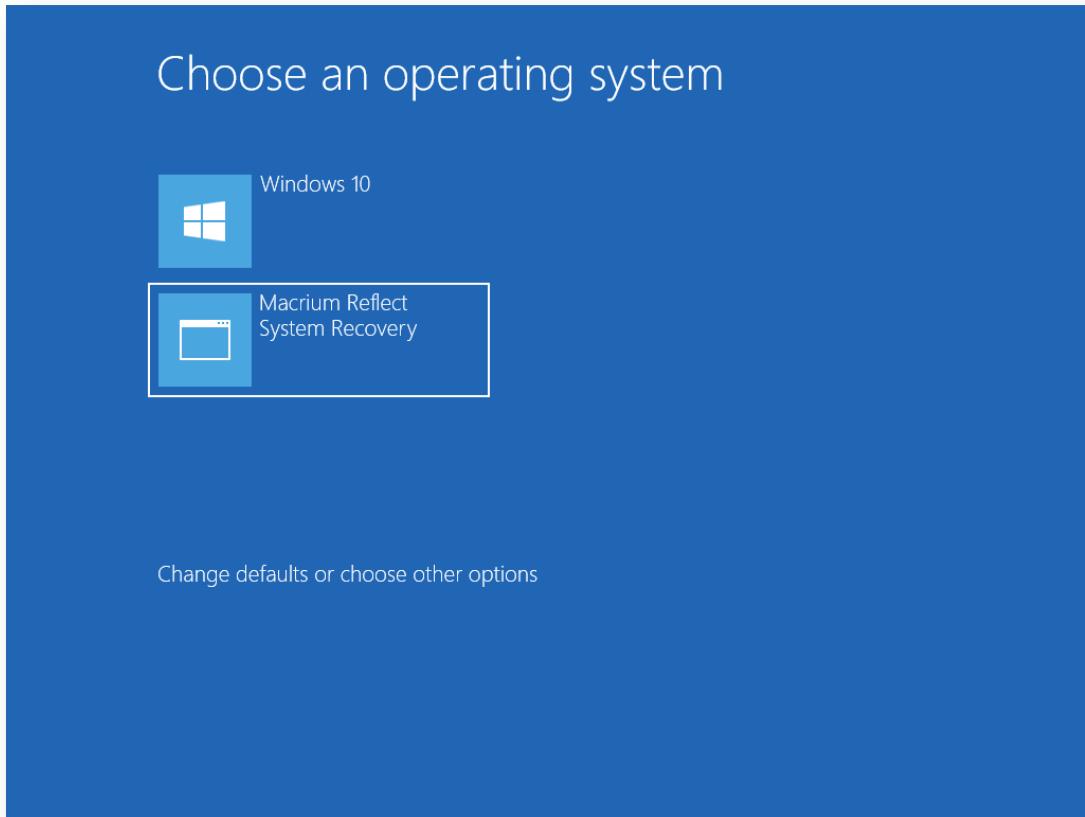
2. Select **Windows Boot Menu** in the device list and click **Build**.

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The Macrium recovery boot menu option - Windows 10



Technicians portable application support



Applies to Server Edition Technician's License only.

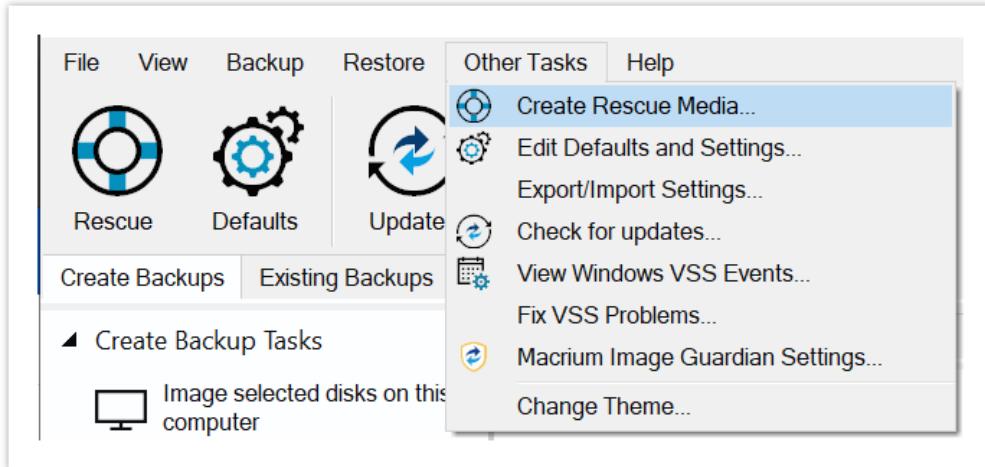
Note: Technician's Portable Application USB sticks, Optical media and ISO image files expire when your license for Technician's product expires. You need to recreate your USB stick / ISO image file after this time.

The Macrium Reflect Technician's License allows a single user to image multiple PCs (as specified in the license). Macrium Reflect runs as a portable application from USB Rescue Media, mounted ISO image file or optical media. The media also acts as a bootable rescue environment, which you can use to back up and restore licensed PCs. Portable Mode Reflect is very similar to the Macrium Reflect environment you are familiar with.

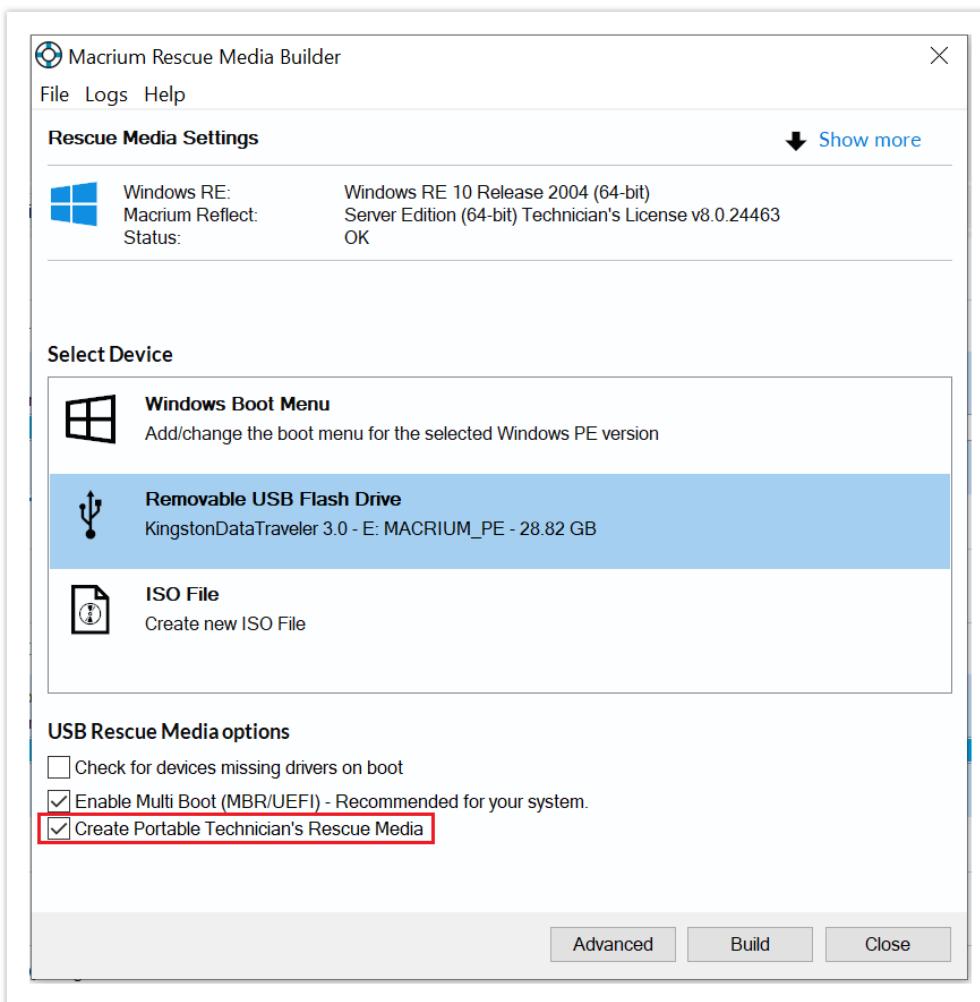
Creating a technician's USB stick

1. Take the '**Other Tasks**' > '**Create Rescue Media...**' menu option.

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2. Select **USB Device, CD/DVD Burner or ISO File** as your target media.
3. Check **Create a Technician's Rescue Media**.

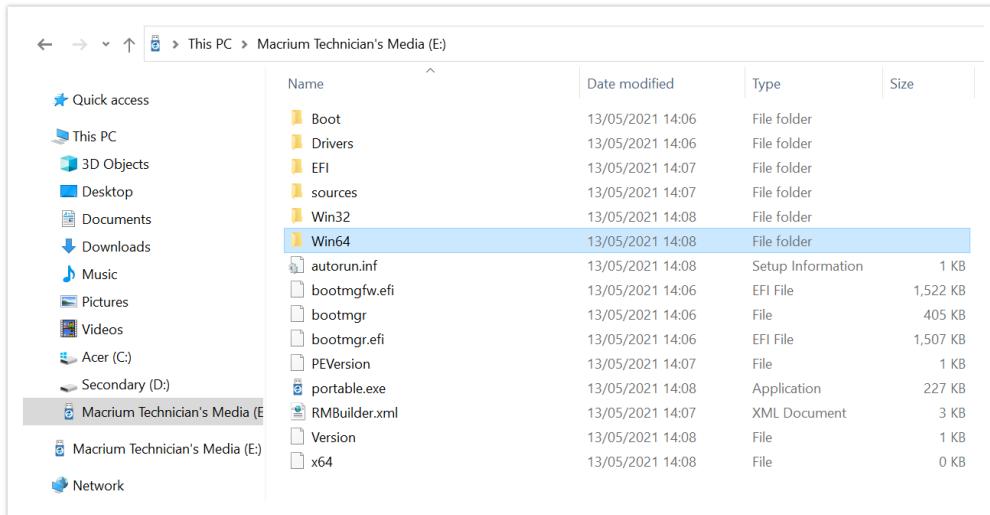


4. Click **Build**.

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Launching Macrium Reflect from the USB or ISO image

1. Insert the USB or Optical media file and you will be asked to choose what happens with it.
 2. Select **Open folders to view files**.
 3. In the root of the USB stick, select folder Win32 or Win64.
- The media contains both 32-bit and 64-bit versions of Macrium Reflect. To launch the right one, a launcher is provided called portable.exe.
4. Double click **reflect.exe** to launch Macrium Reflect.



Adding drivers to the portable PE environment

You can add drivers directly to the Windows PE rescue environment by booting into Windows PE and taking Restore > View Unsupported Devices. For more information see [Adding device driver software](#)

Adding drivers in Windows

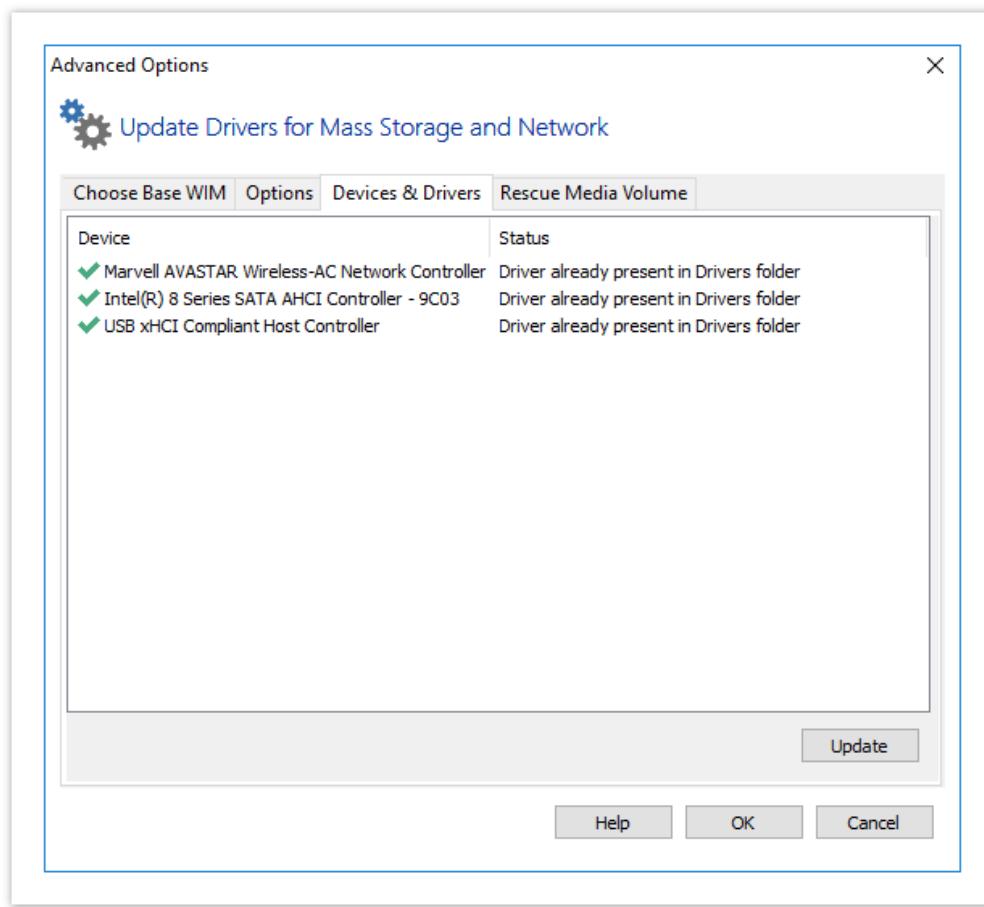
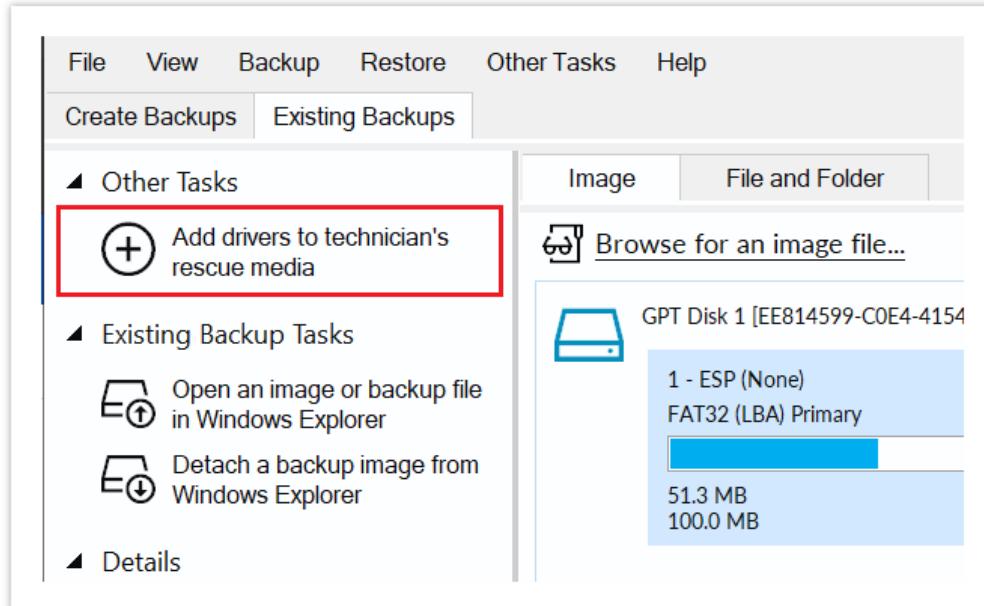


Please note that this option is not accessible when booted in the PE environment and is only available in Windows.

The portable edition of Reflect offers the ability to copy any missing drivers from the current system. To do this:

1. Select the **Add Drivers to technician's rescue media** option from the other tasks group on either the **backup** or **restore** tabs.

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About Adding Drivers to WinPE Rescue Media

WinPE is packaged with a large collection of drivers, however, there are many devices that are not part of the WinPE list of drivers. For WinPE to recognize your device, you need to add a driver. Your device then communicates with WinPE and loads at boot time of WinPE.

The main devices to be concerned with are hard drive/RAID controllers, network interface cards (NIC) or USB controllers and USB hubs.

If you intend to use a network device then you need to ensure that your NIC is supported in WInPE. If your hard drives are attached to a RAID controller then you need to ensure that your RAID Controller is supported in WinPE, either by a WinPE driver or by adding a driver.

A device driver is a collection of files (also referred to as a driver package) and generally comprises of:

1. The driver software. These files have a .SYS extension.
2. The driver information, or INF, file which contains the installation instructions for the drivers. These files have a .INF extension.
3. An optional security catalog which signs the drivers for operating systems which require signed drivers, commonly used on x64 operating systems. These files have a .CAT extension.
4. One or more optional supporting software library files (Dynamic Link Library) which contain further code to support the driver software. These files have a .DLL extension.

Your best sources for driver packages are the CD that comes with your device (or motherboard) or downloads from the vendor website as a ZIP file. When downloading a package from the vendor website, it is best to source a ZIP package for easy extraction.

Fixing Windows boot problems

This article explains how to use the 'Fix Boot Problems' option to resolve common boot problems when restoring an image.

- Fix boot problems on MBR/BIOS systems
- Fix Boot problems for GPT/UEFI Boot Systems

When restoring an image or cloning an HD there can be situations where Windows is unable to boot due to incorrect boot configuration. This article explains how Reflect enables you to resolve these situations.

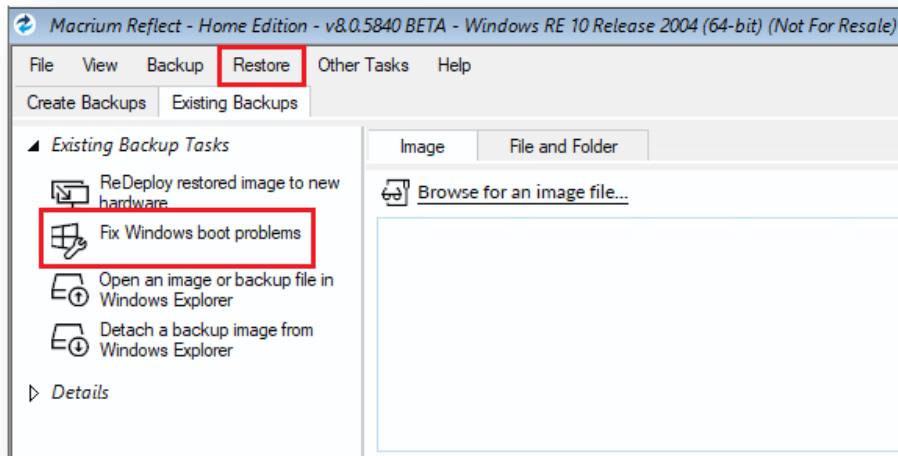
Depending on whether the disk you have restored uses GPT or MBR partitioning schemes, the action you need to take may vary. This article covers both cases.

Fix boot problems on MBR/BIOS systems

Fix Windows boot problems is available in the Windows PE Rescue media environment. To fix Windows boot problems, start your computer with your rescue media inserted. Then, after a restore or clone, to use fix boot problems:

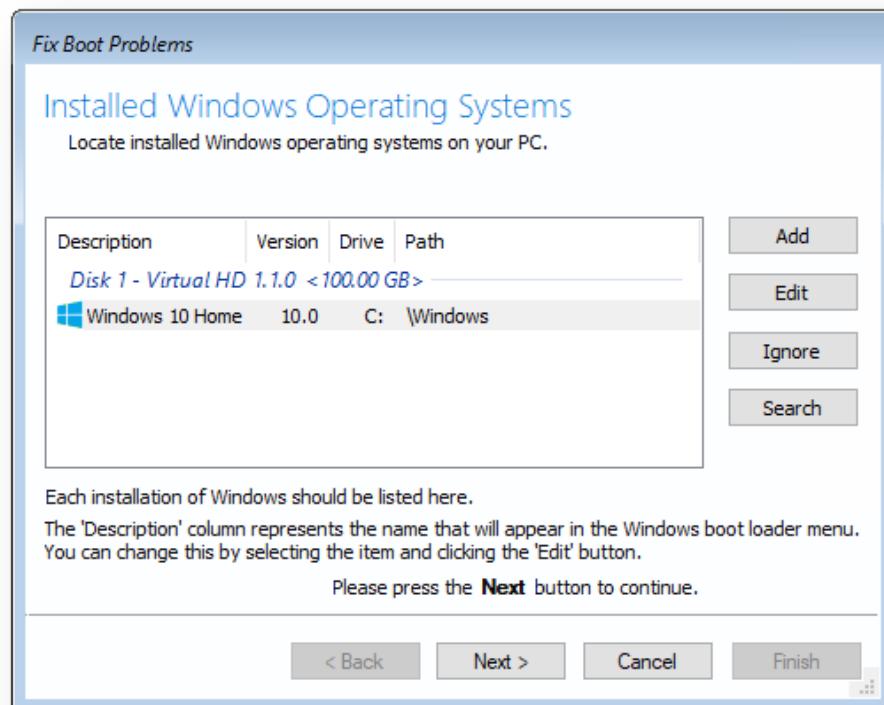
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1. Select the **Restore** menu, then select **Fix Windows boot problems**. Alternatively, select the **Existing Backups** tab then under existing backup tasks select **Fix Windows Boot Problems**.



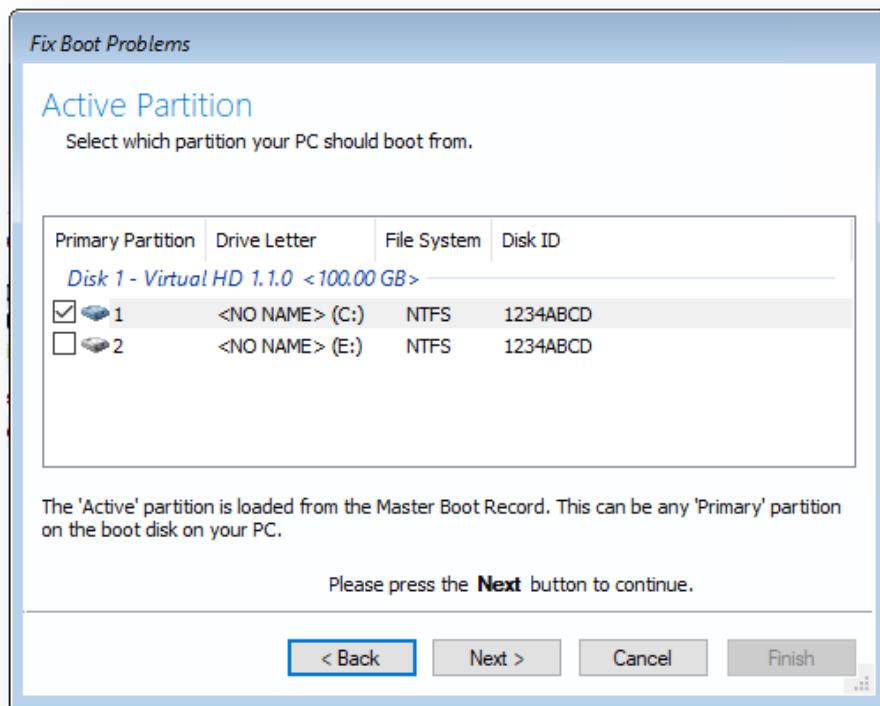
2. The Fix boot problems wizard will then open.

3. You will be presented with a list of Windows Installs, which the wizard detects. Verify these are correct. If the wizard has not automatically detected your Windows install, add it using the buttons on the right. You can also correct any details using the edit functionality.

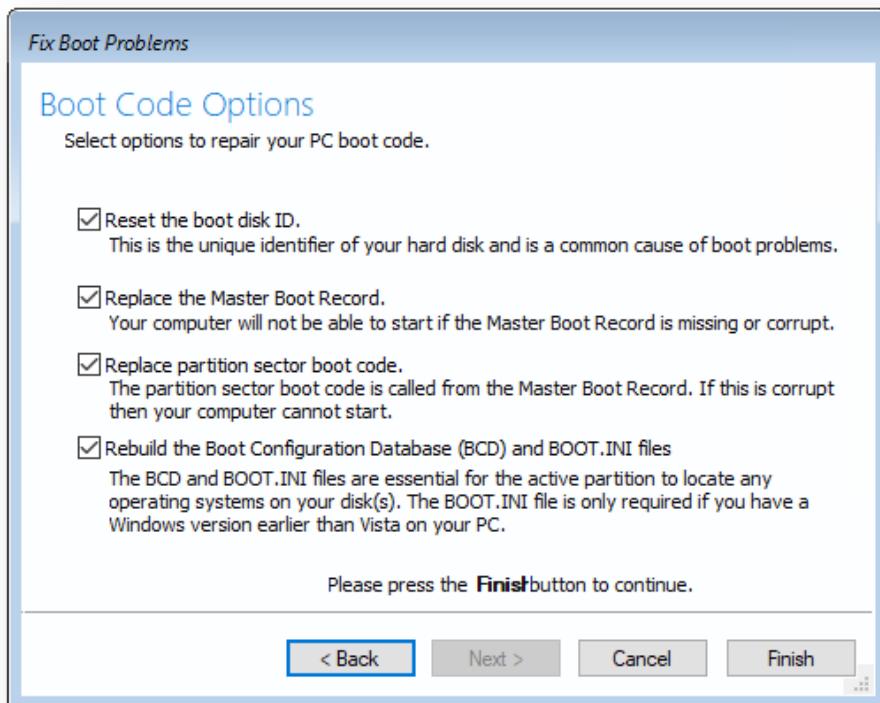


4. **Select the active partition.** The wizard automatically selects the boot disk for the relevant Windows install, but you can change this if you are using an alternative setup:

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5. Choose the boot options to be fixed. We recommend leaving all options checked, however, power users may wish to alter the behavior of the wizard.



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6. Click **Finish**. The wizard will then offer you the choice to reboot. If you need to perform additional tasks in the PE environment such as ReDeploy, select **no**. Otherwise, select **yes**.

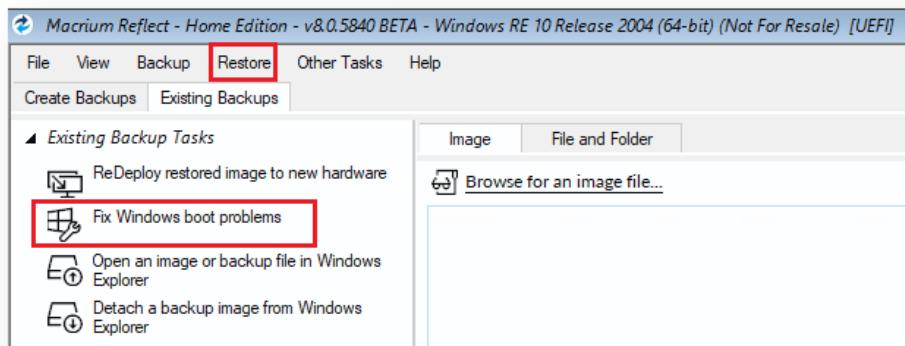
7. Your system will now boot.

Fix Boot problems for GPT/UEFI Boot Systems

Fix boot problems is available in the same location as for MBR systems. Boot your UEFI capable rescue media.

Then:

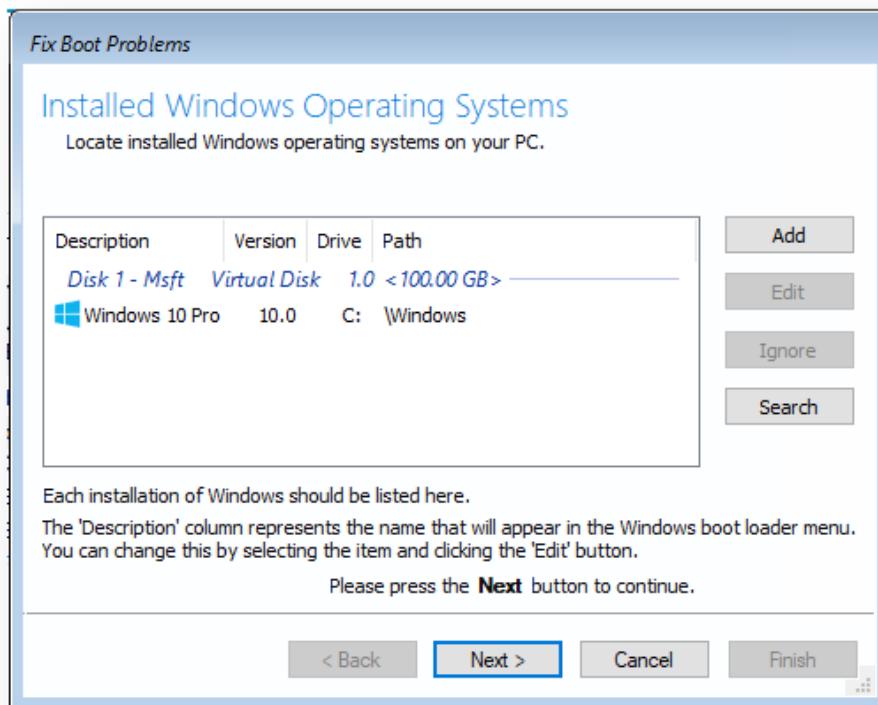
1. Select the **Restore** menu, then select **Fix Windows Boot Problems**. Alternatively, choose the **Existing Backups** tab then under existing backup tasks select **Fix Windows Boot Problems**.



2. The Fix boot problems wizard will then open.

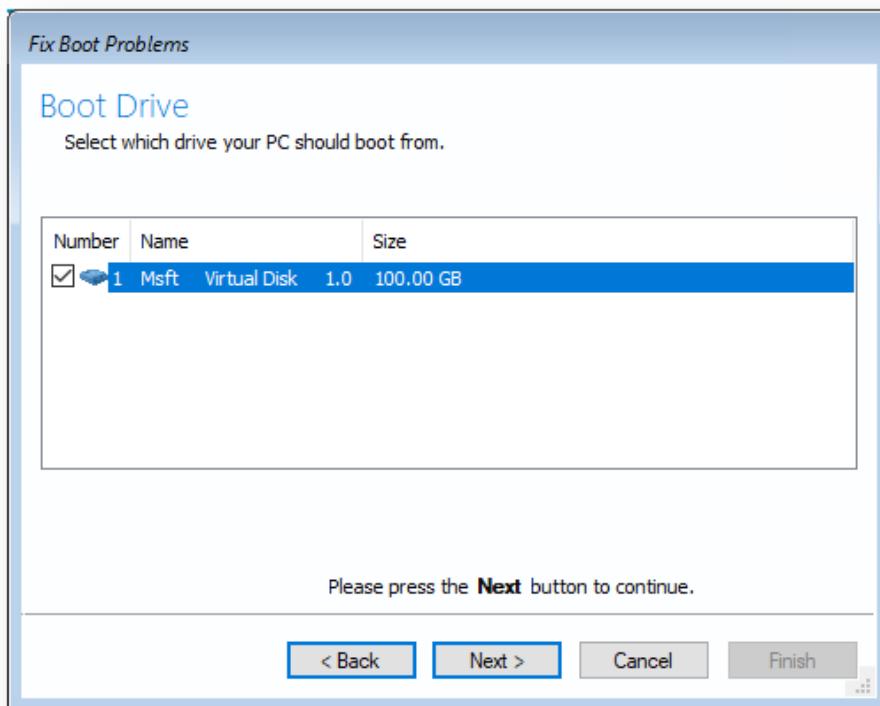
3. You will be presented with a list of Windows Installs, which the wizard detects. **Verify** these are correct. If the wizard has not automatically detected your Windows install, **add it** using the buttons on the left. You can also **correct any details** using the edit functionality.

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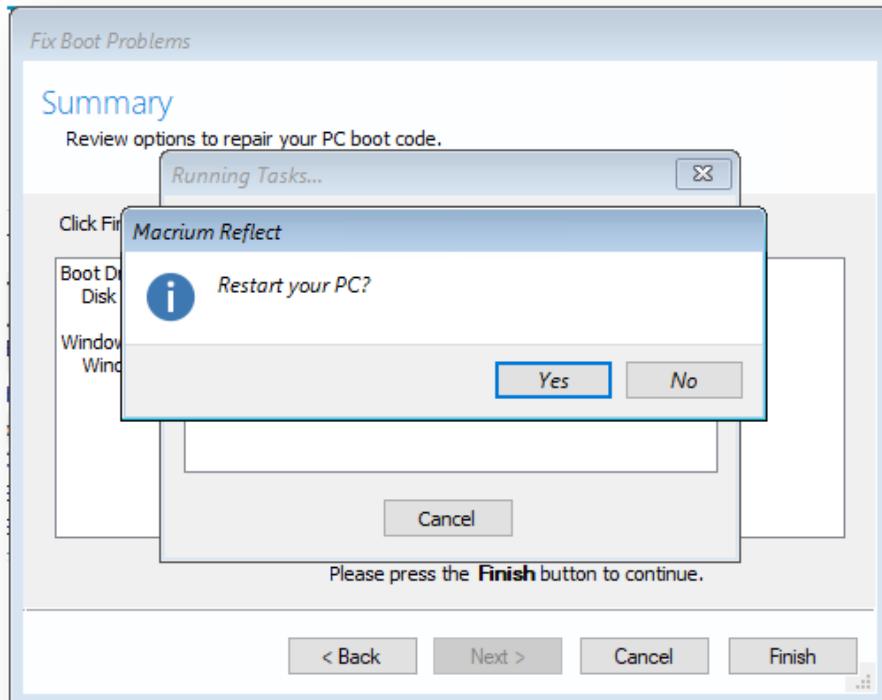
4. **(Optional Step)** if you have multiple disks, you may be asked to select which you should boot from. **Choose** the disk you wish to boot from, then **press next**.

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5. The wizard will then display a summary screen. **Press Next.**
6. You will then see a report showing you a choice of actions and allowing you to restart your PC. **Select Yes** if you wish to restart now and **select No** if you wish to perform additional tasks in the PE environment.

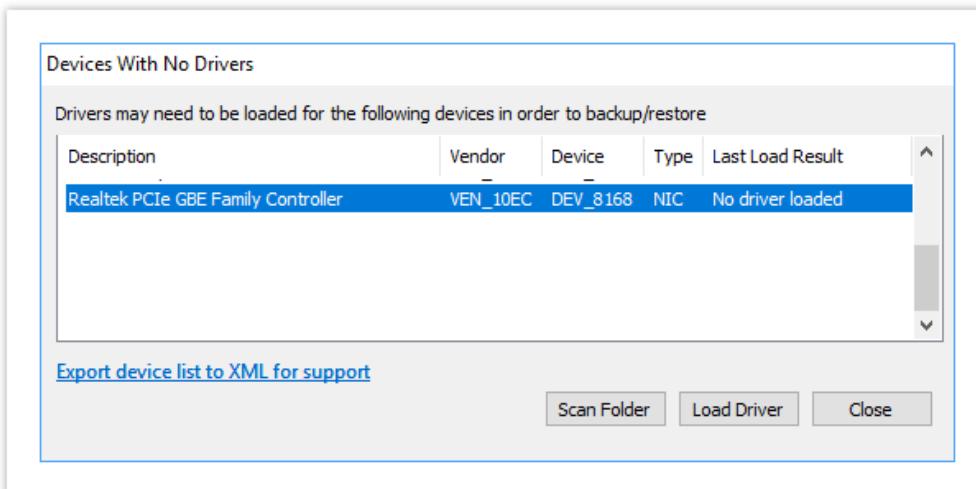
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Updating rescue media to include additional hardware drivers

While you have valid rescue media, it is possible that further down the line you add hardware to your computer without updating the rescue media. Macrium Reflect provides a way of loading drivers for these pieces of hardware when in Windows PE.

Select the **Restore > View Unsupported Devices** menu option, the following dialog will be shown:



a list of devices which are currently unsupported will be shown. Drivers can be loaded using two methods:

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- Select a device from the list and **click Load Driver**. Browse and select a driver INF file in the dialog that is displayed. Macrium Reflect will try and load the driver and report the result back.
- Select '**Scan Folder**'. The selected folder structure will be searched for driver INF files for all devices in the list. After the scan, a dialog will be displayed showing which devices had drivers loaded.

Notes on Driver Packages

After downloading a driver package, unzip to a folder that Macrium Reflect has access to. All files within the driver package should be extracted including .CAT and .DLL files.

When loading drivers Macrium Reflect will check for device support in INF files and if found will attempt to load the driver. It is important that all the files that the driver package consist of should be present in the same folder as the INF file. There will definitely need to be the .SYS file for the driver. The driver package may also consist of .CAT and .DLL files, these need to be present in the same folder as well in order to load successfully.

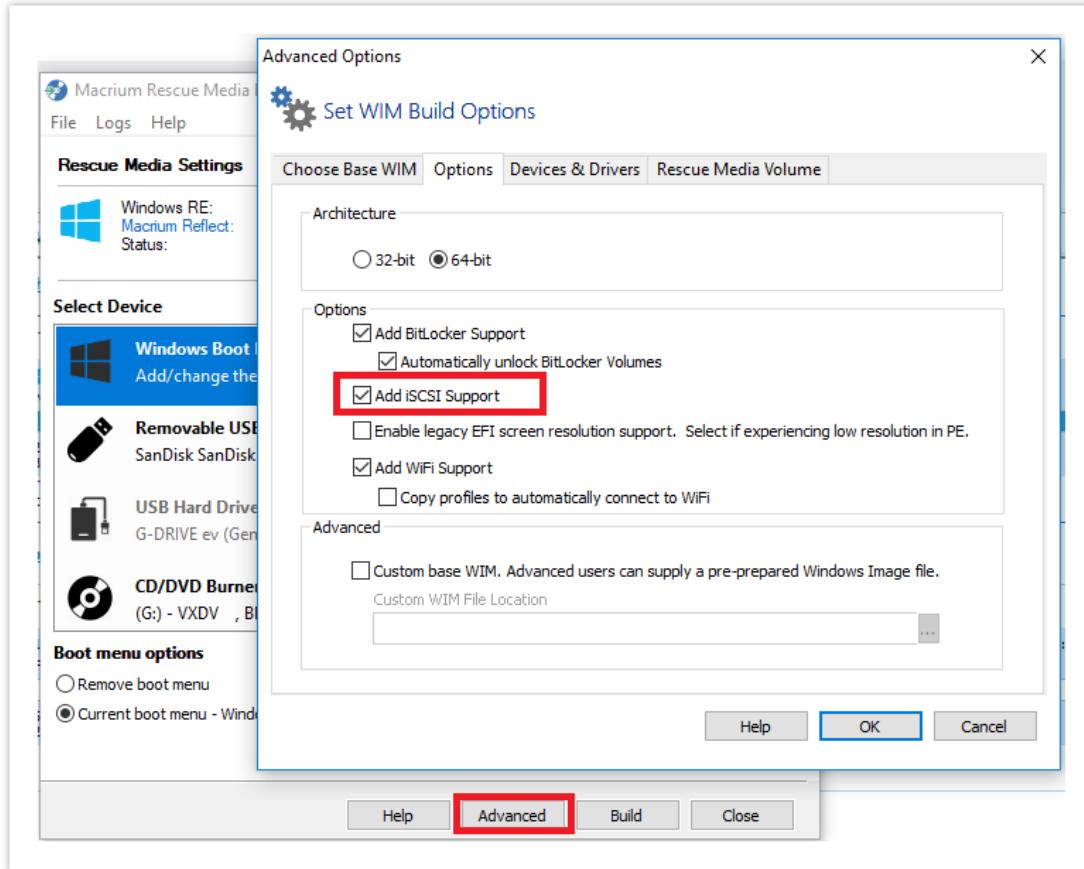
Drivers must ideally match the architecture of your Windows PE installation. It should be noted that Windows 7 drivers may appear to have been added to Windows PE 4.0/5.0 successfully but will only sometimes work.

Adding iSCSI support to Windows PE

Macrium Reflect can include the components necessary to connect Windows PE to iSCSI. This enables restoration and clones to iSCSI connected disks.

1. Ensure that your Windows PE rescue media has been created with the '**Add iSCSI Support**' option selected.

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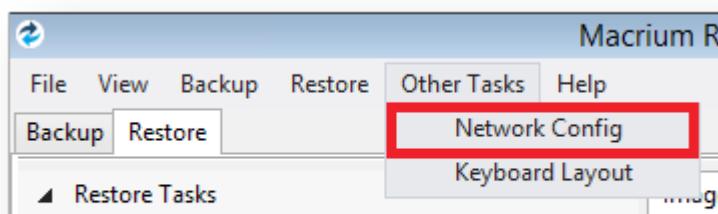
2. Boot into Windows PE and start a command prompt.



The command line can be accessed by clicking the black icon on the bottom left corner of your screen.

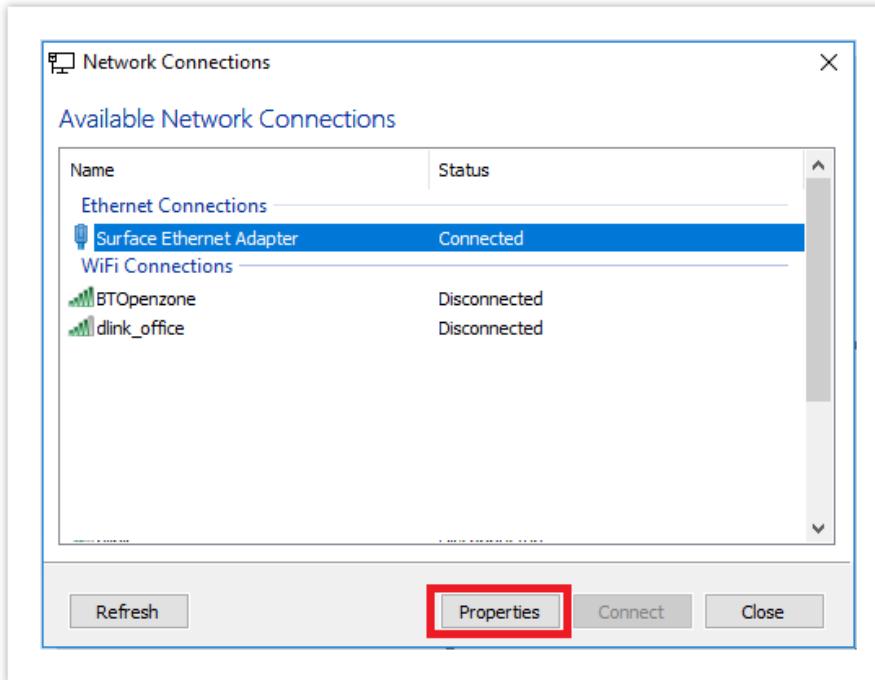
3. You will need to change the IP address of your Windows Pre-installation Environment to the same IP address that is configured on your Windows Host in order to be authenticated by the iSCSI target since unknown IP addresses will result in a timeout when trying to login to the target.

Take '**Other Tasks**' > '**Network Config**'



4. Select the connected network adapter and click 'Properties'.

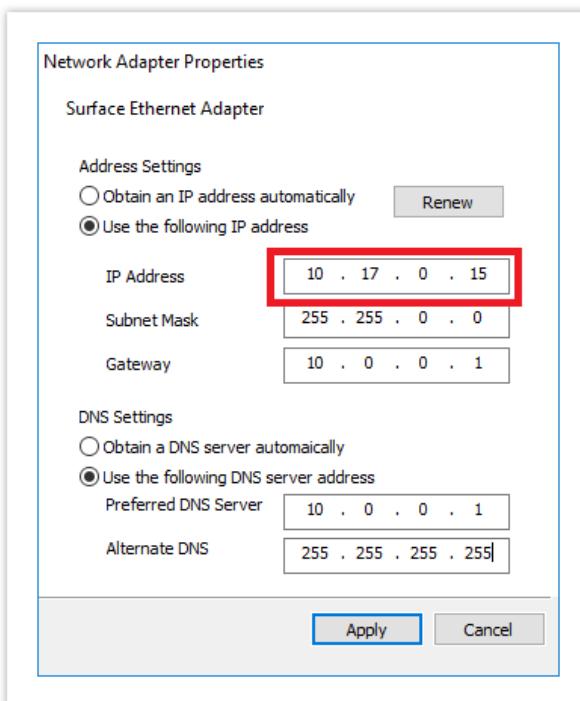
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5. In Network Adapter Properties **input the same IP address that is configured to connect to the iSCSI target.**

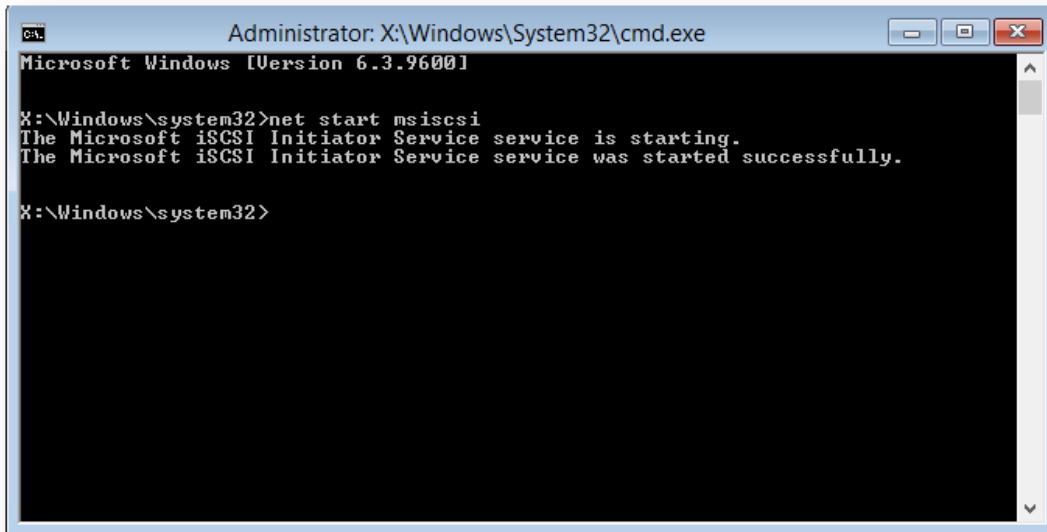
Note: In this case the Windows host IP address is '10.17.0.15'.

Please replace with the correct IP address for your Windows host.



6. In the command window type “**net start msiscsi**” to enable the Microsoft iSCSI server:

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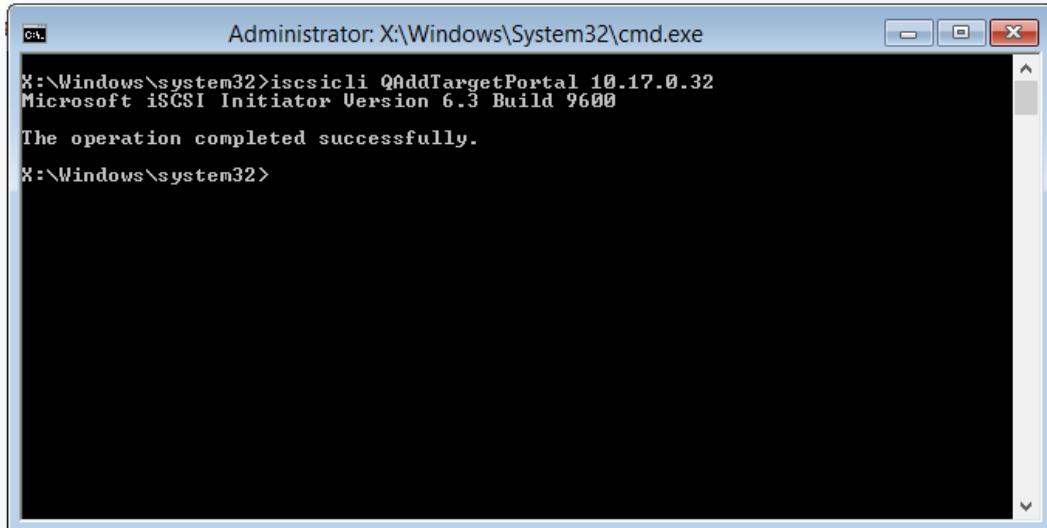
Administrator: X:\Windows\System32\cmd.exe
Microsoft Windows [Version 6.3.9600]

X:\Windows\system32>net start msiscsi
The Microsoft iSCSI Initiator Service service is starting.
The Microsoft iSCSI Initiator Service service was started successfully.

X:\Windows\system32>

- After the service has started connect the iSCSI target to Windows PE by typing "**iscsicli QAddTargetPortal 10.17.0.32**".

Note: In this case the target is '10.17.0.32' please replace with the correct IP address for your own iSCSI target.



Administrator: X:\Windows\System32\cmd.exe

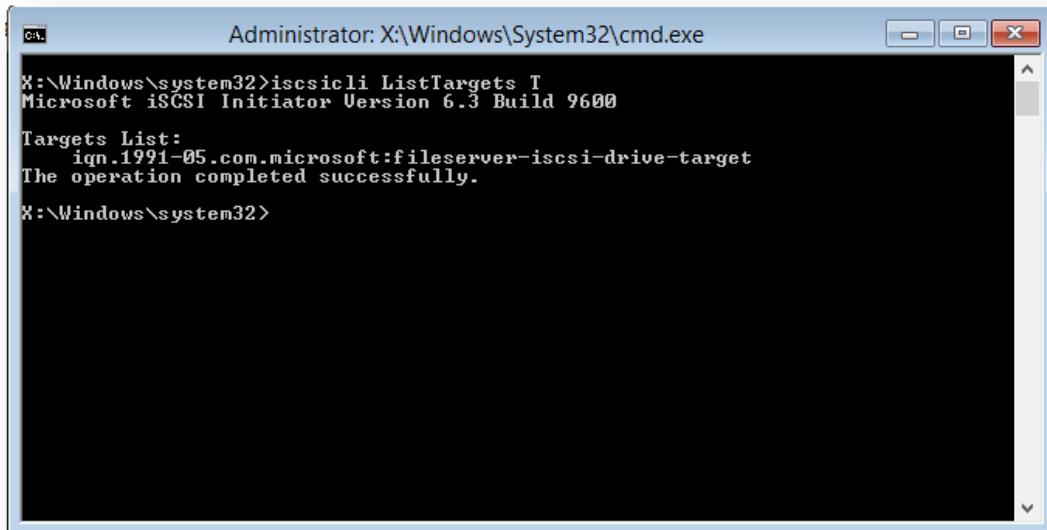
X:\Windows\system32>iscsicli QAddTargetPortal 10.17.0.32
Microsoft iSCSI Initiator Version 6.3 Build 9600
The operation completed successfully.

X:\Windows\system32>

Note: Replace 10.17.0.32 with your IP address

- Connect to the target in order to find out its Internet Qualified Name that is used to logon to the iSCSI target.
Type: "**iscsicli ListTargets T**"

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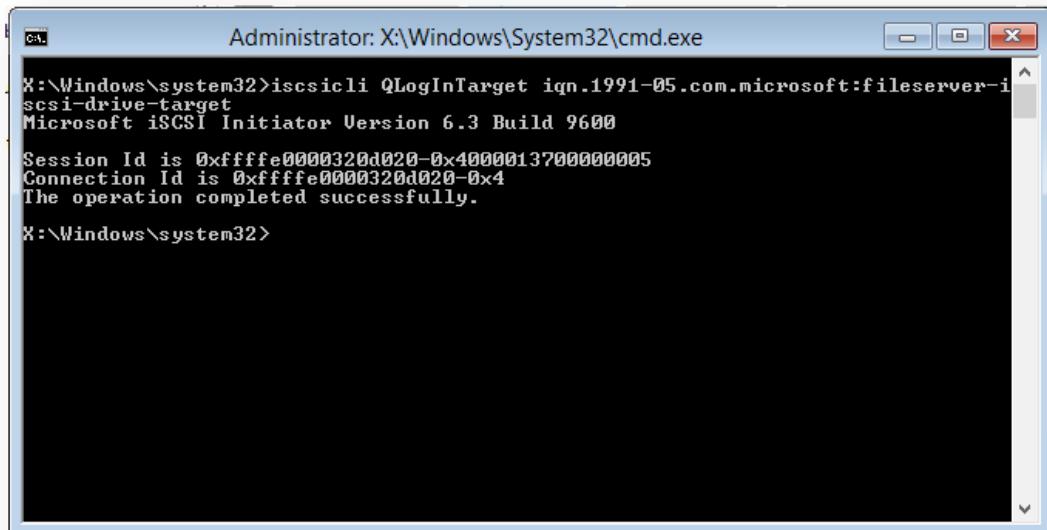


```
Administrator: X:\Windows\System32\cmd.exe
X:\Windows\system32>iscsicli ListTargets T
Microsoft iSCSI Initiator Version 6.3 Build 9600
Targets List:
  iqn.1991-05.com.microsoft:fileserver-iscsi-drive-target
The operation completed successfully.
X:\Windows\system32>
```

The above command gave output to a target name: **iqn.1991-05.com.microsoft:fileserver-iscsi-drive-target**

This target name is used to logon and access the iSCSI Virtual Disk.

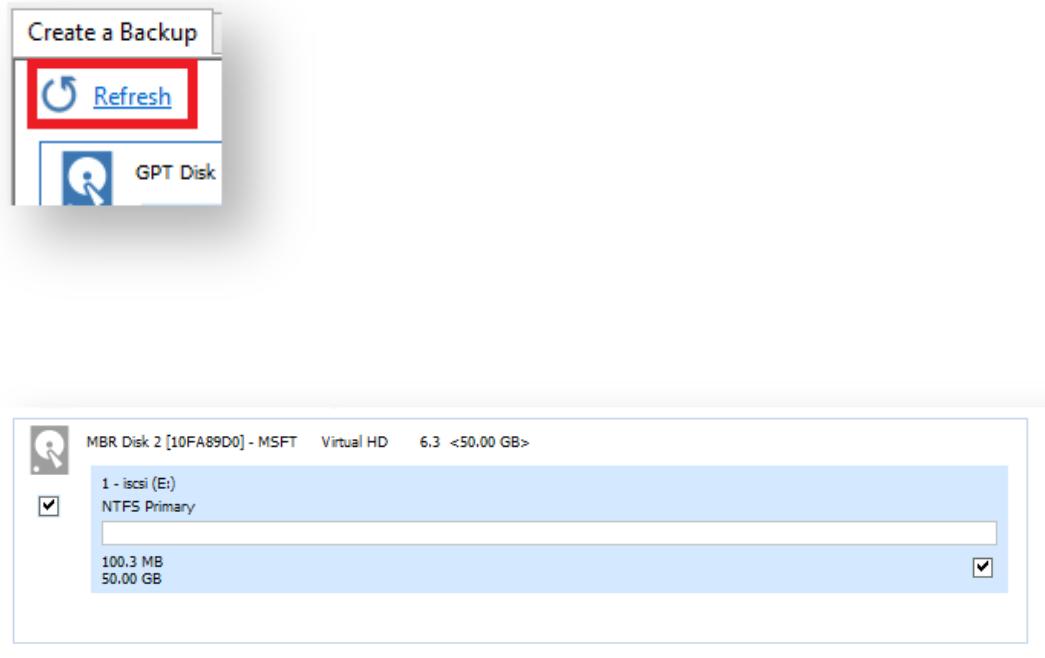
- Using the “**iscsicli QLogInTarget iqn.1991-05.com.microsoft:fileserver-iscsi-drive-target**” you will add the iSCSI Virtual Disk to Reflects interface and it will appear as a local disk available for restore and clone .



```
Administrator: X:\Windows\System32\cmd.exe
X:\Windows\system32>iscsicli QLogInTarget iqn.1991-05.com.microsoft:fileserver-iscsi-drive-target
Microsoft iSCSI Initiator Version 6.3 Build 9600
Session Id is 0xfffffe0000320d020-0x4000013700000005
Connection Id is 0xfffffe0000320d020-0x4
The operation completed successfully.
X:\Windows\system32>
```

- If the iSCSI disk is not visible at first in the restore tab, **select the 'Backup' tab** in Reflect and **click Refresh** .

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Your iSCSII disk is now connected and can be used as a target for your image restores and clones.

Adding BitLocker support to Windows PE



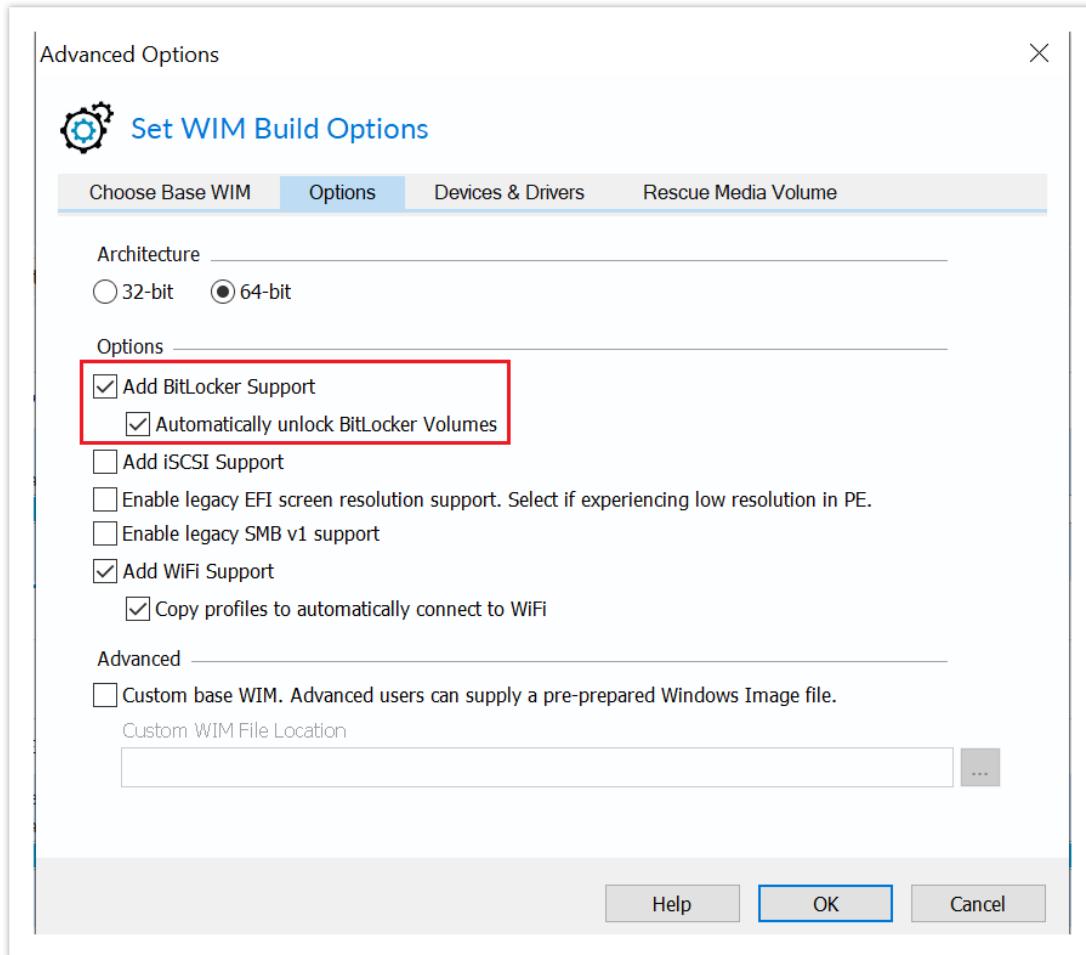
Note: It isn't absolutely necessary to unlock a BitLocker encrypted drive when restoring an image of the encrypted partition. The partition will restore without problems but will require re-encrypting on reboot.

Unlocking the drive in Windows PE enables intelligent sector copy imaging and cloning, RapidDelta Restore (RDR), and also free access to the drive's contents using PE Explorer. In addition, restoring to an unlocked drive will retain the encryption status of the drive when rebooting.

Automatically unlocking BitLocker encrypted drives

Macrium Reflect can include the components and decryption keys necessary to automatically unlock Microsoft BitLocker encrypted drives in Windows PE.

In the **Rescue Media Builder** select **Advanced** then **Add BitLocker Support** and **Automatically unlock BitLocker Volumes**.



When Windows PE starts any BitLocker locked drives that were attached when the recovery media was created it will automatically unlock them.

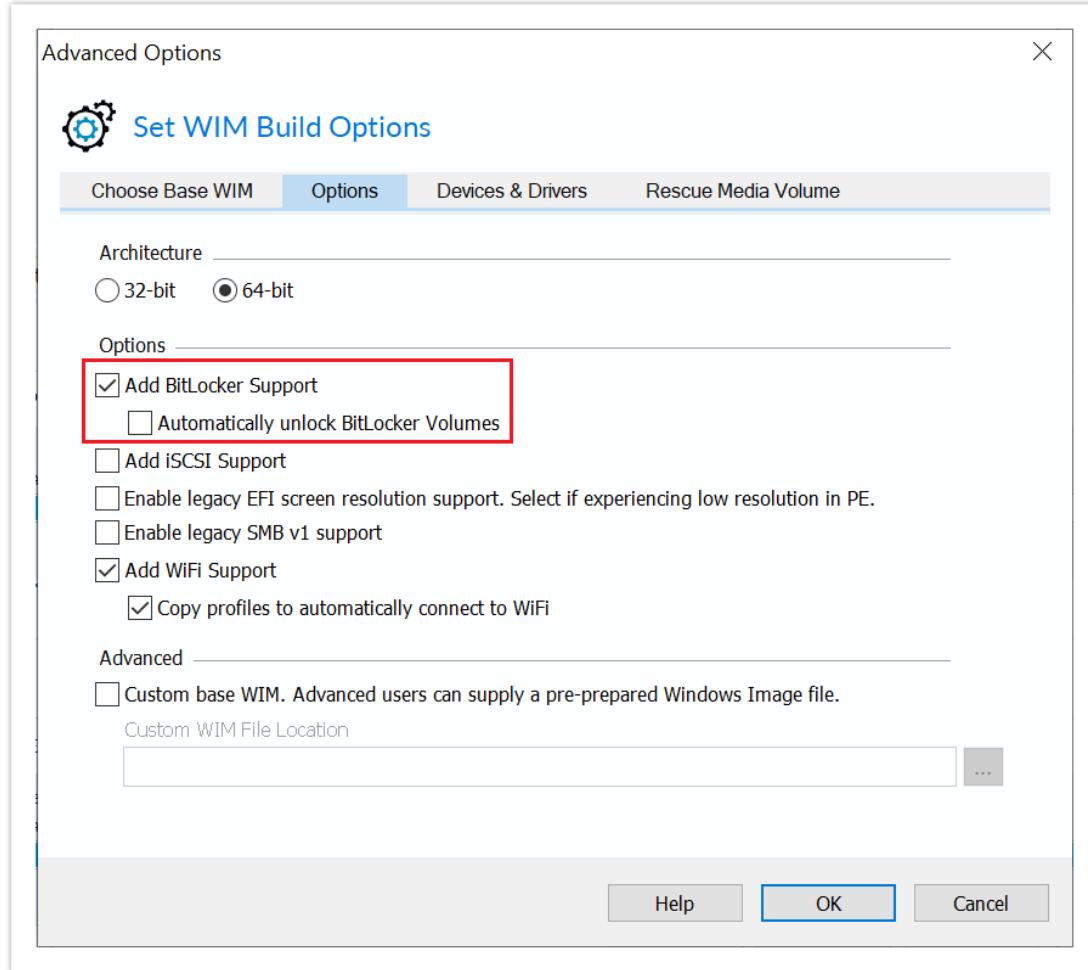
Unlocking BitLocker encrypted drives using a USB stick

Automatically unlocking encrypted drives when PE starts may present an unacceptable security risk for some users.

Automatic unlocking requires no user intervention and the Macrium Reflect boot menu is able to access encrypted drives without password entry.

An alternative method is to **de-select** the **Automatically unlock BitLocker encrypted drives** option in the Rescue Media Builder:

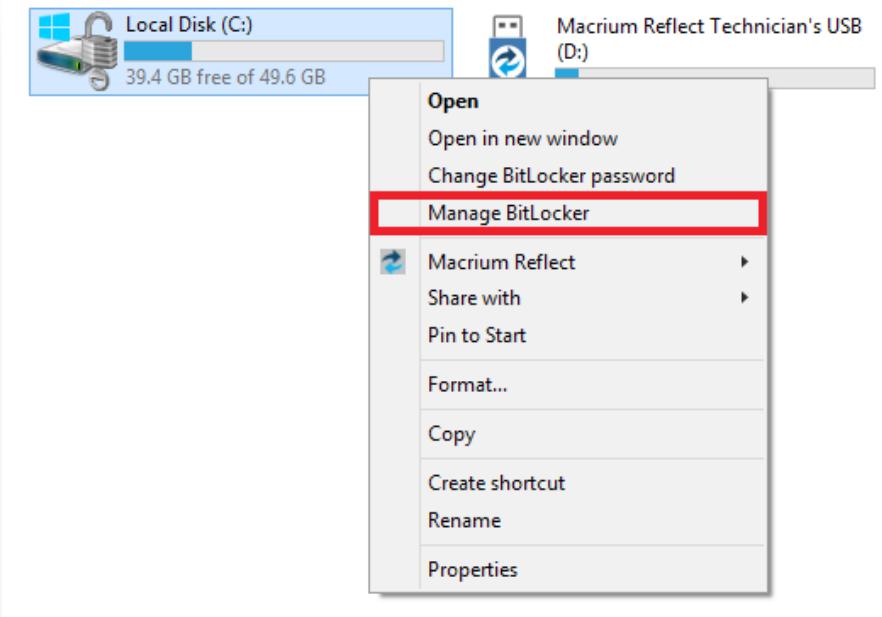
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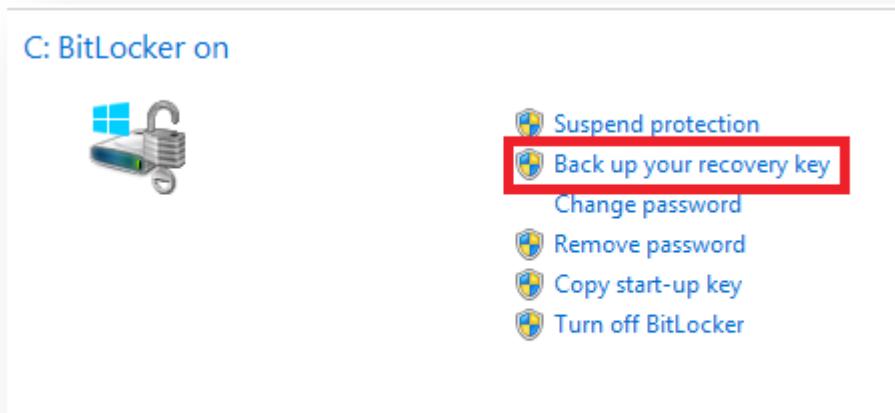
You can then save BitLocker Encryption Key files (.BEK) and/or BitLocker password TXT files to the root of any USB stick. This could also be a Windows PE rescue media USB stick.

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1. In Windows Explorer, right click on any BitLocker encrypted drive and click on **Manage BitLocker**.

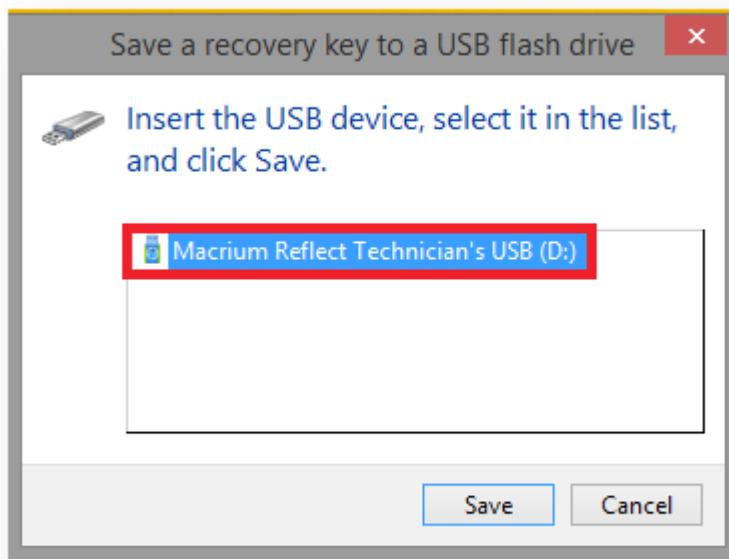
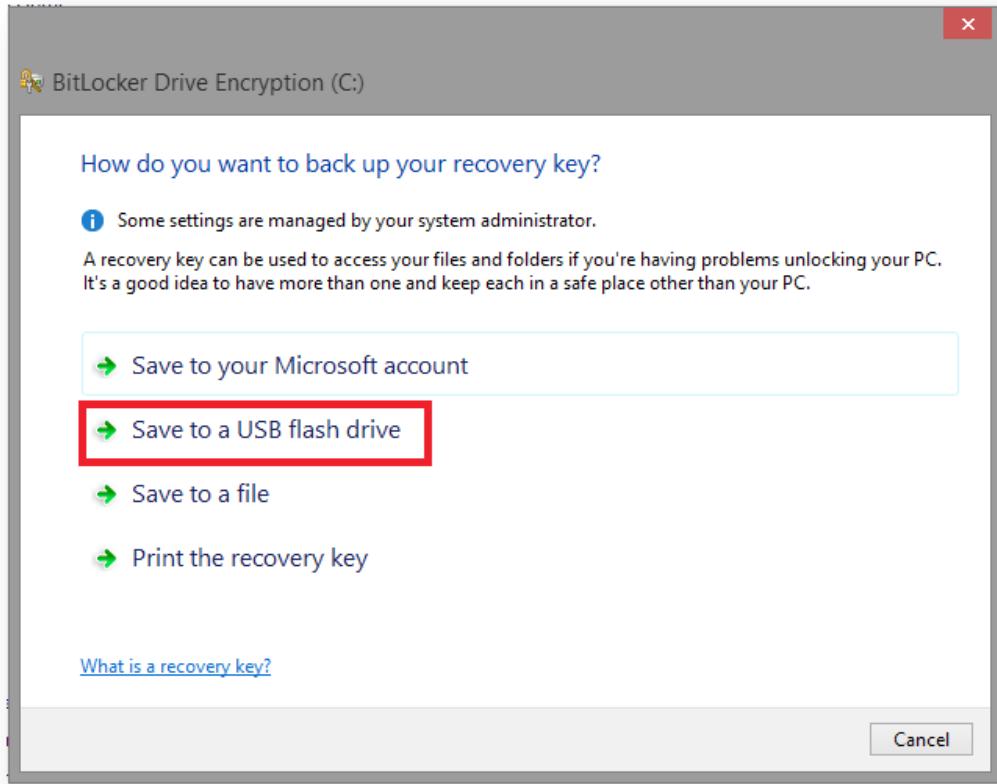


2. In the newly opened window click '**Back up your recovery key**'



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3. In the BitLocker Drive Encryption wizard select '**Save to a USB flash drive**' and chose the USB device you want to save to.



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After choosing the USB device you want to save the Recovery Key file to, click **Save** and then **Finish** in the BitLocker Drive encryption wizard. This action will save a .BEK file and/or a recovery password text file to the chosen USB device.



Note: The .BEK file is a protected operating system file, it is hidden by default and won't be visible within Windows Explorer. It can be made visible by changing Folder Options and de-selecting the option to **Hide Protected operating system files**.

You can add as many keys as you have encrypted drives.

When Windows PE starts ensure that your USB flash drive is attached to your PC. Your encrypted drives will then be automatically unlocked when Macrium Reflect initializes.

Restoring an image from within the Rescue Media

This article is for Restoring an image from within Windows PE Rescue Media. For restoring an image in Windows see [Restoring an image within Windows](#).

If the image contains only data, restoring it is very simple using Macrium Reflect. You can restore it back to its original location without interrupting the operating system.

Before you begin: You must have a backup image of the disk ready to restore.

1. During start up of your PC on the first image you see press a button that will start a **Boot selection** menu.



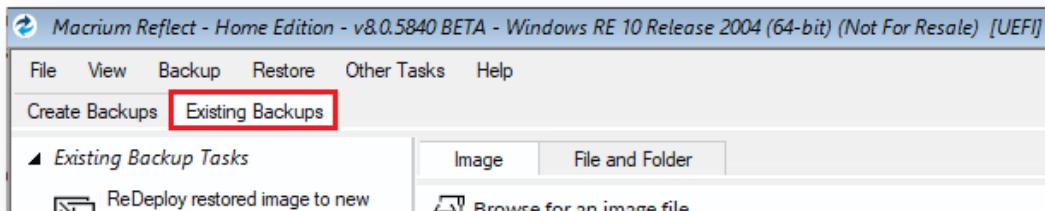
Boot selection button differs from one PC manufacturer to another, best way to find out the **Boot selection** menu on your PC is to consult the motherboard manual provided by the manufacturer.

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Chose **CD-ROM drive** or a **Removable USB device** based on the choice of Rescue Media you've built and press **Enter** to load the Rescue Media.

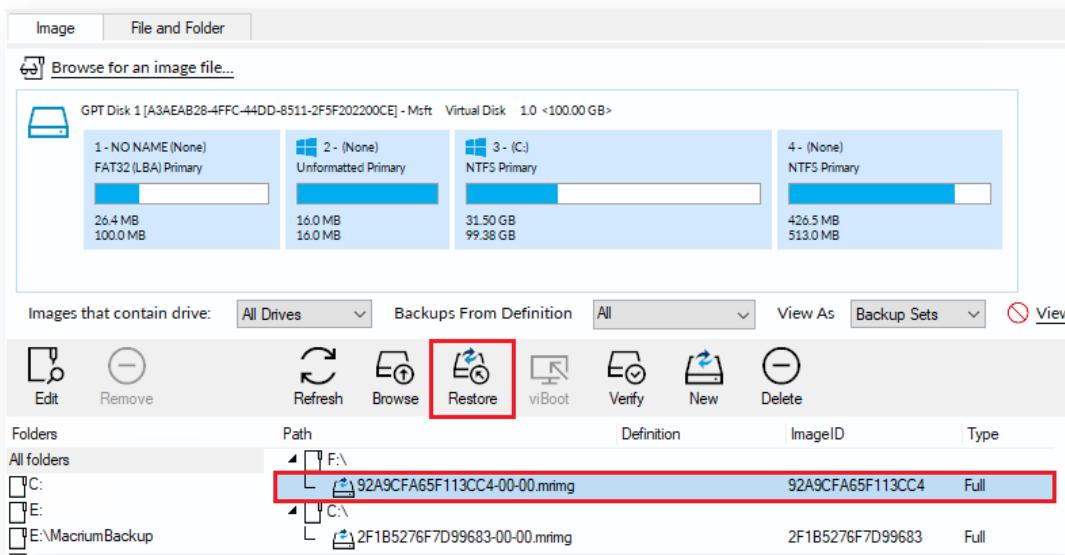
2. When You have loaded into windows PE, select the **Existing Backups** tab, then **Image**.



Backup images will be available to choose from and be restored in the main pane.

3. Select the image you wish to restore and click the **Restore** icon.

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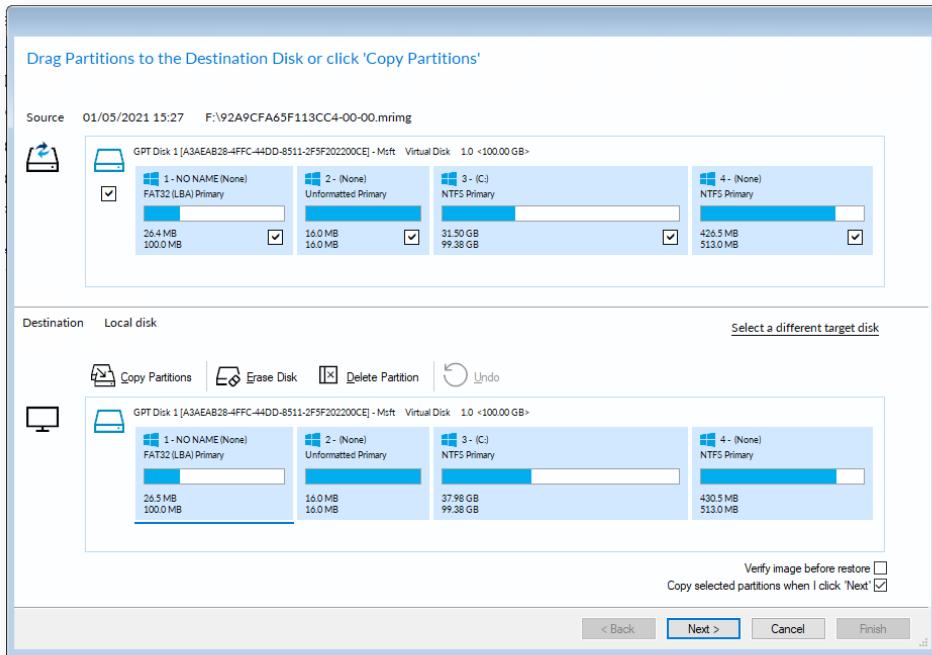
If you cannot find the backup image you would like to use in the provided list, select **Browse for an image file...** at the top of the existing backups tab and look through the windows explorer to find it.

4. This next window gives you the ability to edit partitions prior to the restore.

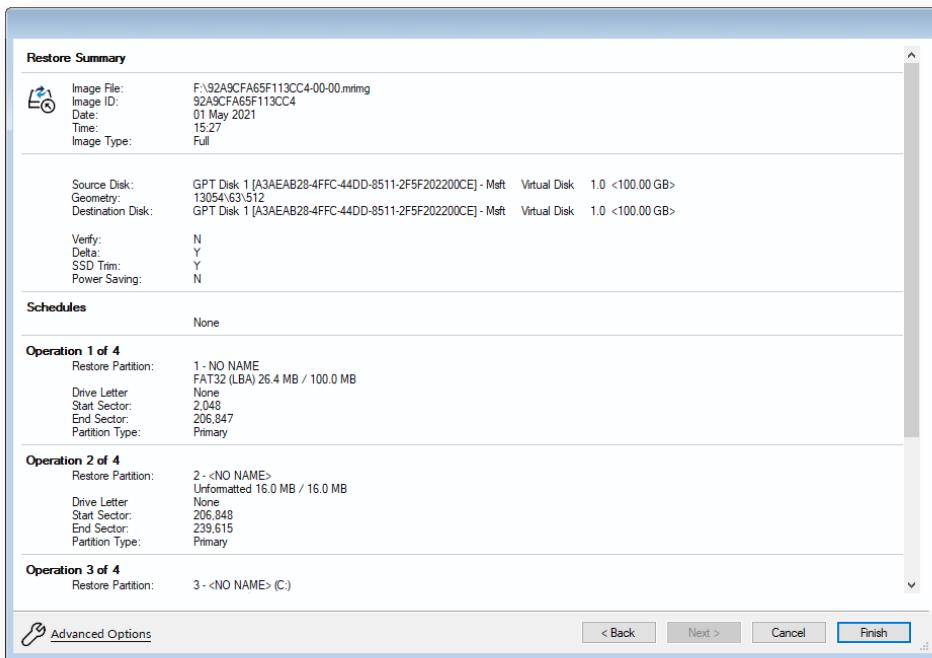
i Moving and Resizing the restored partition

By default, partitions restore to their original locations. However, it's also possible to select a different target disk and to drag partitions to different locations, and resize them to use the available space. Simply drag the source partition to any available partition or free space on the target disk. You can also delete partitions on the target disk to make space. For more destination options and further information, see [Modifying restored partition properties](#).

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5. This is the restore summary page, here you can finalize your Restore and if required access the **Advanced Options**.



The **Advanced Options** include:

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Option	Description
Rapid Delta Restore:	Copy only changed data blocks to complete the restore process more quickly See: Rapid Delta Restore - RDR
SSD Trim:	Enable TRIM on restore to increase both the lifetime and the performance of the SSD. See: SSD Trim Support
Verify Image:	To verify the image integrity before restoring.
Master Boot Record:	To replace the Master Boot Record (MBR) with the MBR from the backup. The MBR is a small program that executes when the computer starts up. If this program becomes corrupt then you can have problems starting the computer operating system. Note: On modern GPT/UEFI systems this option has no effect.

- Once you have looked over the summary and you are happy with your restore settings you can click **Finish** and begin the operation.

Macrium Image Guardian

- Macrium Image Guardian Overview
 - Protected File Access
 - Installing Macrium Image Guardian
 - Activating Macrium Image Guardian
 - Macrium Image Guardian Events
 - Enabling and Disabling MIG on NTFS Volumes
-

Macrium Image Guardian Overview

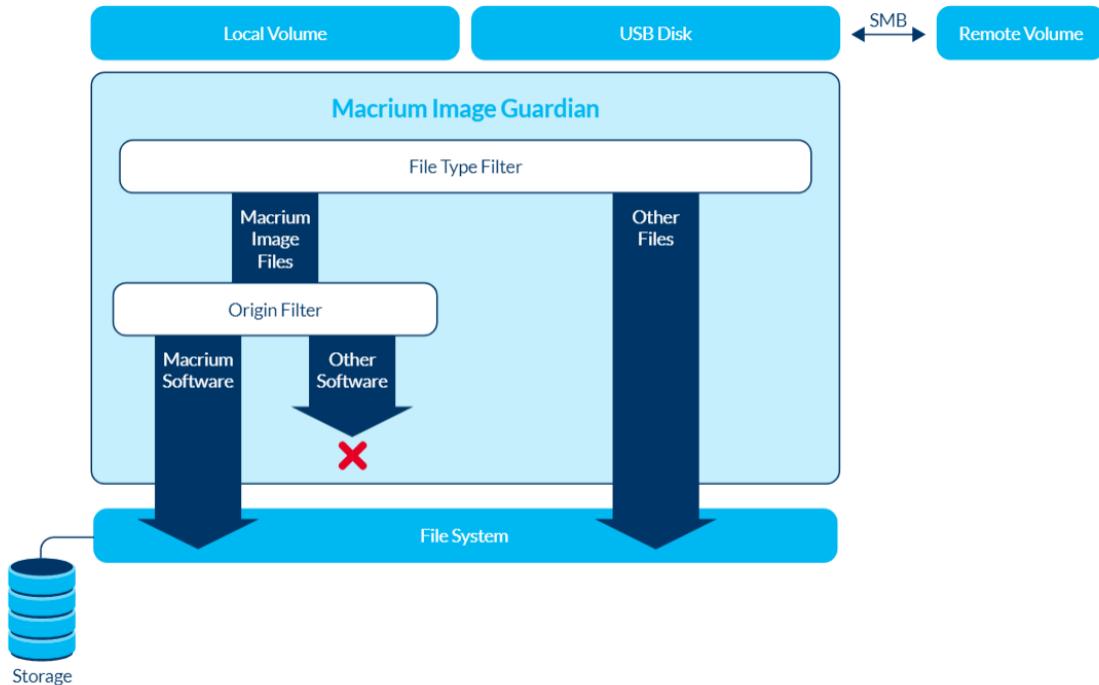


Macrium Image Guardian protects your backup files from unauthorised modification.

MIG grants write access to existing backups file for Macrium Reflect 7.1, any image tools created by us, and optionally, [MS RoboCopy](#). All other process attempting to update existing backup files will be denied access.

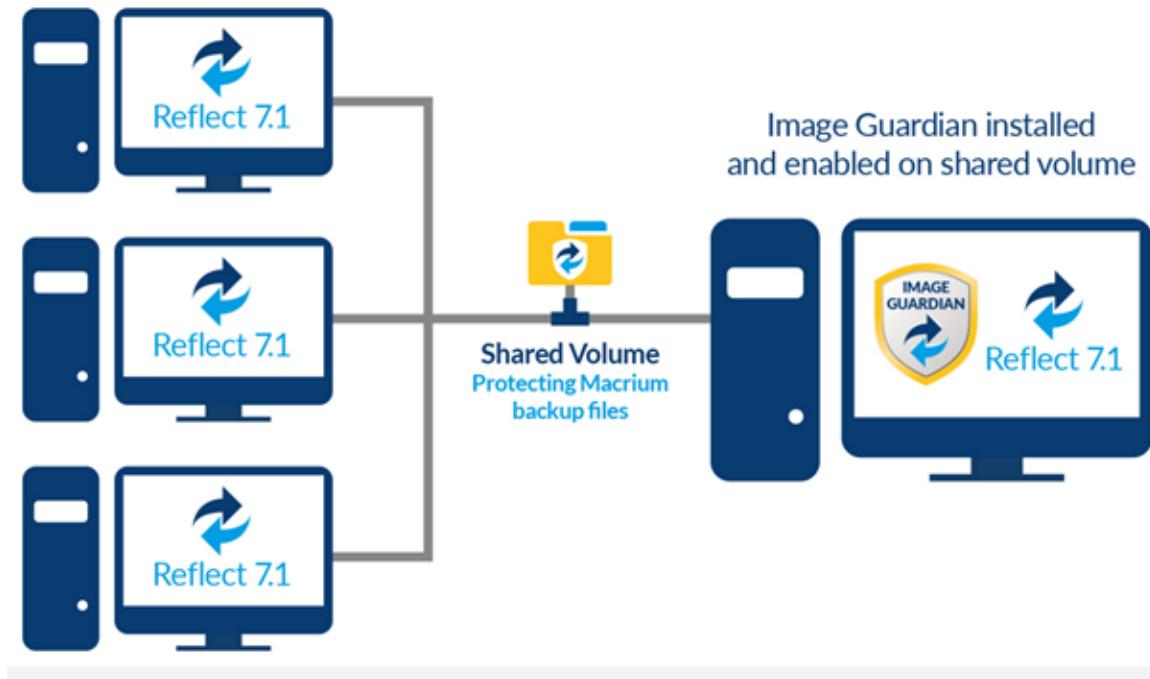
MIG protects local **NTFS** volumes and allows Macrium Reflect 7.1 and later to use the protected volume as a shared network resource.

Macrium Image Guardian protection architecture



Macrium Image Guardian protecting backups in a networked environment

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In the above illustration, the PC sharing the backup repository (Shared Volume) has a full install of Macrium Reflect, including **MIG**. A local drive is shared over the network and **MIG** has been enabled on that drive in the Macrium Reflect user interface.

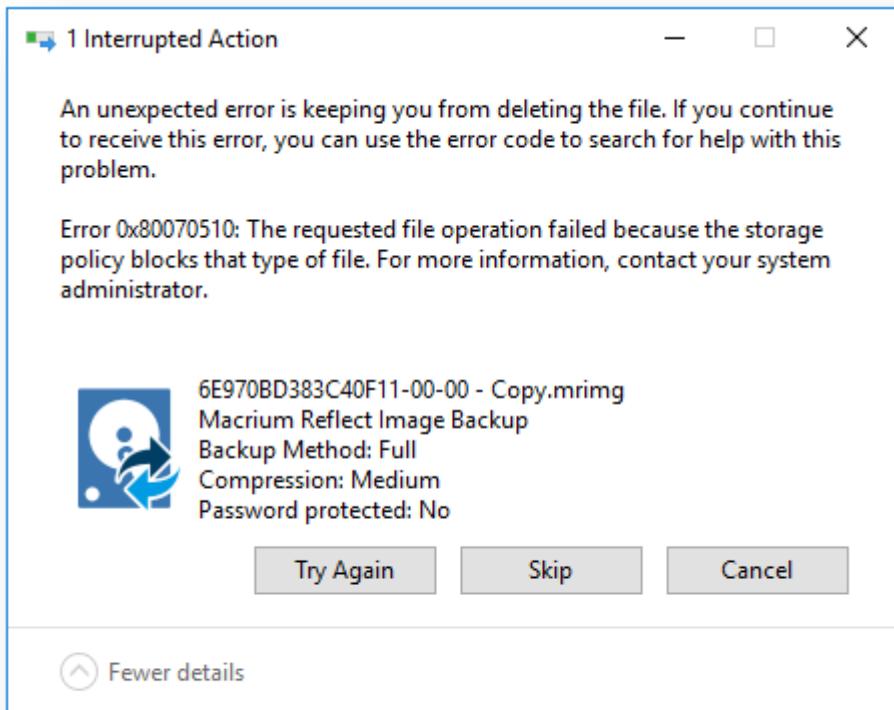
The other PC's on the network can backup to this shared drive and **do not** require MIG to be installed. Backup file write access is automatically granted to Macrium Reflect 7.1, and later, write access for earlier versions of Macrium Reflect and other processes will fail.

The PC hosting the share with **MIG** installed can be used as a standalone Macrium Reflect installation. The protected drive will prevent unauthorised access to backup files on that drive if the local PC creates backups to the protected volume.

Protected File Access

Macrium Image Guardian will protect all existing local backup files from unauthorised modification or deletion. All such activity will be blocked with **error 0x80070510 - Storage policy block**.

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Protected File Types

The following file extensions are protected by Macrium Image Guardian.

Extension	Backup Type
.mrimg	Macrium Reflect image files
.mrbak	Macrium Reflect File and Folder backup files
.mrrex	Macrium Reflect Exchange backup files
.mrsql	*Macrium reflect SQL backup files



***Note:** SQL backup files can only be created to a protect volume by Macrium Reflect running on the **local PC**. Network write access will be blocked for all processes, including Macrium Reflect. This limitation will be removed in a future update.

Windows File operations on Macrium Backup files

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Macrium Image Guardian will block opening of backup files for modification or delete. The following lists some of the operations and special considerations if you are maintaining the location and life of Macrium backup files outside of Macrium Reflect.

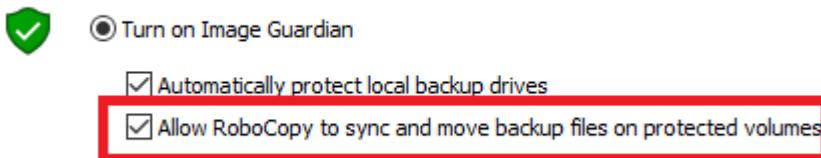
1. **Windows Explorer Copy.** New backup files can be created on a protected volume as the result of a **Windows Explorer** copy operation.

Copying a file to the same folder as the original will be blocked on local file systems. Duplicate files in the same folder is undesirable and should be avoided. The identity of the backup file will be duplicated and this can lead to unpredictable results in Macrium Reflect.

2. **DOS Commands. COPY, MOVE, and XCOPY.** These commands will succeed where the result of the operation is a new file. Overwriting or deleting existing backup files files will fail.
3. **RoboCopy.** RoboCopy.exe can copy, move and synchronise folders. For more information on RoboCopy parameters please see here: [https://technet.microsoft.com/en-us/library/cc733145\(v=ws.11\).aspx](https://technet.microsoft.com/en-us/library/cc733145(v=ws.11).aspx)

Some RoboCopy parameters may perform delete file and overwrite operatons on your backup files and have special functionality in MIG if the '**Allow RoboCopy to sync and move backup files on protected volumes**' option is enabled:

Image Guardian Settings



Parameter	Rule
/MOVE /MOV	If the source folder is on a protected volume then the /MOVE /MOV parameters will only delete backup files in the source folder if the destination folder is also on a protected volume . This ensures that existing files cannot be moved to an unprotected volume and compromised.
/MIR /PURGE	If the target folder is on a protected volume then the the /MIR /PURGE parameters will only delete backup files in the target folder if both of the following conditions are true: <ol style="list-style-type: none">a. The source folder is a backup destination in any saved backup definition xml file.b. The target folder is not a backup destination in any saved backup defintion xml file This ensures that the synchronisation operation cannot inadvertently, or otherwise, delete files in a folder that is used as a backup destination in Macrium Reflect.

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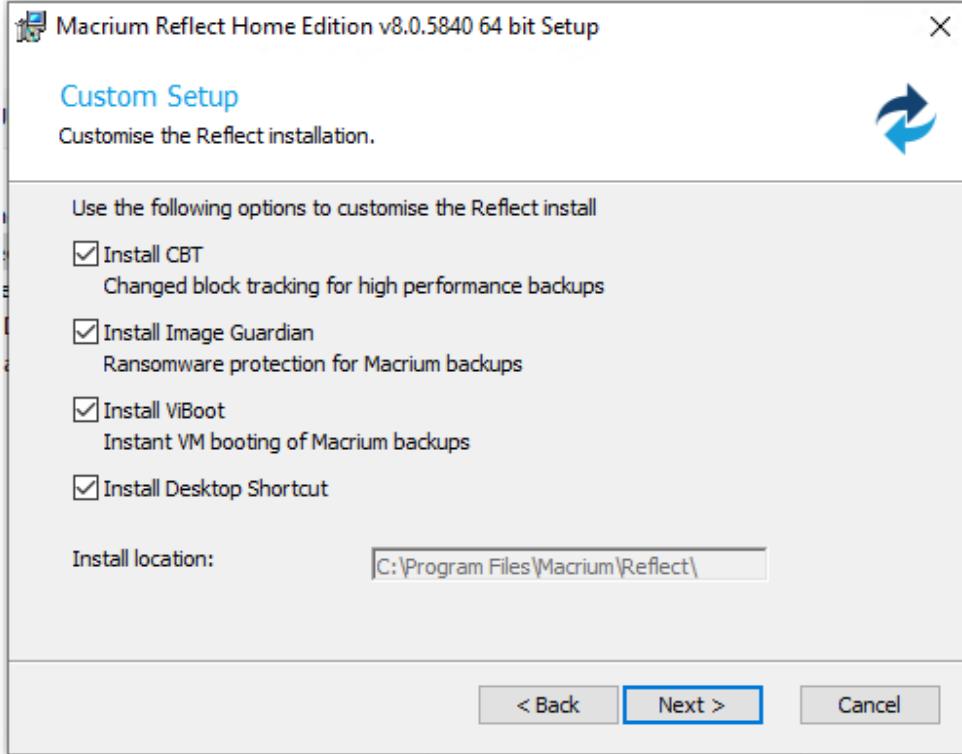
Parameter	Rule
All overwrite operations	If the result of any parameter is to overwrite an existing backup file on a protected volume then this will only be allowed if the target folder is not a backup destination in any saved backup definition xml file.

ⓘ RoboCopy and Network Shares

If the **source of a /MOVE /MOV or target of a /MIR /PURGE operation** is a **MIG protected volume on a network share** then all delete operations are **blocked**. This is because RoboCopy 'Rules' can only be applied if the Windows session that's opening the files is the same Windows session that's running RoboCopy. In the case of a network share, the remote computer is opening the files and will block all delete operations.

Installing Macrium Image Guardian

MIG is an optional component in the Macrium Reflect installer. It is selected by default and is available for Windows 7 and above in all editions of Macrium Reflect except for the Free Edition.



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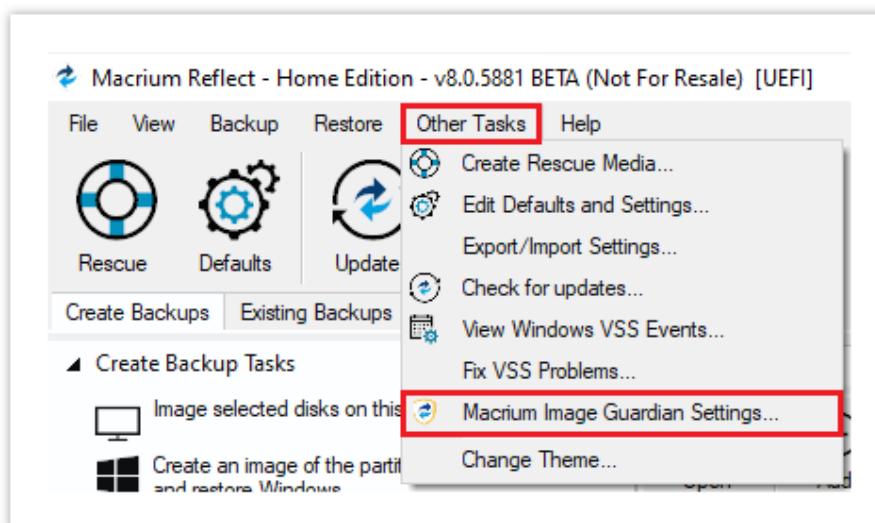
After installation, if **MIG has automatically protected any local back drives for existing backup definitions** then the following message box is displayed the first time Macrium Reflect is started:



Activating Macrium Image Guardian

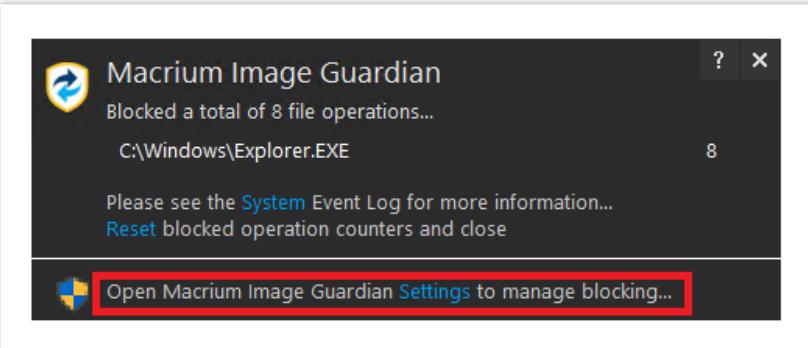
MIG is active directly after installation and will automatically protect backup destination drives.

To turn MIG on, off, or temporarily disable take the **Other Tasks** menu, then select the **Macrium Image Guardian Settings...** menu option.

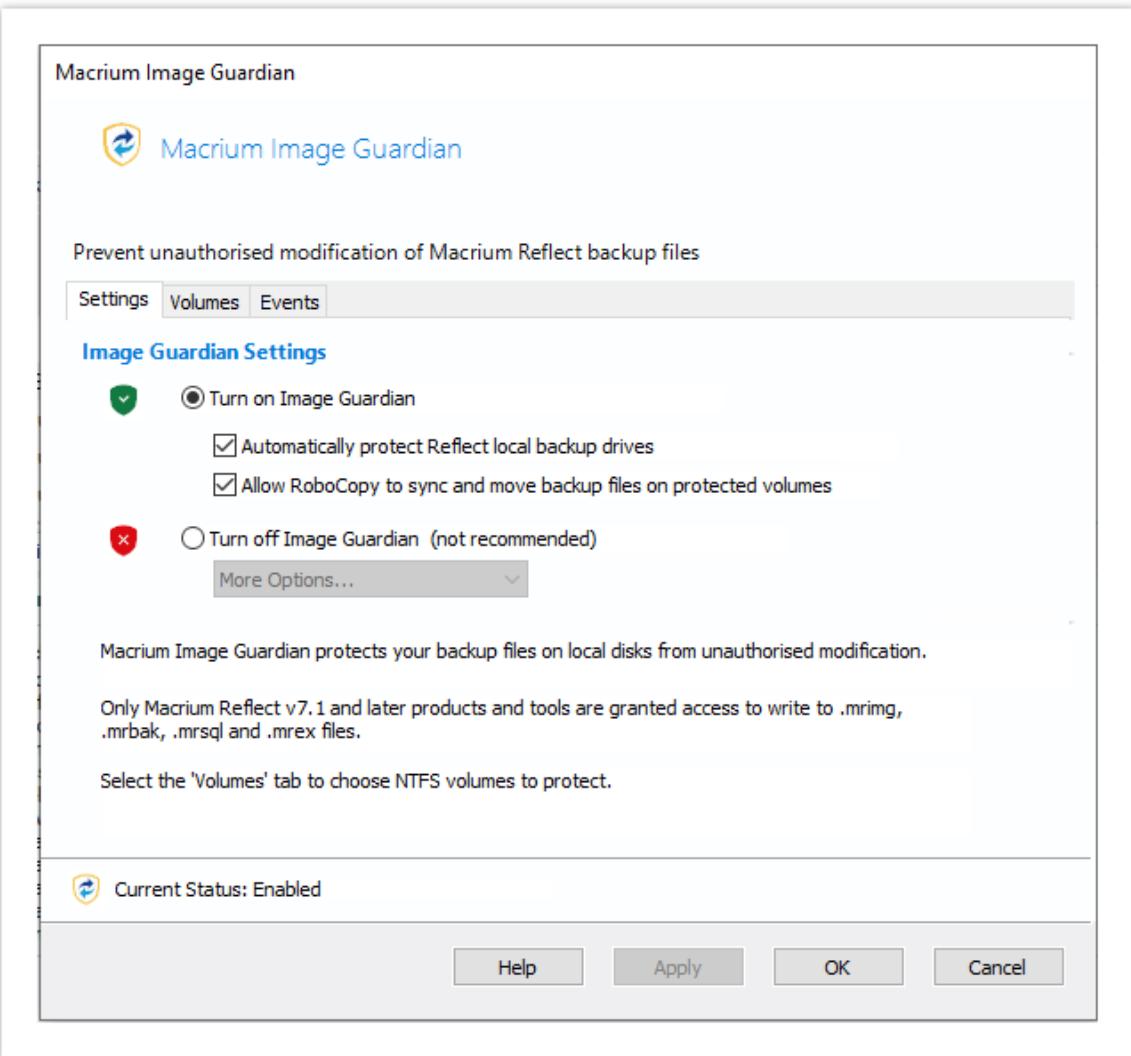


You can also activate the MIG Settings dialog by clicking **Settings** in the MIG blocked activity popup.

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The MIG Settings dialog



Turn on Image Guardian	Starts the Image Guardian Service
-------------------------------	-----------------------------------

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Automatically protect local backup drives	<p>When turned on, all saved backup definitions are searched and Image Guardian is enabled for local backup drives</p> <p>When creating a new backup, unprotected target drives will be automatically protected by enabling Image Guardian on the drive.</p> <p>When the PC is restarted, Image Guardian will be re-enabled on all backup drives. This prevents accidentally leaving your drives unprotected by manually turning protection off.</p>				
Allow RoboCopy to sync and move backup files on protected volumes	<p>Enables the MS utility RoboCopy to delete and overwrite backup files on protected volumes with the /MOV, /MOVE, /PURGE and /MIR parameters.</p> <table border="1" data-bbox="389 640 1413 988"> <thead> <tr> <th data-bbox="389 640 531 707">Parameter</th><th data-bbox="531 640 1413 707">Rule</th></tr> </thead> <tbody> <tr> <td data-bbox="389 707 531 988">/MOVE /MOV</td><td data-bbox="531 707 1413 988"> <p>If the source folder is on a protected volume then the /MOVE /MOV parameters will only delete backup files in the source folder if the destination folder is also on a protected volume.</p> <p>This ensures that existing files cannot be moved to an unprotected volume and compromised.</p> </td></tr> </tbody> </table>	Parameter	Rule	/MOVE /MOV	<p>If the source folder is on a protected volume then the /MOVE /MOV parameters will only delete backup files in the source folder if the destination folder is also on a protected volume.</p> <p>This ensures that existing files cannot be moved to an unprotected volume and compromised.</p>
Parameter	Rule				
/MOVE /MOV	<p>If the source folder is on a protected volume then the /MOVE /MOV parameters will only delete backup files in the source folder if the destination folder is also on a protected volume.</p> <p>This ensures that existing files cannot be moved to an unprotected volume and compromised.</p>				
	<p>/MIR /PURGE</p> <p>If the target folder is on a protected volume then the the /MIR /PURGE parameters will only delete backup files in the target folder if both of the following conditions are true:</p> <ol style="list-style-type: none"> <li data-bbox="595 1179 1405 1246">1. The source folder is a backup destination in any saved backup definition xml file. <li data-bbox="595 1268 1341 1336">2. The target folder is not a backup destination in any saved backup defintion xml file <p>This ensures that the synchronisation operation cannot inadvertently, or otherwise, delete files in a folder that is used as a backup destination in Macrium Reflect.</p>				
All overwrite operations	<p>If the result of any parameter is to overwrite an existing backup file on a protected volume then this will only be allowed if the target folder is not a backup destination in any saved backup definition xml file.</p>				
	<p>i RoboCopy and Network Shares</p> <p>If the source of a /MOVE /MOV or target of a /MIR /PURGE operation is a MIG protected volume on a network share then all delete operations are blocked. This is because RoboCopy 'Rules' can only be applied if the Windows session that's opening the files is the same Windows session that's running RoboCopy. In the case of a network share, the remote computer is opening the files and will block all delete operations.</p>				

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Turn off Image Guardian	Turns off the Image Guardian service. Optionally select from the list of further options:	
	1 Minute to 2 Hours	Select to temporarily disable MIG for the selected time
	Restart service on reboot	MIG will remain 'Off' until the next Windows reboot.



Note: Clicking 'Apply' will immediately change MIG and update the status text.:

The **status area** above the buttons shows the current status of MIG.



Current Status: Enabled



Current Status: Disabled



Current Status: Disabled Until Reboot



Current Status: Temporarily Disabled

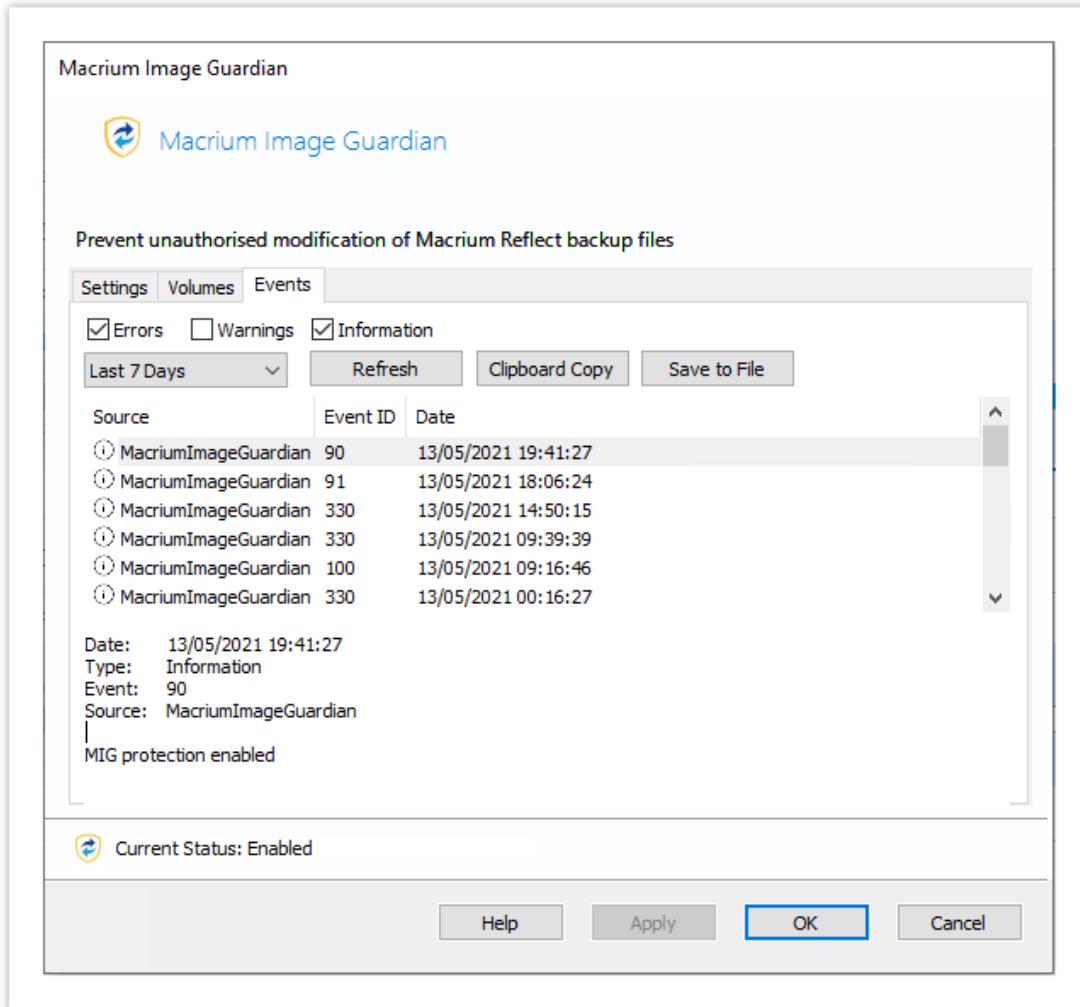
MIG is disabled for: 04:28

Re-Enable

Clicking 'Re-Enable' will immediately cancel the outstanding temporary disable and **turn MIG 'On'**.

Macrium Image Guardian Events

To view Image Guardian windows events, take the **Other Tasks** menu, then select **Macrium Image Guardian Settings...** menu option and **select the Events tab:**



Number	Event Name	Severity	Description
100	EVT_MIG_SERVICE_STARTED	Informational	Image Guardian service started
110	EVT_MIG_DRIVER_STARTED_BY_SERVICE	Informational	Image Guardian driver started by service
200	EVT_MIG_SERVICE_STOPPED	Informational	Image Guardian service stopped
300	EVT_MIG_VOLUME_PROTECTED	Informational	

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Number	Event Name	Severity	Description
			Volume (\?\Volume{6a2d53fe-c79a-11e1-b189-806e6f6e6963}\) is protected
310	EVT_MIG_BLOCK_VERIFICATION_FILE_ACCESS	Informational	Blocking process (processname.exe) creating verification file as the process is not Macrium certified
320	EVT_MIG_BLOCKED_FILE_ACCESS	Warning	Blocked unauthorised process (processname.exe) accessing file (\?\Volume{6a2d53fe-c79a-11e1-b189-806e6f6e6963}\Folder\filename.mrimg)
330	EVT_MIG_USER_PROTECTED_VOLUME	Informational	User has enabled Image Guardian on volume (\?\Volume{6a2d53fe-c79a-11e1-b189-806e6f6e6963}\)
340	EVT_MIG_USER_DISABLED_VOLUME	Informational	User has disabled Image Guardian on volume (\?\Volume{6a2d53fe-c79a-11e1-b189-806e6f6e6963}\)
500	EVT_MIG_ERROR_BAD_EVENT	Error	Error could not open Image Guardian verification event. Error code = 123
510	EVT_MIG_ERROR_PROTECTING_VOLUME	Error	Error protecting volume (\?\Volume{6a2d53fe-c79a-11e1-b189-806e6f6e6963}\). Error code = 123
520	EVT_MIG_ERROR_UNPROTECTING_VOLUME	Error	Error unprotecting volume (\?\Volume{6a2d53fe-c79a-11e1-b189-806e6f6e6963}\). Error code = 123

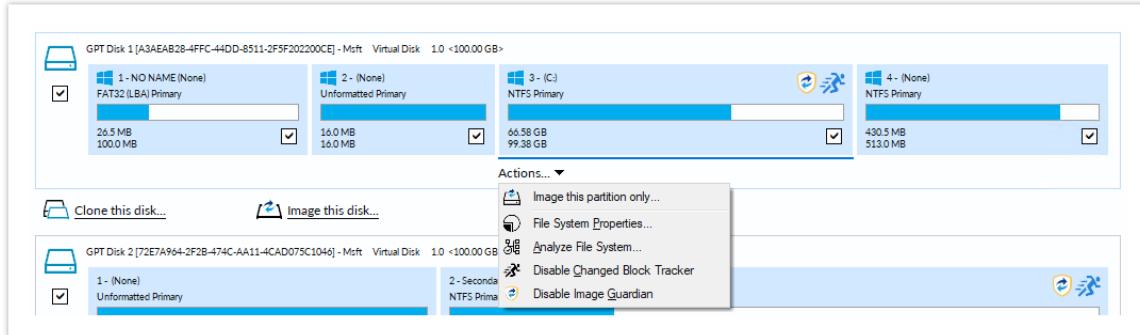


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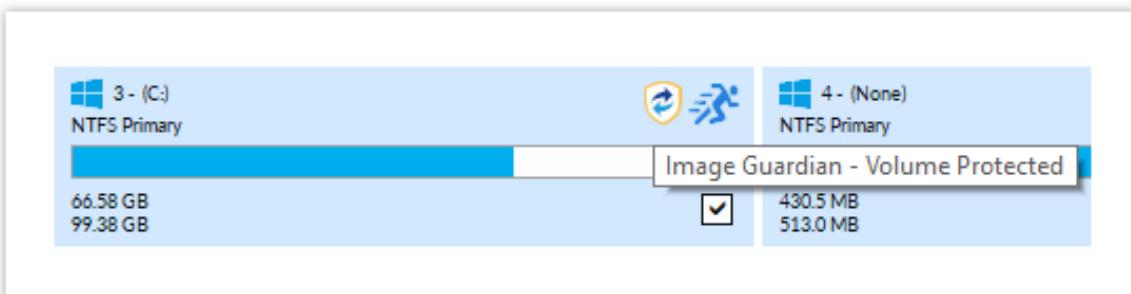
When an unauthorized process attempts to write to, delete, or rename a Macrium backup file the action will be blocked and Windows Event 320 will be generated

Enabling and Disabling MIG on NTFS Volumes

MIG can be enabled or disabled on any **NTFS volume** by using the **Actions** menu in the Macrium Reflect main window.



A **MIG** shield indicates that a volume is protected:



ⓘ Automatic Protection

Please note that if the option to '**Automatically protect local backup drives**' is selected in the MIG settings dialog, then **unprotected volumes** will be **automatically protected** when the next backup runs to the volume, or on reboot, if the volume contains the path of a backup destination saved in a backup definition.

Why MIG isn't available for 3rd party NAS devices

A frequent question asked about **Macrium Image Guardian** is why popular NAS devices aren't supported. This is an obvious question but misses a fundamental understanding of how network storage works.

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Unlike Windows shares, NAS devices have their own proprietary operating systems. Each NAS device is effectively a computer with its own file system and sharing control software. It isn't possible to control the way files are stored on NAS devices without installing a low level device driver specialised for each different NAS OS, usually Linux based. This also assumes that the NAS manufacturer has allowed 3rd party suppliers access to install file system drivers. It's a similar scenario to installing popular Anti-Virus software directly on a NAS, it isn't possible.

With that said, we are open to working with NAS manufacturers, and should a method of complementing a NAS file system be possible, we will certainly be involved.

Macrium Changed Block Tracker

Macrium Reflect Changed Block Tracker (MRCBT) reduces the amount of time it takes to perform incremental and differential images by monitoring the changes to an NTFS formatted volume in real-time. This is especially relevant when a file system contains very large files, such as virtual hard disk (VHD) files, where speed improvements are significant and can reduce the Incremental image time from hours to minutes or even seconds.

Implemented as a kernel mode filter driver, sitting below the NTFS file system driver, MRCBT is able to intercept all I/O requests to the logical volume and maintain a record of which blocks have changed.

Traditionally, Macrium Reflect has detected changes to the file system by comparing the NTFS Master File Table (MFT) on the source volume, with the MFT of the most recent image in the backup set. While this method is one of the quickest solutions available, we do not consider it an optimal solution when used in a continuous incremental scenario, especially if multi-GB files are present in the file system.

In addition to numerous performance improvements, starting with version 7.2, MRCBT tracks TRIM events. These events are generated by NTFS when a file is deleted or moved and are used by MRCBT to optimize the image by excluding the relevant blocks from the backup.

When MRCBT is first enabled, it captures an internal NTFS attribute that represents the number of times that the file system has been restarted. By tracking changes to this value, MRCBT can detect if a volume has been modified in any environment where MRCBT is not operating (e.g. on another computer or operating system).

When MRCBT is enabled and Reflect detects that the Restart attribute correctly sequenced, the subsequent incremental and differential image can be generated by comparing the changed block database (created by MRCBT) on the logical volume with that stored in the previous image in the chain. This is indicated by a blue running-man icon displayed in the Reflect UI (see image below).

If Reflect detects that the Restart attribute is not correctly sequenced, the subsequent incremental or differential image will be generated using the traditional method. This is indicated by a grey running-man icon displayed in the Reflect UI.



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A reboot is required after installing Macrium Reflect to enable CBT. You can create images without rebooting but CBT will only be enabled after a restart.

The NTFS Restart attribute is a fundamental component of the NTFS file-system and has been supported by all Linux and Apple operating systems dating back several years.

Due to technical limitations with Windows XP, Macrium Reflect Changed Block Tracker will only work on Windows Vista and higher operating systems.

When MRCBT is being used to generate an Incremental or Differential image of the volume, you will see the following line in the Image log:

Operation 1 of 1

Hard Disk:	1
Drive Letter:	C
File System:	NTFS
Label:	
Size:	475.91 GB
Free:	163.94 GB
Used:	311.98 GB

Starting Image - Saturday, February 18, 2017 13:58:34

Initializing
Destination Drive: Macrium Drive (G:) - Free Space 250.54 GB
Creating Volume Snapshot - Please Wait

Volume Snapshots Created

Saving Partition - (C:)

Reading File System Bitmap
CBT Init Success

Searching for NTFS meta data

Looking for changes
Saving Partition

Saving Index
New File: 2 GB 8133288622FA0FE0-15-15.mrimg

Image Completed Successfully in 00:02:34

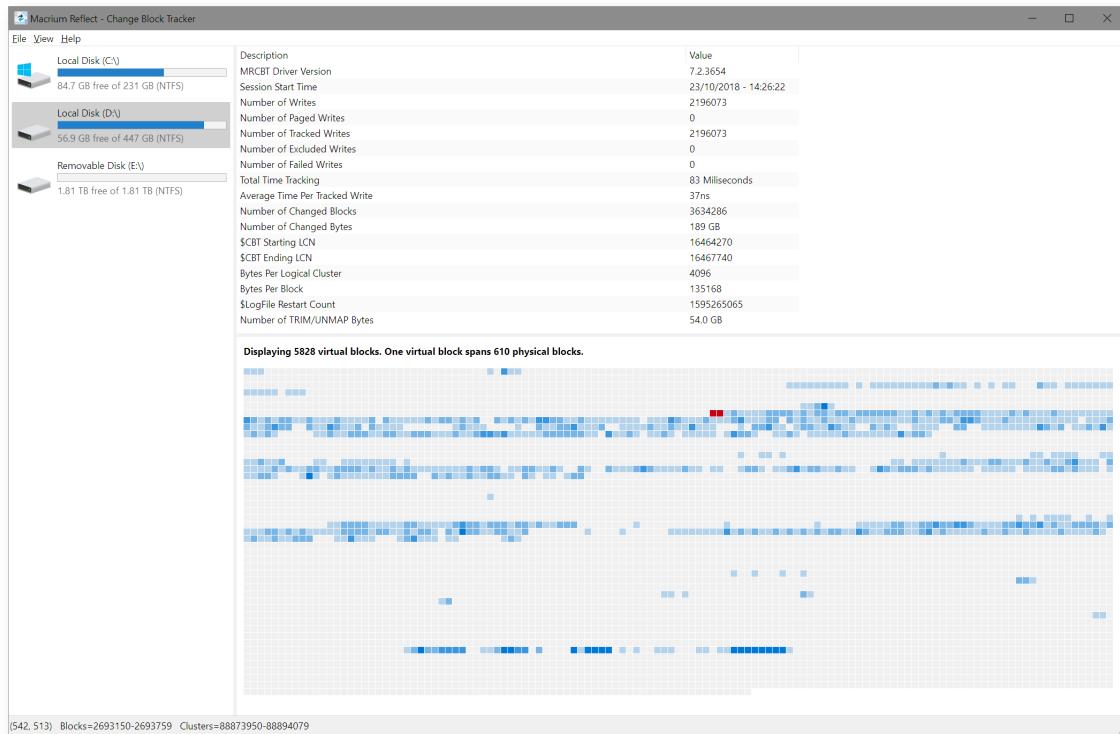
I/O Performance: Read 71.2 MB/s - Write 264.9 MB/s

CBT Init Success indicates that the Incremental is using the CBT driver. Note that the '**'Looking For Changes'** operation will be nearly instantaneous with no progress shown.

Macrium CBT Driver Tools

Macrium CBT Driver Tools is a small Windows utility to install and monitor the Macrium CBT driver. Macrium CBT Driver Tools provides the user with a visual representation of the changed blocks and of the various performance metrics reported by the kernel mode driver. **Macrium Driver Tools** can be found here: C:\Program Files\Macrium\Reflect\MrCBTTools.exe

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Selecting a drive shows performance metrics and tracked block information for the chosen drive. The darker shades indicate a higher percentage of changed blocks.

Note: The red blocks indicate the physical location of the MRCBT tracking file on the volume. This view will be reset when a Macrium Reflect backup of the volume is started.

Clicking on one of the shaded blocks will cause Macrium Driver Tools to display a list of files that are currently using the clusters within the block.

Performance Metrics

Metric Name	Description
Session Start Time	The date and time that MRCBT started monitoring the volume. This value will be reset when the volume is mounted, normally when Windows is restarted.
Number of Writes	The total number of write operations on the volume that MRCBT has monitored since the session started.
Number of Paged Writes	The total number of write operations on the volume, flagged as PAGING_IO, that MRCBT has monitored since the session started.
Number of Tracked Writes	The total number of write operations on the volume that MRCBT has tracked since the session started.

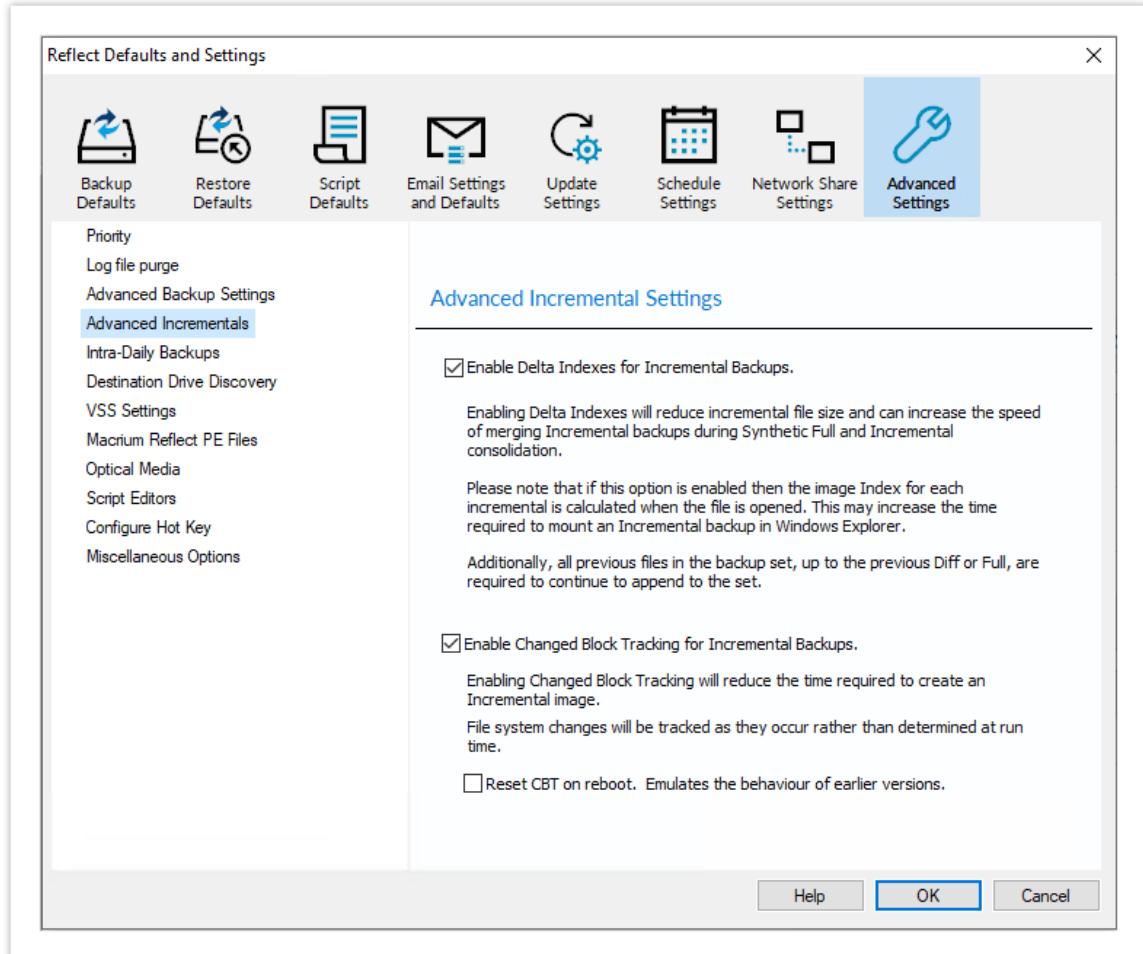
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Number of Excluded Writes	The total number of write operations on the volume that MRCBT has excluded, due to already having a record of a change to that disk area, since the session started.
Number of Failed Writes	The total number of write operations on the volume that MRCBT has failed to track since the session started. NOTE: If this value is anything other than zero, Macrium Reflect will fall back to the normal method of generating an incremental backup.
Time Tracking	The total length of time that MRCBT has taken to track writes on the volume since the session started.
Average Time Per Tracked Write	The average length of time that MRCBT is taking to track each write operation on the volume since the session started.
Number of Changed Blocks	The total number of changed blocks on the volume since the session started.
Number of Changed Bytes	The total number of changed bytes on the volume since the session started.
\$CBT Starting LCN	The first Logical Cluster Number (LCN) of the MRCBT tracking file.
\$CBT Ending LCN	The last Logical Cluster Number (LCN) of the MRCBT tracking file.
Bytes Per Logical Cluster	The number of bytes per logical cluster for the volume, as reported by NTFS.
Bytes Per Block	The number of bytes per block, as reported by Macrium Reflect.
\$LogFile Restart Count	The current value of the NTFS \$LogFile Restart Count.
Number of TRIM /UNMAP Bytes	The number of bytes that have been affected by a TRIM or UNMAP event.

Enabling and disabling CBT

CBT is enabled by default. You can change whether CBT is enabled or disabled by selecting the **Enable Changed Block Tracking for Incremental Backups** check-box in the **Advanced Increments** page of the **Reflect Defaults and settings**.

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Note: You can enable or disable CBT at any time without affecting your Image sets.

We recommend enabling the Delta Indexes for Incremental Backups option as this will produce the smallest incremental image files in the shortest amount of time. Please see [Delta Indexes for Incremental Backups](#)

Macrium viBoot

Macrium viBoot

Macrium viBoot enables you, to instantly create, start and manage **Microsoft Hyper-V** and **VirtualBox** virtual machines using one or more Macrium Reflect image files as the basis of the virtual machine storage sub-system.

At a minimum, viBoot enables you to boot into the images you have made using Macrium Reflect, for validation purposes, or to retrieve data from old applications stored on a bootable image. At an enterprise level, you could recover an entire network environment in minutes.

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Macrium viBoot is now built upon new technology that allows it to instantly present a Macrium Reflect image file as a Microsoft Virtual Disk (.VHDX) or VirtualBox/VMWare (.vmdk) file. The type of virtual machine to create is automatically detected by viBoot based on the virtualization software installed on the host.

When creating a new Hyper-V or VirtualBox virtual machine, Macrium viBoot will create two Microsoft Virtual Hard Disk (.VHDX) or VirtualBox (.VMDK) files respectively for each of the disks described within the selected Macrium Image file. The first VHDX/VMDK file is incomplete and only contains enough information to describe the disk layout and a signature to mark it as a Macrium viBoot VHDX/VMDK. The data for the disk is retrieved from the Macrium Image File by the Macrium Virtual Disk Provider filter driver as required. Because the data is not stored with the VHDX/VMDK, its size will never exceed a few megabytes. The second VHDX/VMDK file is a standard differencing disk that will receive any modifications made to it during the lifetime of the virtual machine.

As with any differencing difference file (VHDX or VMDK), this file can grow dramatically in size, depending on the usage of the virtual machine.

These disk files (VHDX or VMDK) are stored in the designated Macrium viBoot repository and remain open until the Macrium viBoot virtual machine is deleted from within viBoot.



Note: The default location for the viBoot Microsoft Hyper-V VHDX files is **C:\ProgramData\Macrium\viBoot**. This is configurable from within the Macrium viBoot UI.
Both VHDX and VMDK files related to VirtualBox VMs are stored under **C:\ProgramData\Macrium\viBoot\VirtualBox**



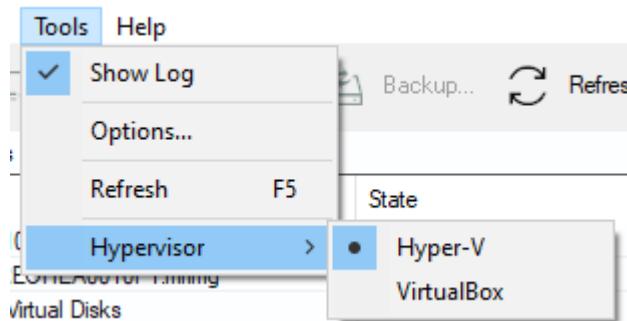
Note: viBoot only supports **Microsoft's Hyper-V** and **VirtualBox** running on a **minimum of Windows 8.0 or Windows Server 2012**.

Switching between Hyper-V and VirtualBox

viBoot can be switched between **Hyper-V** and **VirtualBox** mode using the 'Tools' menu:

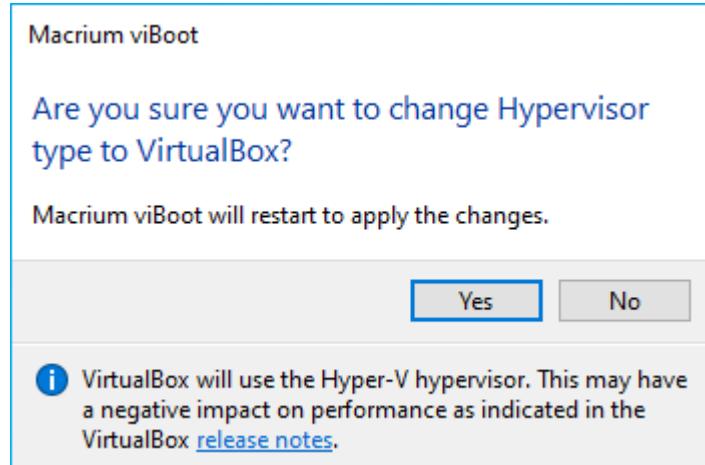
Note: **VirtualBox less than v6.1.4** cannot be run on Windows where Microsoft Hyper-V service is running.

Microsoft Hyper-V feature must be disabled for **VirtualBox 6.0.xx** to function. Please run "bcdedit / set hypervisorlaunchtype off" after disabling Hyper-V feature from "Turn Windows features on or off"



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Macrium viBoot will be restarted after changing Hypervisor mode. This doesn't affect the state of existing VMs, whether they are running or not:



Performance Warning

If **VirtualBox v6.1.4** (or later) is **installed alongside Microsoft Hyper-V**, **VMs will not run with optimum performance**.

See the [VirtualBox Change Log](#) for more information on this.

The current hypervisor type is shown in the application title bar:



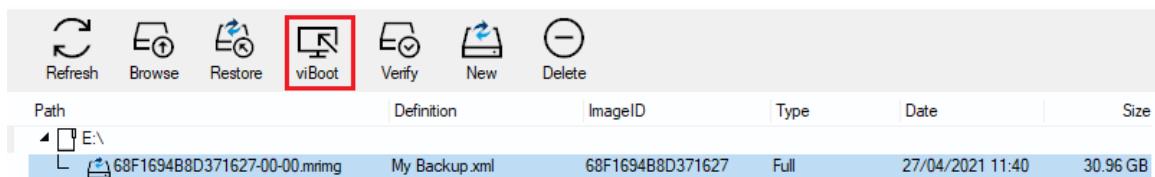
Booting an image directly from Macrium Reflect

An image that contains the Windows System and Boot partition(s) can be directly booted from the 'Restore' view in Macrium Reflect.

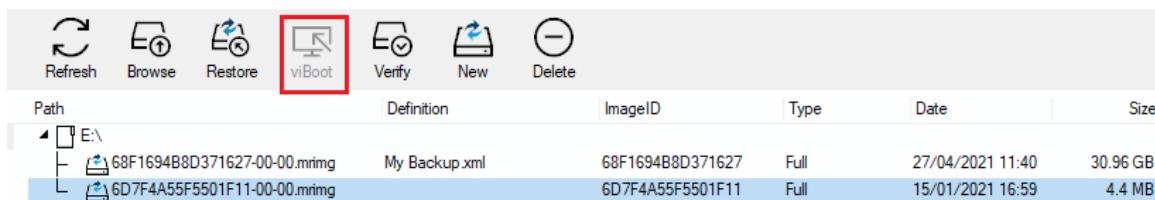
Boot architecture	Partitions
MBR - Master Boot Record	Boot partition: This may be the same partition as drive 'C:' but is likely to be a separate small (100 to 300 MB) partition named the Microsoft System Reserved partition or MSR. Windows partition: This is the partition that contains the Windows OS and will be drive C:
UEFI - Unified Extensible Firmware Interface	UEFI System Partition: A small FAT32 formatted partition that doesn't have a drive letter. Windows partition: This is the partition that contains the Windows OS and will be drive C:

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If an image contains the partitions required for booting then the image will show an active 'viBoot' icon:



Otherwise the icon will be disabled:



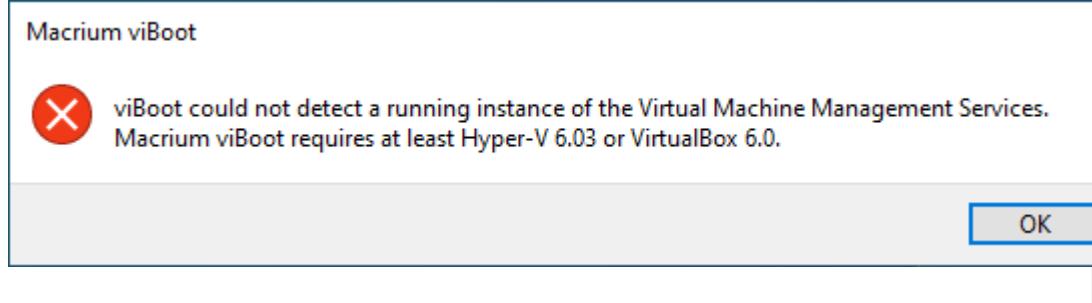
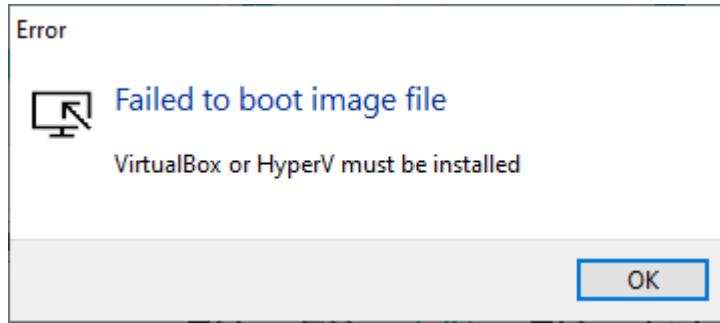
To boot an image directly with viBoot.

1. Click the '**Existing Backups**' tab.
2. **Select** the bootable image.
3. **Click the 'viBoot'** icon.

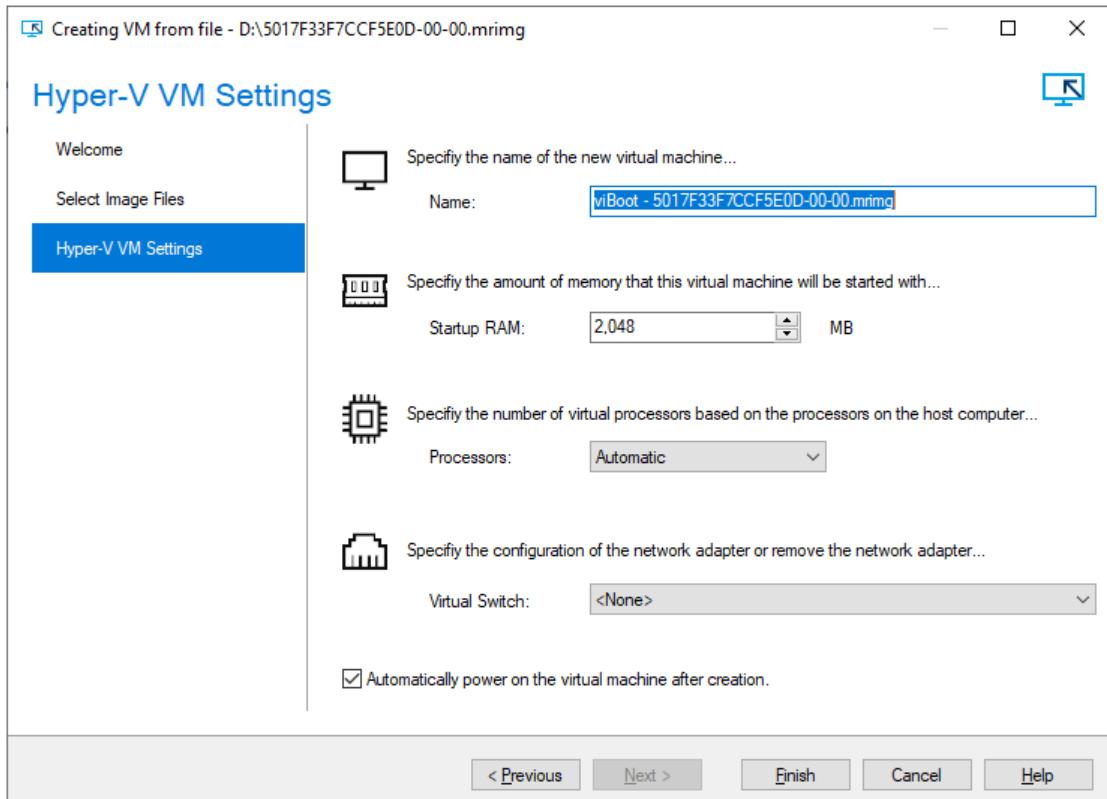


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Note: If viBoot cannot run on your Windows installation then you will receive an error message indicating the reason(s):



4. If viBoot can launch, the viBoot **Hyper-V/VirtualBox** settings dialog will start.



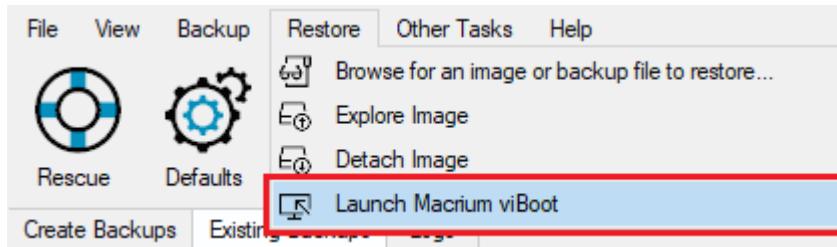
5. Make any changes to the VM properties and **click 'Finish'**

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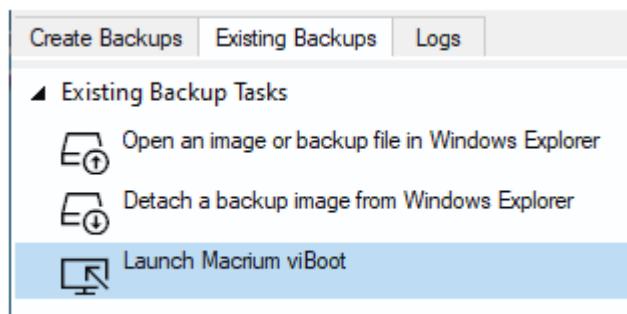
The VM will now start and boot directly into Windows.

Starting the viBoot create Virtual Machine Wizard from Macrium Reflect.

Take the '**Restore**' > '**Launch Macrium viBoot**' menu option



Or, click the '**Launch Macrium viBoot**' task link on the **Existing Backups** tab.

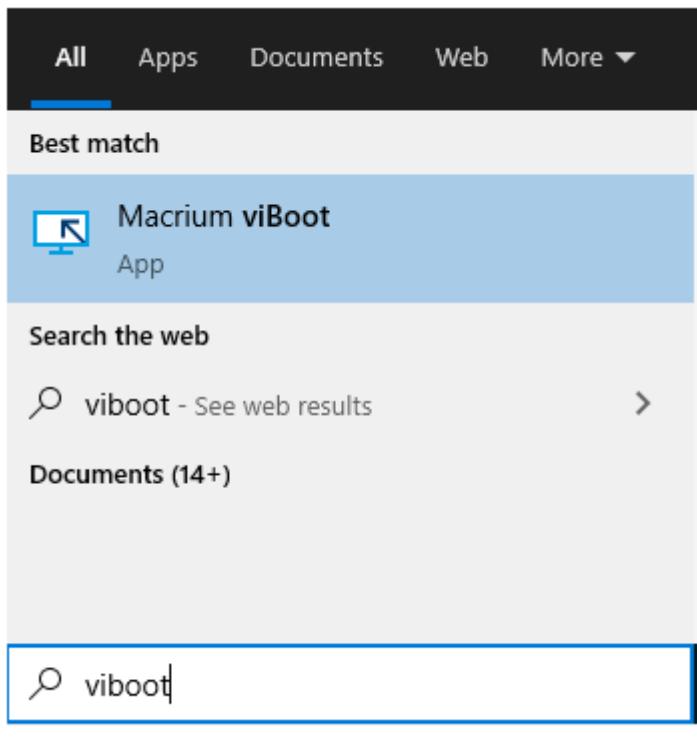


This will start the viBoot Virtual Machine User Interface.

Launching viBoot as a standalone application

viBoot is installed by default during the standard Macrium Reflect installation and can be started using the installed shortcut:

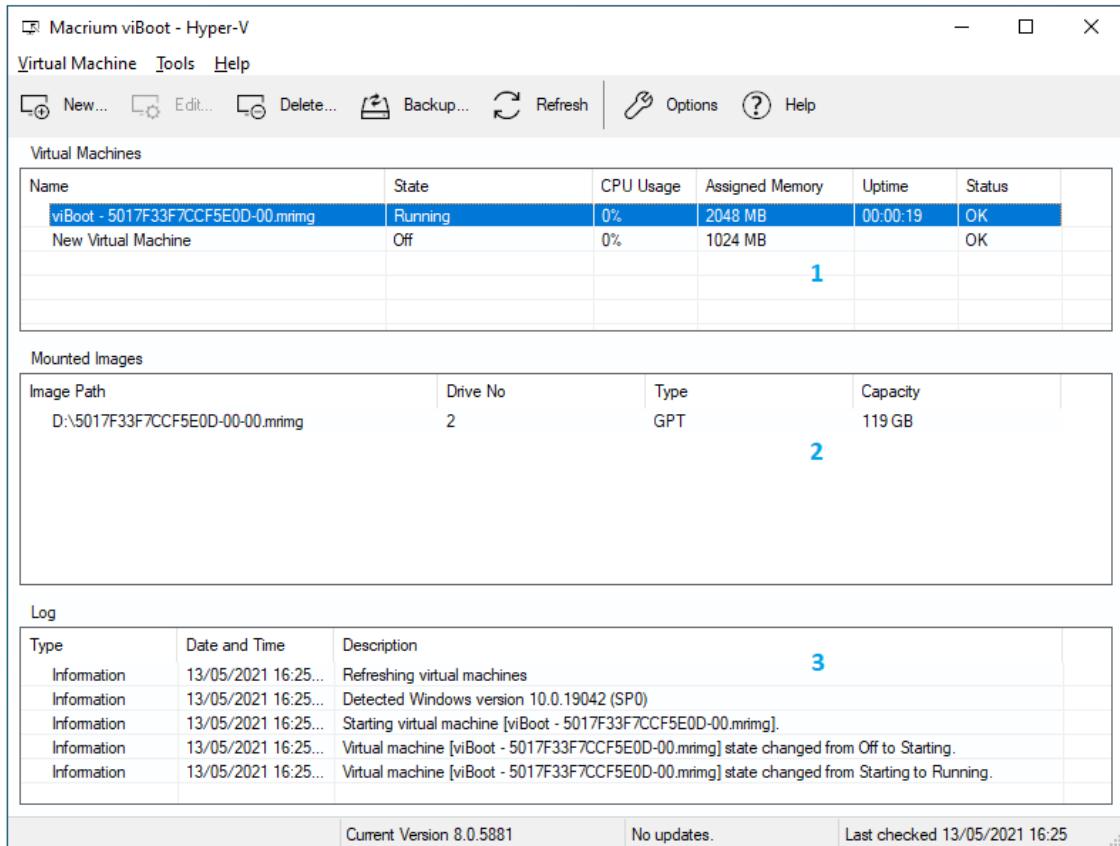
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Main Window

The Macrium viBoot main window allows you to see at a glance, which Macrium Reflect image files you have mounted (2), and which virtual machines are connected to those drives (1).

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The “Virtual Machines” view (1), displays the name of the viBoot created virtual machine, the current state of the virtual machine (Off, Running, etc) and the current CPU usage of the virtual machine. Selecting a Hyper-V virtual machine in the “Virtual Machines” view (1) will update the “Mounted Images” view (2) to list the Macrium Reflect images that are being referenced by the virtual machine.

The “Mounted Images” view (2), displays the path of the image file(s) used to create the virtual drive(s), the physical drive number assigned to the drive by Windows, the partition type of the drive (MBR or GPT) and the drive capacity.

The "Log" view (3), shows a record of the actions taken by viBoot.

Macrium viBoot can only monitor the state of virtual machines and drives while it is running. Clicking the Windows close button will close viBoot.

Main Window Commands

Macrium viBoot menu:

Menu Item	Sub Menu Item	Description
Virtual Machine	Connect	Connect to a virtual machine.

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Menu Item	Sub Menu Item	Description
	<u>Backup...</u>	Backup a powered off virtual machine.
	<u>New...</u>	Displays the viBoot Wizard which allows you to create a new virtual machine.
	<u>Edit...</u>	Allows you to modify existing virtual machine settings such as adding additional memory into the VM.
	<u>Delete...</u>	Deletes the currently selected virtual machine and allows you to backup any changes to the data that have been made.
	<u>Start</u>	Starts the currently selected virtual machine.
	<u>Shut down</u>	Shuts down the currently selected virtual machine.
	<u>Turn off</u>	Turns off the currently selected virtual machine.
	<u>Pause</u>	Pauses the currently selected virtual machine.
	<u>Reset</u>	Resets the currently selected virtual machine.
	<u>Exit</u>	Exit the Macrium viBoot application.
Tools	Show Log	Toggles the display of the Log window.
	<u>Options...</u>	Configure the virtual machine repository folder, and logging options.
	<u>Refresh</u>	Instructs viBoot to refresh it's view of the virtual machines and mounted images.
	Hypervisor	Allows you to choose between Hyper-V or VirtualBox Hypervisor when both are available.
Help	<u>Contents...</u>	Displays this help content.
	<u>About Macrium viBoot...</u>	Displays the viBoot version and copyright notice.

Tip

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You can right-click on the virtual machine pane to display the "Virtual Machine" menu as a context menu.

Macrium viBoot toolbar:

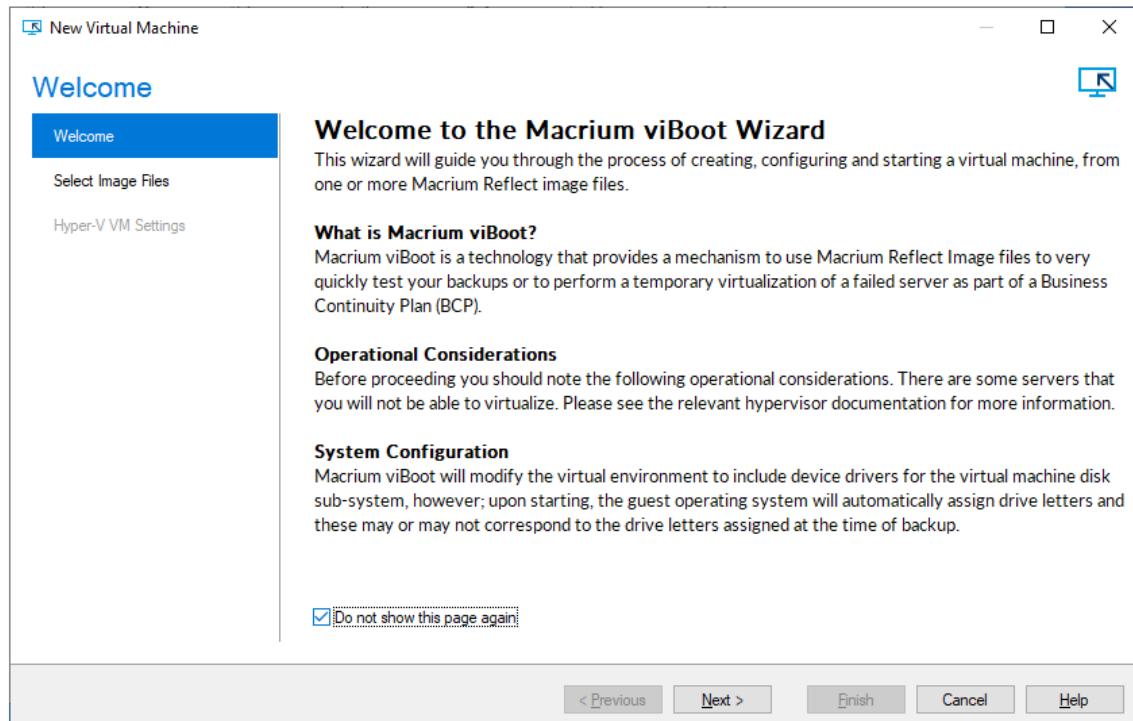
	New - Displays the viBoot Wizard which allows you to create a new virtual machine.
	Edit - Displays the viBoot Wizard which allows you to modify existing virtual machine settings.
	Deletes the currently selected virtual machine and allows you to backup any changes to the data that have been made.
	Backup a powered off virtual machine.
	Refresh the list virtual machines and states.
	Options - Configure the virtual machine repository folder, and logging options.
	Help - Displays this help content.

Macrium viBoot Wizard

The Macrium viBoot Wizard will configure and start a Microsoft Hyper-V virtual machine from one or more Macrium Reflect image files.

The "Welcome" page provides a brief introduction and explains some of the limitations of virtualization.

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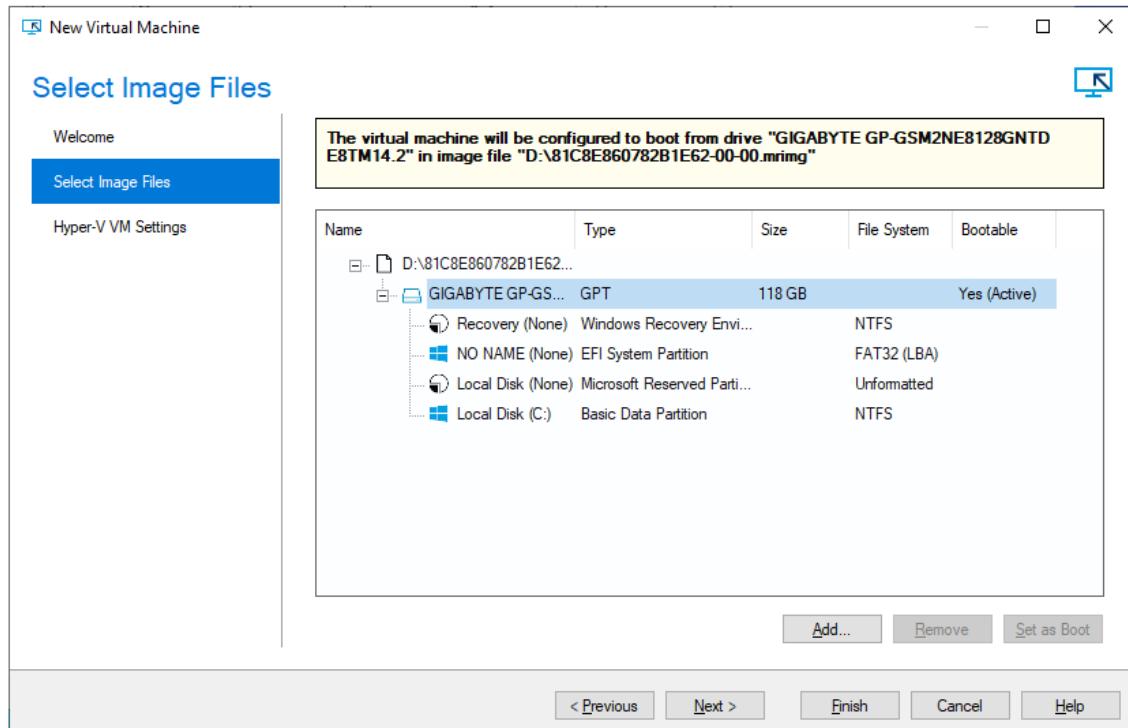


Select Image Files allows you to add one or more Macrium Reflect image files to be used for the virtual machine.

i For VirtualBox VM

If creating new VirtualBox VM, below dialog box will show "VirtualBox VM Settings" to select VirtualBox VM settings instead of Hyper-V VM settings.

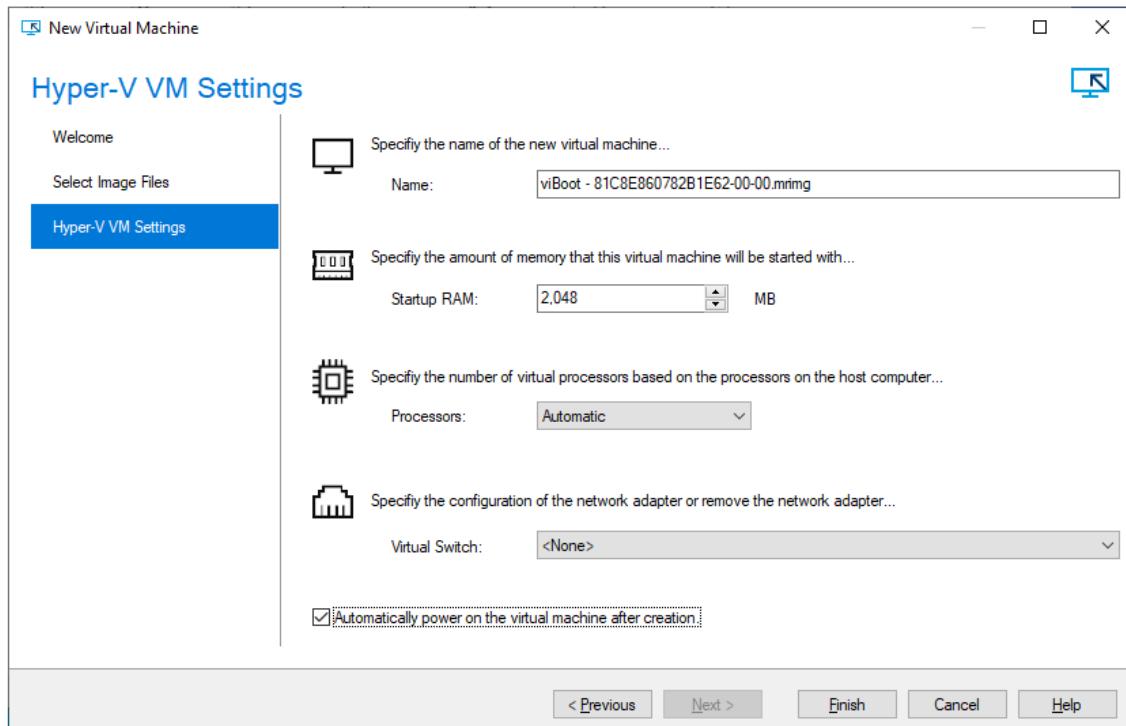
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The first boot-able disk will be marked as the boot disk. If there are multiple disks that are boot-able, these can be set to be the boot disk by selecting the disk and clicking the "Set as Boot" button.

Hyper-V or VirtualBox VM Settings allows you to configure the virtual machine. The RAM and CPU are limited to match the host computer. If the number of processors is set to "Automatic", viBoot will interrogate the Windows settings from the image files to set the correct number of processors. A Virtual Switch of "<None>" ensures that the new virtual machine is not connected to the network. "Automatically power on the virtual machine after creation" checkbox is selected by default. By unchecking, user can just create a virtual machine without starting it.

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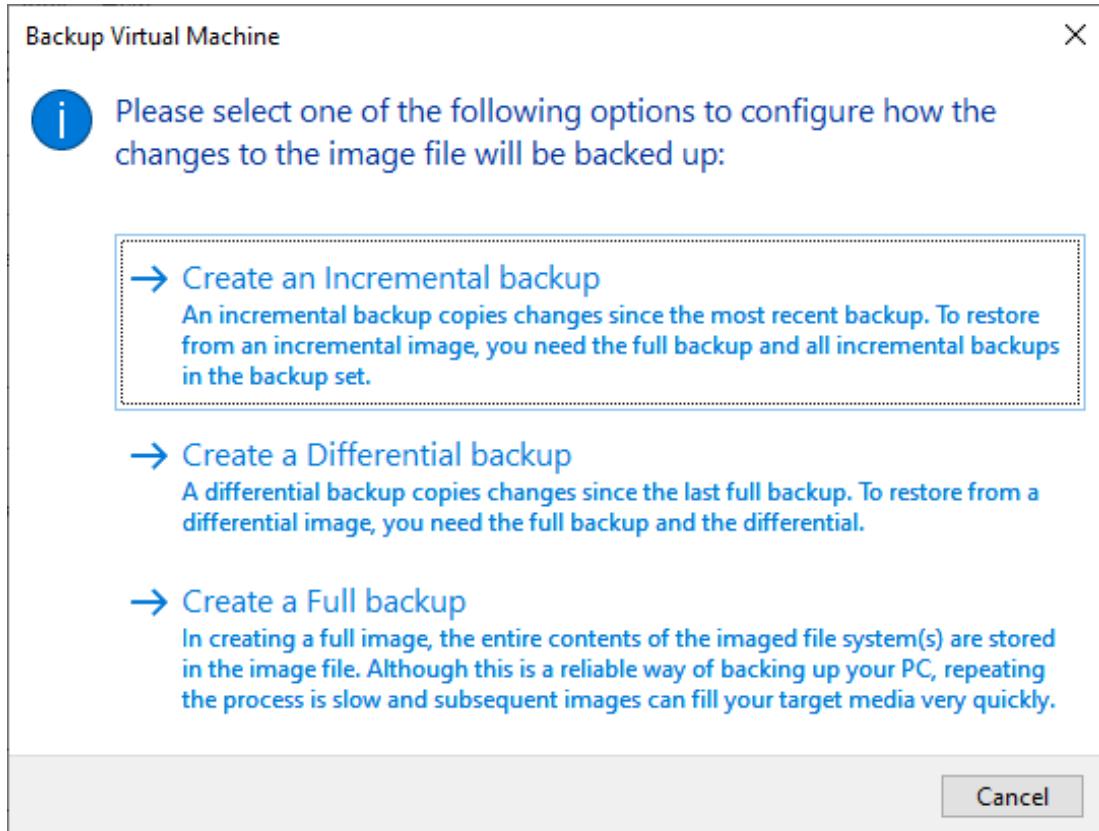
Please note that no changes whatsoever, are made to the original image files.

Delete Virtual Machine

Virtual machines can be deleted from viBoot when the virtual machine is turned off. When the virtual machine is deleted from viBoot the virtual drives will be dismounted and the virtual machine removed from Hyper-V. Prior to deletion viBoot allows the virtual machine to be backed up.

If a viBoot virtual machine is deleted from Hyper-V, the virtual drives will still be mounted. viBoot will list a virtual machine called "Unassigned Virtual Disks" that can be deleted to dismount the virtual drives.

Note: When you delete a virtual machine the Macrium Reflect images used to create the virtual machine are not deleted.

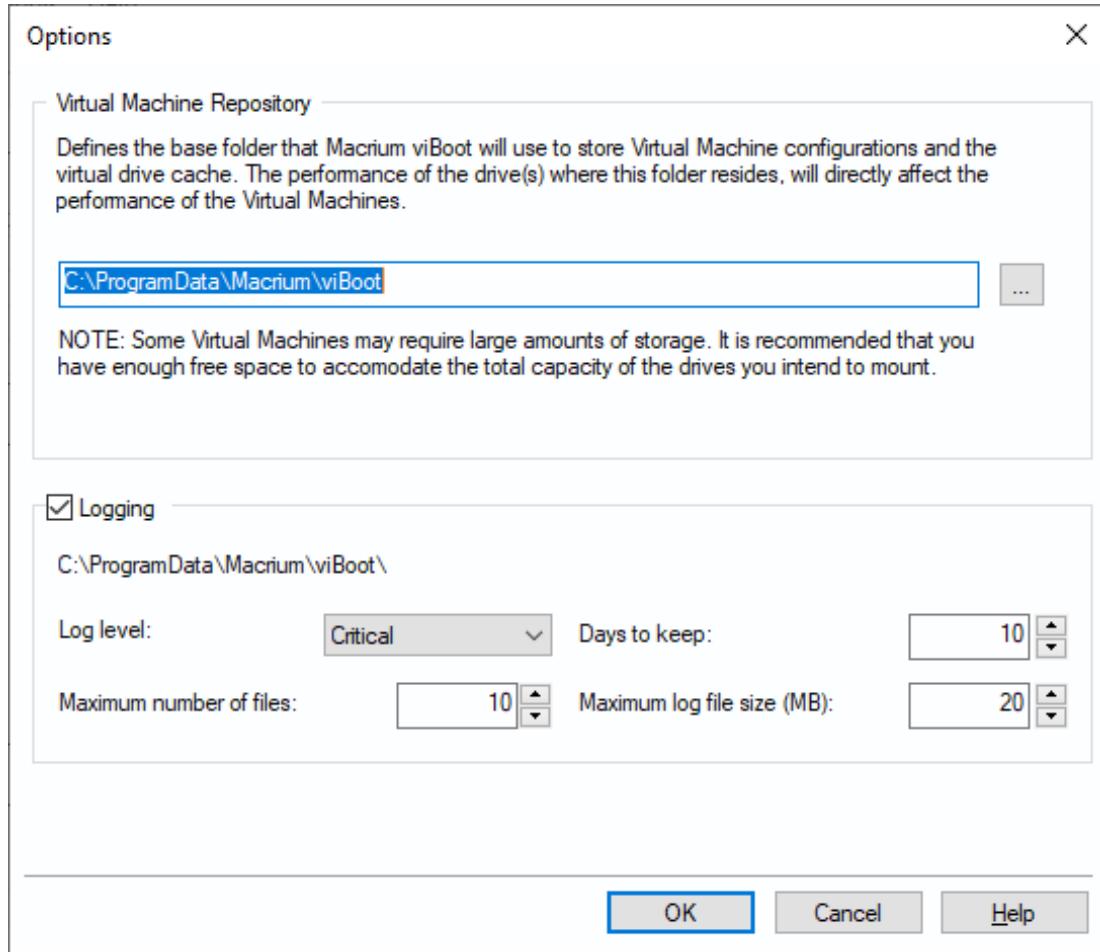


Options

The “Options” button on the Macrium viBoot main toolbar, will display the “Options” dialog box. From here you can modify some of the behavior of Macrium viBoot.

The “Virtual Machine Repository” specifies the folder that Macrium viBoot will use to store Virtual Machine configurations and the virtual machine drive cache. ViBoot will move existing virtual machine configurations and associated files to the new location if it was changed after creating virtual machines.

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Macrium viBoot writes a log of actions taken by the application. This file is saved to "%LOCALAPPDATA%\Temp\Macrium". The log file is configured by the following options:

Log level - Controls type of information written to the log file:

- Critical
- Error
- Warning
- Information
- Debug

Maximum number of files - Number of log files to keep before purging. A value of zero will disable this check.

Days to keep - Log files older than the specified number will be purged. A value of zero will disable this check.

Maximum log file size(MB) - Maximum file size for the log file, before a new log file is created. A value of zero will disable this check.

Macrium viBoot demonstration video

Re-deploying to new hardware

From the rescue environment you can launch Macrium **ReDeploy** to adapt the recovered Windows system to its new environment whether that is a virtual machine or a different computer. With Macrium Reflect **ReDeploy**, you can restore an image to a replacement computer or even create virtual hard drives to virtualize the machine, a technique sometimes called Physical to Virtual or P2V.

Macrium **ReDeploy** is included in all paid editions of Macrium Reflect. This excludes the Free Edition and 30-day trials.

Further reading:

- Re-deploying Windows to new hardware using Macrium ReDeploy
- Using Windows sysprep and deploying using Macrium Reflect

Re-deploying Windows to new hardware using Macrium ReDeploy

Introduction

Macrium ReDeploy overcomes issues with Windows boot processes to run a Windows installation on new hardware. There are a variety of scenarios where you move a windows installation to a new machine, for example:

- Due to hardware failure or planned upgrade.
- Moving between a physical and a virtual machine (P2V / V2P).
- Changing a non-raid to a raid installation or legacy SATA to AHCI SATA.

Aspects of the Windows boot process can cause a boot failure after significant changes to the hardware, ReDeploy can overcome these.

Discovering hardware and association with matching device drivers is time consuming and must be undertaken while windows is being installed. It is skipped during a normal Windows boot making the boot delay acceptable.

Early in the boot process, the boot loader loads the Windows kernel (the core of the operating system) and the critical drivers required to get Windows up and running. If the new hardware configuration requires a new driver to read the disk containing the operating system then Windows will fail to boot.

When the kernel and critical drivers are loaded, the kernel starts. The kernel and its associated hardware abstraction layer (HAL) need to match the motherboard for best enabling. Drivers are optionally loaded to handle specific central processing unit (CPU) features. For a stable system, the driver needs to match the hardware, in this example, the CPU model.

ReDeploy detects changes to critical system features, locates relevant drivers and injects them into your Windows operating system so it boots.

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ReDeploy makes the complex process of getting an off-line Windows operating system running, as easy and intuitive as possible. It does not, however, install the complete driver set for the new hardware. You can complete the driver installation for devices such as network and graphics adapters when your windows installation boots on your new hardware.

You need to run ReDeploy from the Windows PE Reflect rescue CD. This allows the new hardware to be detected and the configuration of the Windows system modified to enable it to boot.



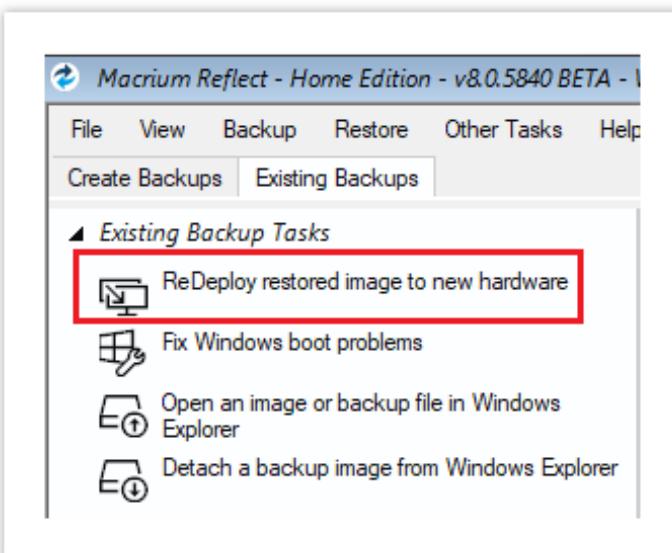
Note: To transfer a Windows Server install to new hardware use Macrium Reflect Server edition for ReDeploy.

For non-server (workstation) installs use ReDeploy included with Home, Workstation, or the Server Edition. Please note that ReDeploy is not included in 30 trial versions of Macrium Reflect



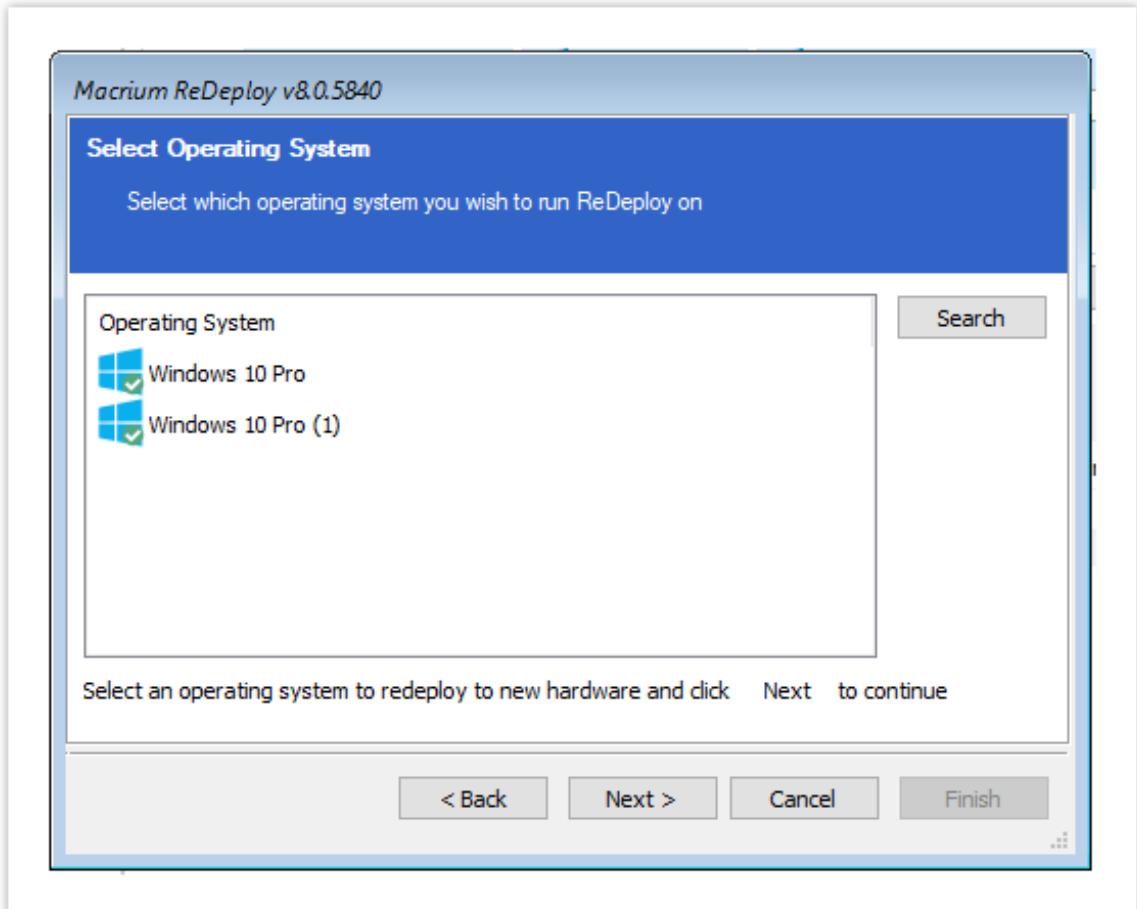
Note: ReDeploy modifies an existing offline operating system to work with new hardware. Restore your system image to the PC being deployed before running ReDeploy. There is no need to reboot your PC after restoring an Image and before you run ReDeploy.

1. Boot the target PC with the Windows PE rescue CD or USB equivalent. (There is a link to a video on creating a Windows PE rescue CD at the bottom of this page).
2. Click **ReDeploy Restored Image to new hardware**.



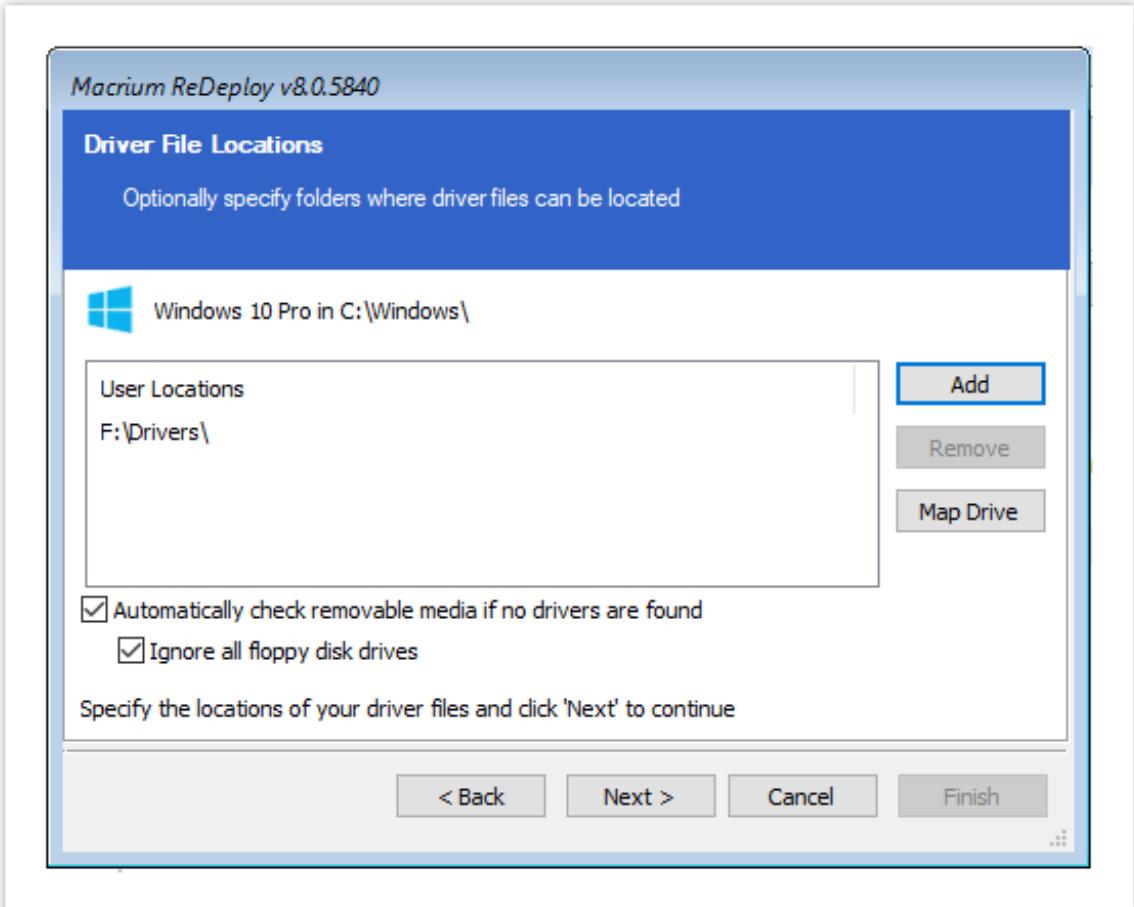
3. If you have a multi-boot system, then you will be presented with a list of operating systems, select the operating system to be redeployed. Click **Next**.

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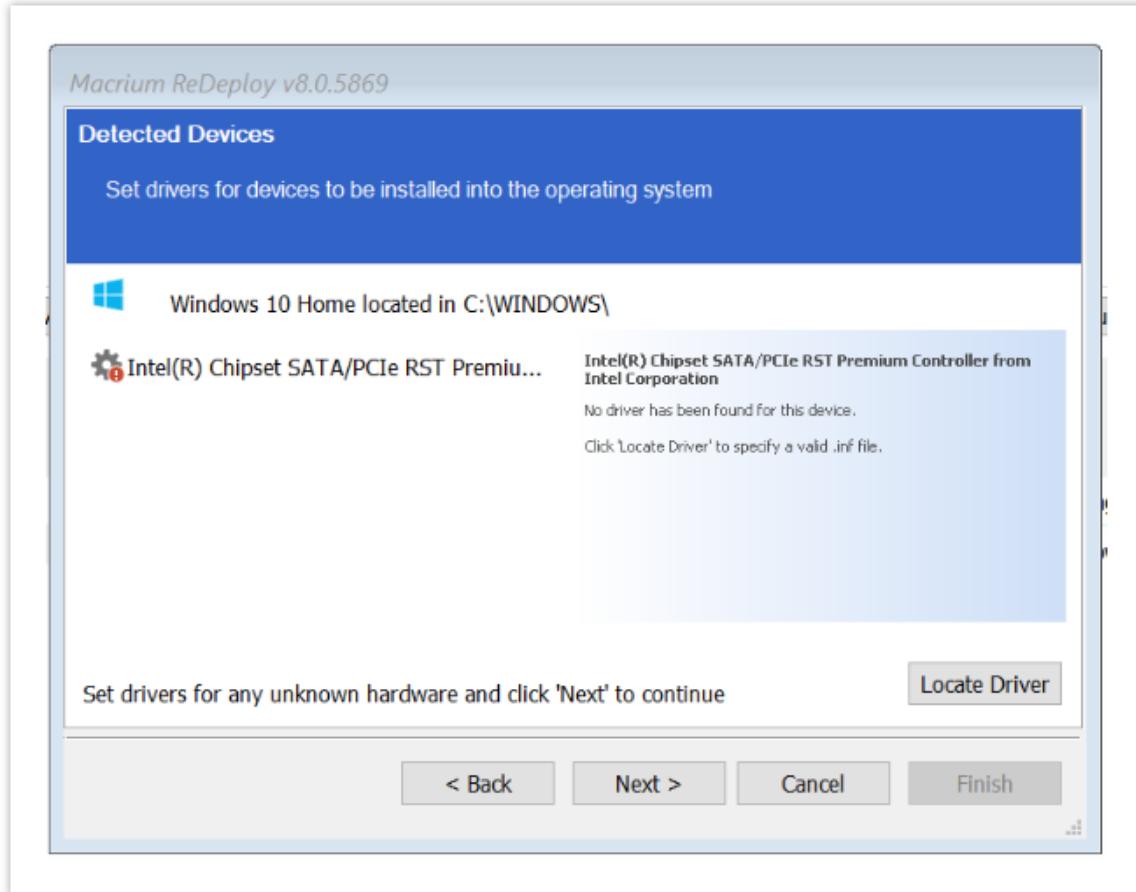
4. Specify driver locations for your mass storage devices (such as RAID card).
 - a. If you haven't already, insert a driver disk for the hardware you are going to boot from.
This will typically be the motherboard or RAID card driver CD.
 - b. Click **Add** to add driver locations.
You can also specify additional paths such as network folders.
 - c. Click **Map Drive** to add a network share.
 - d. Click **Next**.
5. ReDeploy searches through user specified driver locations. If none are specified or no matching drivers are found then it searches removable devices such as CDs and disk drives. ReDeploy also searches through Windows' database of drivers.

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6. ReDeploy seeks drivers for all discovered mass storage devices and displays a list with details, Click **Next**.

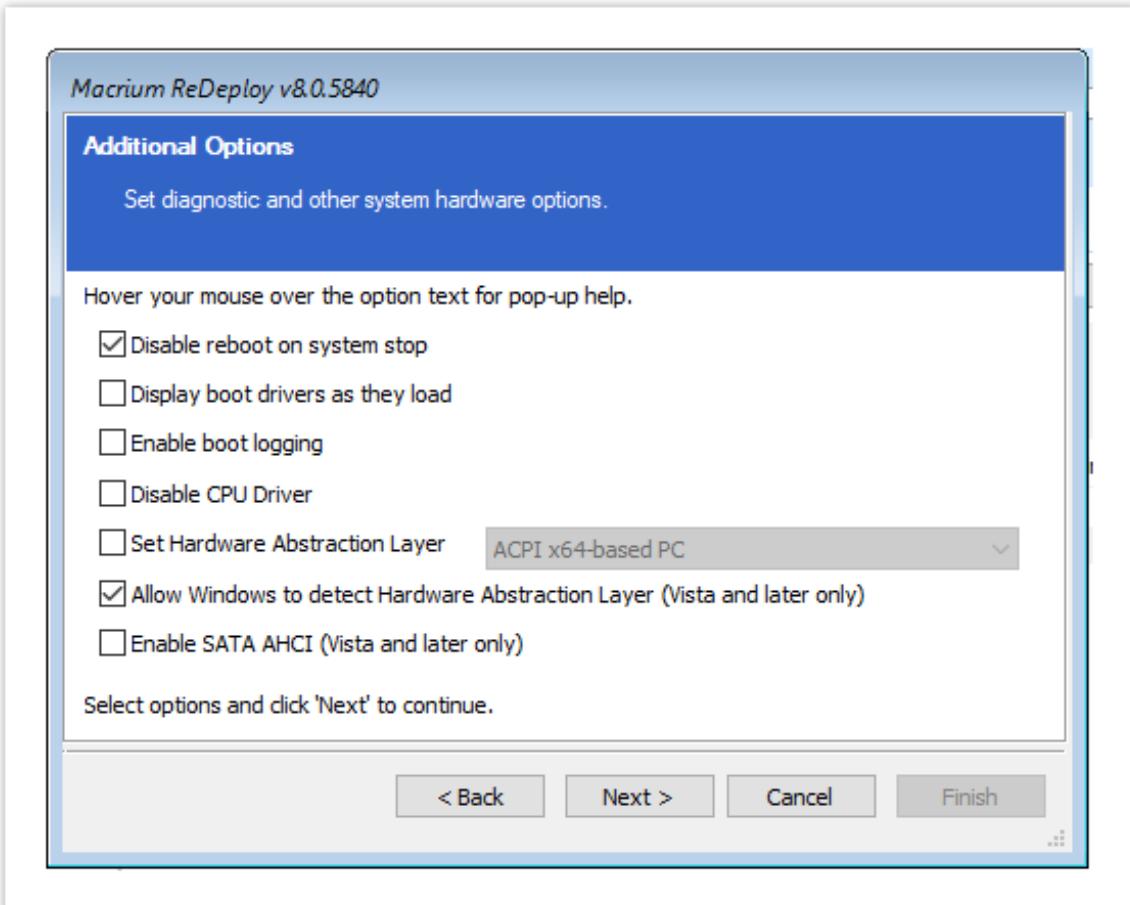
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For each mass storage device, there are three possibilities:

- a. The driver is already installed. It might still need to be enabled at boot, this is done automatically.
 - b. The driver is located, either from a CD, user specified path, or from the Windows database. This driver is installed on completion of ReDeploy.
 - c. No matching driver is located.
7. If no driver is located, or you choose to override the displayed driver, then use **Locate Driver** to manually specify an .inf file.
If you have multiple mass storage interfaces in your system, you only need to locate drivers for hardware that contains the Windows system and active partitions.
8. Review displayed options, leaving them as default if possible. Click **Next**.
If you are having trouble booting these options can help to resolve issues. For more information about these options see below:

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Option	Description
Disable reboot on system stop	Set this option to stop automatic rebooting if a blue screen of death (BSOD) occurs while Windows is loading or running. If this option is not set and Windows generates a BSOD, there will be no time to note the BSOD error codes.
Display boot drivers as they load	Set this option to show which drivers are being loaded as Windows loads. Once Windows is loading and running without issue this option can be reverted using the Windows MSCONFIG utility. You can use the Pause/Break key to freeze the list as it scrolls past, use space to un-pause.
Enable boot logging	Set this option to log drivers being loaded by Windows as it loads. The resulting log file 'ntblog.txt' can be found in the windows folder. Once Windows is loading and running without issue this option can be reverted using the Windows MSCONFIG utility.
Disable CPU Driver	Set this option to disable CPU drivers. This may be useful if you see BSOD's in the selected HAL drivers or system lockup on entering standby or shutdown.

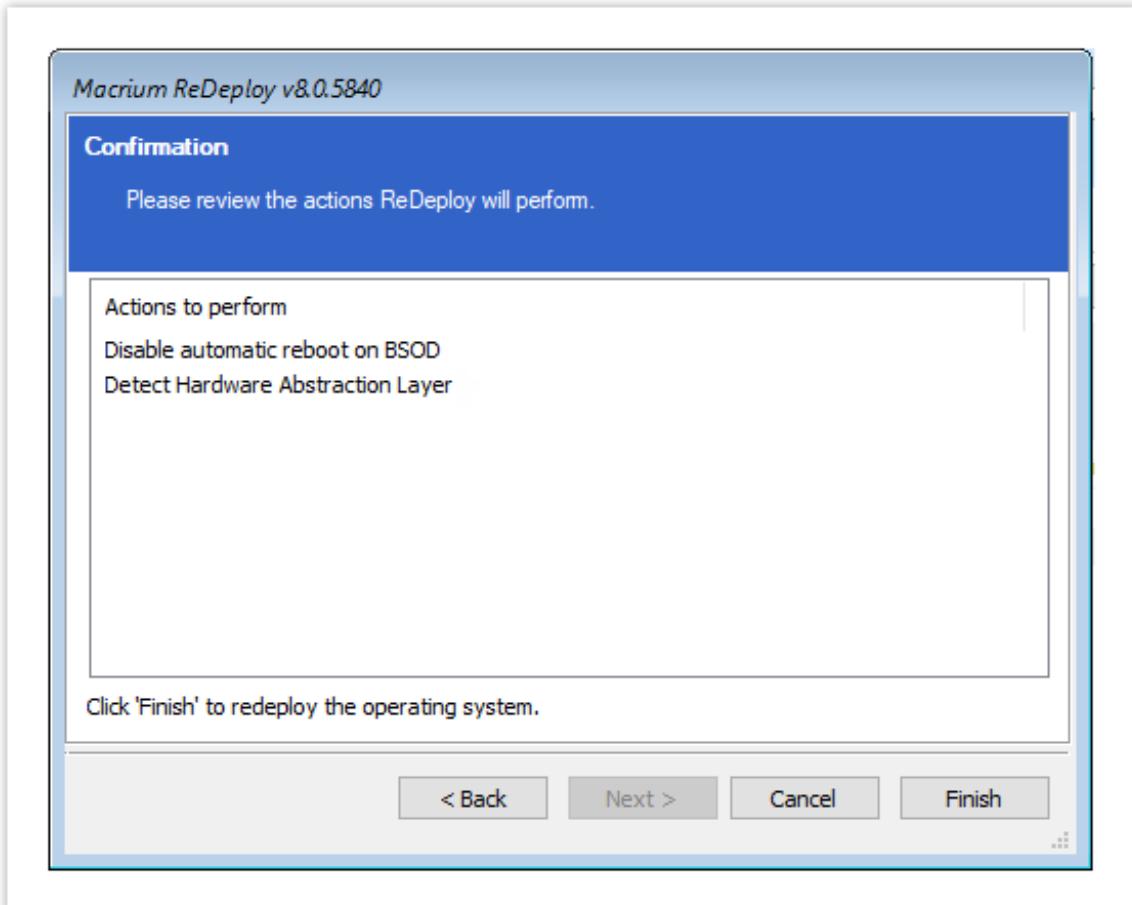
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Option	Description
Set Hardware Abstraction Layer	Set this option to choose which Hardware Abstraction Layer is to be used in the selected Windows operating system. The recommended HAL for this machine is the one initially selected. If you have the incorrect HAL configured, your Windows installation is unstable and can cause random BSOD's or lock ups after Windows boots. In particular, if you are redeploying from or to Virtual Box with an advanced programmable interrupt controller (APIC) unchecked (the default) or very old physical hardware, set a new HAL.
Allow Windows to detect Hardware Abstraction Layer	Set this option to allow Windows to determine the best Hardware Abstraction Layer to use at boot time. This is a Vista and later only option.
Enable SATA AHCI	Set this option to enable support for generic SATA AHCI hardware. You will typically also need to enable an option in your BIOS for your mass storage hardware to operate in this mode. This is a Vista and later only option.

9. Review the actions to be performed and click **Finish** to apply them to the target operating system.

A log file **ReDeploy.log** saves to the drive containing the redeployed operating system.

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After clicking **Finish** to inject drivers and apply your settings you see a confirmation dialog, and you can reboot your OS which should now be compatible with your new hardware.



Note: Check there is a tick in the checkbox against **Check for unsupported devices each time the rescue media loads** before burning the Windows PE rescue CD, so that you can add additional drivers when you boot on new hardware.

Using Windows sysprep and deploying using Macrium Reflect

Using the [Windows sysprep](#) utility you can prepare a machine to be deployed across multiple other machines.

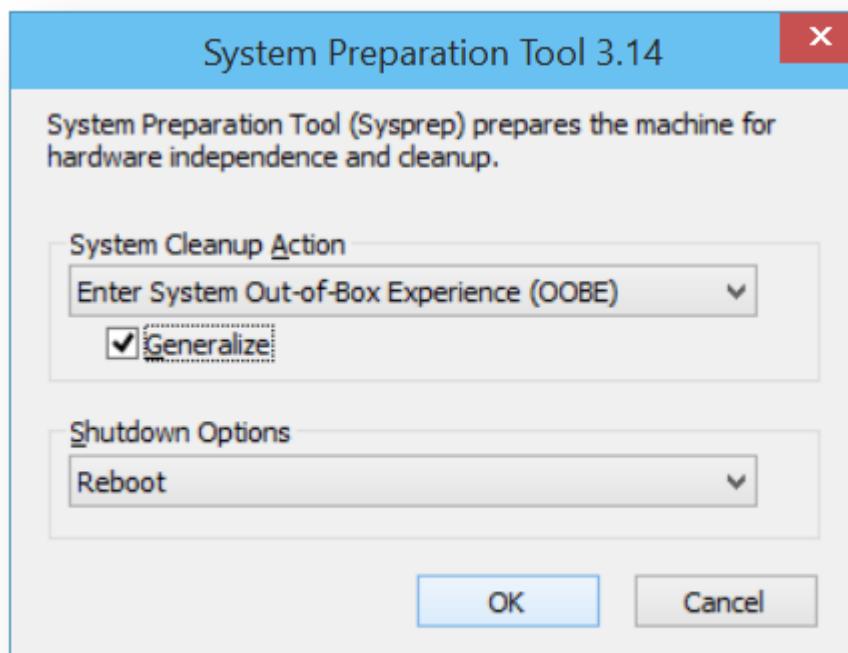
Windows provides a handy utility called **sysprep** which allows you to prepare a master PC image that is configured and set up to be deployed across multiple workstations. By running sysprep, Windows prepares the machine so that when installed on a workstation, the System Admin is prompted for Windows Activation and environment configuration, as if the PC has been installed from scratch.

To prepare a PC to be syspreped, ensure that it contains all the applications and configuration you want the deployed systems to have installed.

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Note: Unless you have sufficient licenses for the machines you are deploying to, Reflect should be uninstalled from the PC that will be used for the base image. However, it is essential to have made a Windows PE based [Macrium Reflect rescue CD](#) on that PC first.

1. Run sysprep:
 - a. Open Windows Explorer and navigate to C:\Windows\System32\sysprep.
 - b. Run **sysprep.exe**.
 - c. Ensure that **System Cleanup Action** is set to **Out-of-Box Experience**, and that **Generalize** is checked as below.



- d. Shutdown options are your choice, selecting **Quit** ensures the system does not reboot or shutdown automatically.
- e. Click **OK**.

This prepares the machine so that it can be deployed to other PCs.

2. Shutdown the PC and boot it to the Macrium Reflect rescue environment.
3. Take an image of the PC using Macrium Reflect and store it to a USB device or a network location.
4. When this is complete, you can deploy the image to the workstations you require.
5. When the restore is complete, boot the new PC.

Windows asks for a new license key and some environment settings.

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Macrium Reflect Server Plus for Exchange and SQL

This article is an introduction to **Macrium Reflect v8 Server Plus for Exchange and SQL**

Macrium Reflect v7 Server Plus has all the functionality of Macrium Reflect v7 Server and additional features for Microsoft Exchange servers and SQL servers.

To get you started the following are some useful tutorials:

- [Introduction to Macrium Reflect](#)

Microsoft Exchange guides:

- [Backing up Microsoft Exchange databases](#)
- [Restoring MS Exchange databases](#)
- [Restoring emails with Mailbox Restore](#)
- [Setting up permissions for Mailbox Restore](#)
- [Adding MS Exchange search folders](#)

Microsoft SQL guides:

- [Backing up MS SQL Databases](#)
- [Running continuous backup of SQL databases](#)
- [Restoring MS SQL](#)

Command line operations with Macrium Reflect

- [Installing Macrium Reflect from the command line](#)
- [Using Macrium Reflect from the command line](#)
- [Verifying image and backup files from the command line](#)

Installing Macrium Reflect from the command line

Introduction

This article explains how to install and uninstall on the command line

Applies to:

Macrium Reflect version 5.x, 6.x, 7.x, and 8.x.

About the Macrium installation process

The macrium installer is msi based with an executable wrapper to ensure it is launched in the correct mode

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Command line installation

In most cases, just invoking the installer interactively will be the most effective way to install Reflect. However, in some cases, particularly if the installation is to be automated across many PCs, it may be more desirable to enable the installation to complete without user intervention. To do this, first download the installer using [ReflectDL](#). Then invoke using the following options.

```
v8.X.XXX_reflect_server_setup_x64.exe /passive /l log.txt LICKEY=XX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXXXX
```

Or, if you have ordered multiple licenses, you can install them on multiple computers with the same command. If you run out of licenses, the install will fail.

```
v8.X.XXX_reflect_server_setup_x64.exe /passive /l log.txt ORDERREF=NNNNNNNN  
ORDEREMAIL=sample_email@macrium.com
```

If the installation fails, consult the log file, specified by the /l parameter to discover why.

The above examples will display a progress bar. If you wish the install to be completely invisible, replace /passive with /qn.



1. The installer name will vary dependent on edition and platform.
2. This will only work with full (not upgrade) licenses.
3. An Internet connection is required.
4. If you have made multiple orders, you can specify a colon separated list, eg ...

ORDERREF=NNNNNNNN:OOOOOOOO:PPPPPPP etc

They will be searched in the same order as specified.

To make sure that the installation won't restart your computer on completion, a no restart parameter can be added.

```
v8.X.XXX_reflect_server_setup_x64.exe /passive /l log.txt LICKEY=XX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXXXX /norestart
```

Adding any parameters mentioned below to your install script will omit the feature from being installed.

The example below shows a version of the install script that will omit MIG from installing with Reflect:

```
NOIMAGEGUARDIAN=YES  
NOVIBOOT=YES  
NOCBT=YES
```

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```
NODESKTOPSHORTCUT=YES
```

eg.

```
v8.X.XXX_reflect_server_setup_x64.exe /passive /l log.txt LICKEY=XX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX NOIMAGEGUARDIAN=YES
```

Using Macrium Reflect from the command line

You can retrieve a prompt for all the command line arguments by simply typing reflect -h from the command line.

Running a Backup

The command line form is as follows:reflect.exe [-v | -e [-w] [-full | -inc | -diff] [xml filename]] Explanations for the switches are as follows:

-h	This help text
-e	Execute the XML file. If no full / diff / inc qualifier is used, a full backup is performed by default.
-v	Validate the XML file and exit
-w	If Reflect is busy then wait until available otherwise exit immediately
-full	Run a full backup
-diff	Run a differential backup
-inc	Run an incremental backup
-pass	Password. Overrides the password saved in the xml file.



Please note that the XML file name is the fully qualified path.

Examples

To validate an XML file

```
reflect.exe -v "c:\backup.xml"
```

To execute an XML file

```
reflect.exe -e "c:\backup.xml"
```

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To execute an XML file with wait if busy

```
reflect.exe -e -w "c:\backup.xml"
```

To execute an XML file and create an incremental image

```
reflect.exe -e -inc "c:\backup.xml"
```

Mounting an image

reflect.exe [Path To Image File] -b [-auto -drives [Drives[s]] -pass [PASSWORD]] Explanations for the switches are as follows:

-b	Browse image
-auto	Automatically assign drive letters. If not specified then you will be prompted
-drives	A comma separated list of drive letters to use. If not specified then the next available letters are used
-pass	The password for protected image files

The image file name is the fully qualified path. If "LAST_FILE_CREATED" is specified then the last image created in the current Windows session is mounted.

Examples

To mount an image and prompt for a drive letter to use

```
reflect.exe "D:\901DBF91346B9A81-00-00.mrimg" -b
```

To mount all partitions in an image using the next available drive letter(s)

```
reflect.exe "D:\901DBF91346B9A81-00-00.mrimg" -b -auto
```

To mount all partitions for the last image created

```
reflect.exe "LAST_FILE_CREATED" -b -auto
```

To mount all partitions in an image using drive letters j,k,l

```
reflect.exe "D:\901DBF91346B9A81-00-00.mrimg" -b -auto -drives j,k,l
```

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To mount all partitions in a password protected image using drive letters j,k,l

```
reflect.exe "D:\901DBF91346B9A81-00-00.mrimg" -b -auto -drives j,k,l -pass "PWD"
```

Unmounting an image

```
reflect.exe [Drive Letter] -u
```

Explanations for the switches are as follows:

-u	Unmount image
----	---------------

If a drive letter isn't specified then all mounted images are unmounted**Examples**

To unmount an image from drive letter 'j'

```
reflect.exe J -u
```

To umount all mounted drives

```
reflect.exe -u
```

Verifying image and backup files from the command line

Introduction

This article explains how to verify Macrium Reflect image and backup files using the standalone command line verification tool '**mrverify.exe**'. **mrverify.exe** supports individual file verification as well as folder and sub-folder file search and verification.

To verify backups using the Macrium Reflect user interface see: Verifying image and backup files



Please use the link below to download:

<http://updates.macrium.com/reflect/utilities/mrverify.exe>



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*Please note that **mrverify.exe** must be run from an Administrator command prompt. For instructions on how to do this please see [here](#).*

The following command line switches are supported:

```
mrverify.exe "full path to image file or folder" -p[--password] "password" -r[--recurse] -x[--fix] -l[--logfile] "logfile name"
```

File name or path with wild card can be used. e,g;

```
d:\backups\*
```

or

```
d:\backups\1FF33614674A6438-00-00.mrimg
```

Switch	Description
-p OR --password	The optional password that was used to protect and/or encrypt the backup
-r OR --recurse	Scan all sub-folders if a folder is specified. The default is not to recurse.
-l OR --logfile	Full path to output log file. This file will be created for each run and contains the file name and verification status 'success' or 'fail' .
-s OR --set	Verify all files in the set. Use if verifying individual file s to ensure they can be restored. When verifying all files in a folder this isn't necessary. The default is not to verify the entire set.
-h OR --help	This help output
-x OR --fix	Attempt to fix failed blocks if the current live file system contains the original data.

Examples:

```
mrverify.exe "d:\backups\1FF33614674A6438-00-00.mrimg"
```

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```
mrverify.exe "d:\backups\1FF33614674A6438-00-00.mrimg" --set --password  
"mypassword" -l "c:\verifylog.txt"
```

```
mrverify.exe "d:\backups\*" --password "mypassword" -r -l "c:\verifylog.txt"
```

On success mrverify.exe will return '0'. If any file fails verification then the return code will be '1'.

The following success/failure text will be displayed in the command window and log:

Verify Success	The file contained no errors.
Verify Failure	The file could not be verified successfully. Try the verification process again using the Macrium Reflect user interface. This may give more information on the problem.
Backup set is not complete. At least one file may be missing	At least one backup file required to restore this file cannot be opened and/or located in the same folder. This message is displayed as a Warning or an Error failure condition if the --set command line switch is used.
Password Error	The backup file is password protected and/or encrypted and the supplied password is not correct.
Block 99999 - Repaired	The -x OR --fix switch was used and a data block has been repaired.

Generating scripts and batch files

Introduction

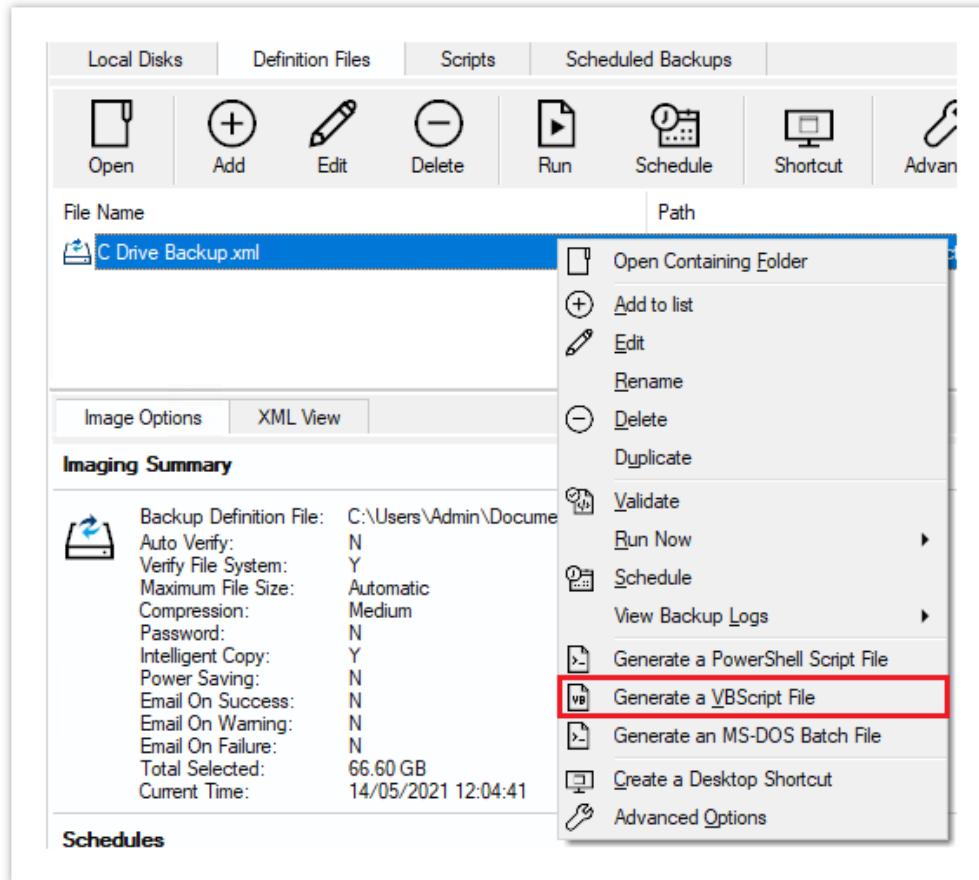
Macrium Reflect includes the ability to automatically create VBScript, PowerShell and MS-DOS source files to add pre and post backup functionality to your backup jobs. This enables system administrators to manage complex backup scenarios.

- Generating a VBScript source file
- Generating an MS-DOS batch file
- Generating a PowerShell source file

Generating a VBScript source file

For an example of a generated VBScript source file please see [Example VBScript Source](#)

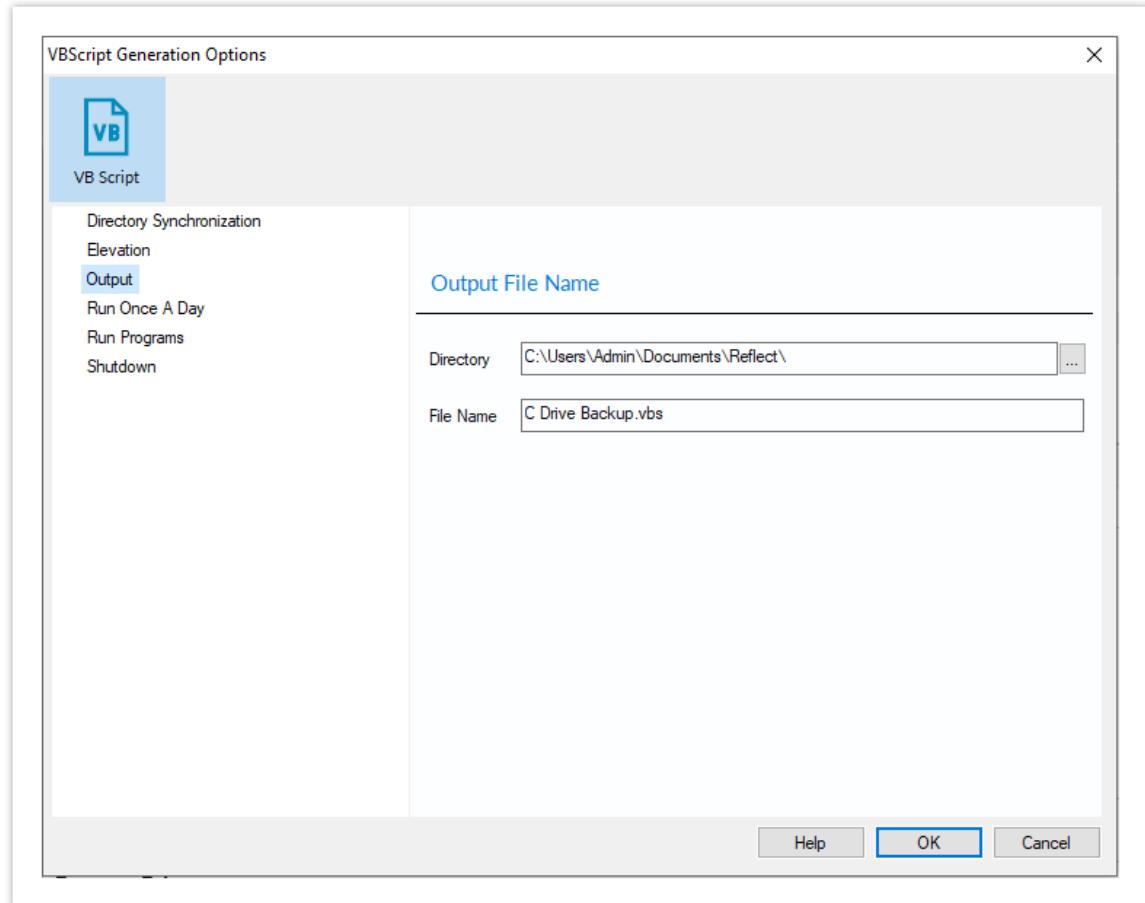
To generate a VBScript file select the **Definition Files** tab on the main window then right-click on a file and select **Generate a VBScript file**.



This opens the **VBScript Generation Options** dialog:

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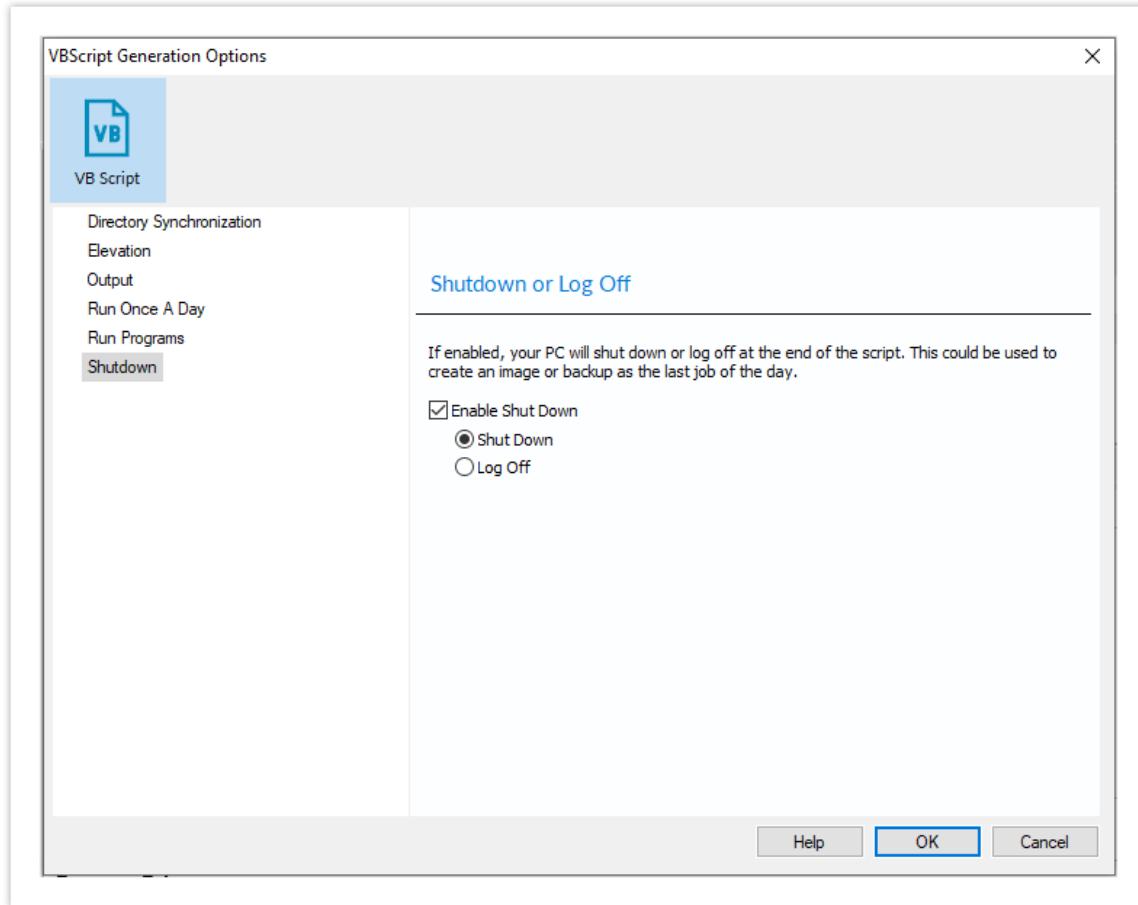
Output



Property	Value
Directory	The folder where the source file is saved
File Name	The name of the VBscript source file. This defaults to the XML file name with a .vbs extension

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Shutdown

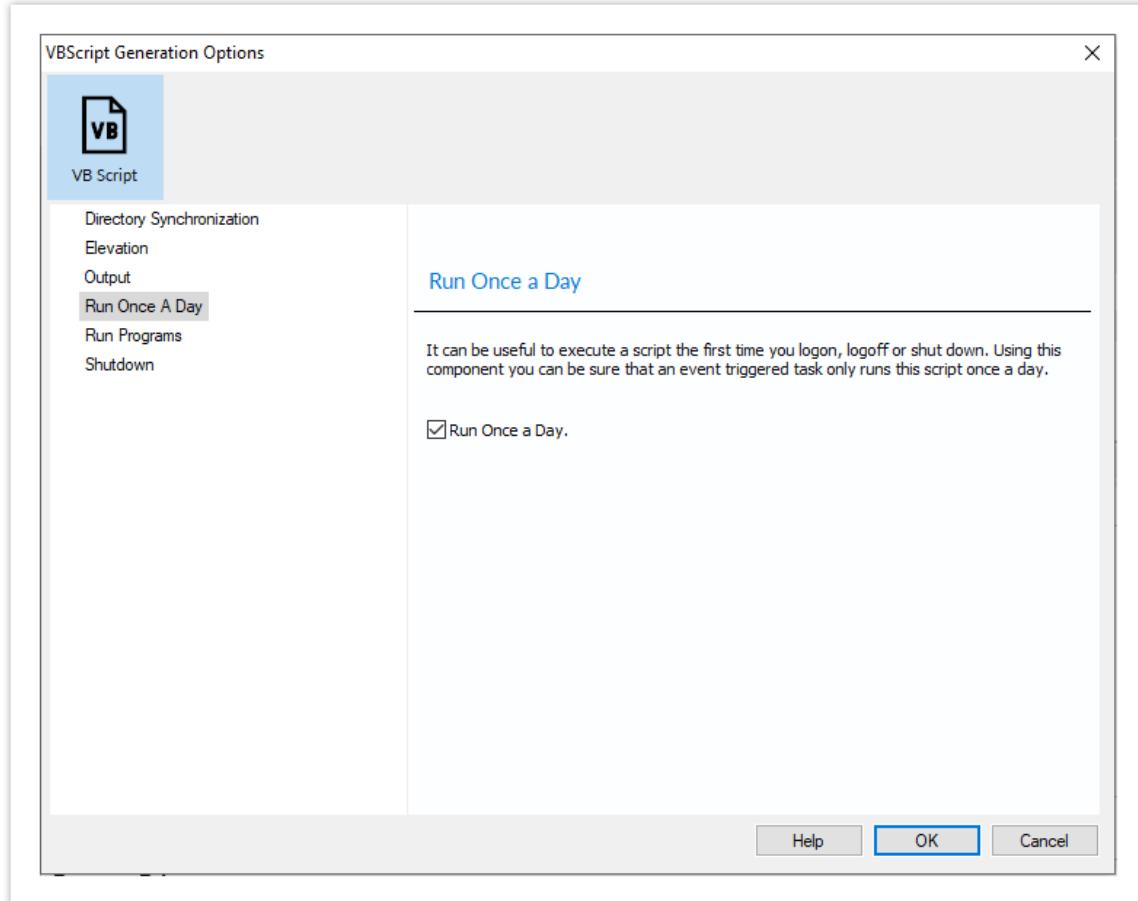


Generated code...

```
' Issue shutdown command
objShell.Run "shutdown -s"
```

Property	Value
Enable Shut Down	Select to enable this property
Shut down	The PC will shut own at the end of the backup
Log Off	The user will be logged out at the end of the backup

Run Once a Day



Generated code...

```
' The following function call ensures that this script only runs once a day
If HasRunToday Then
    WScript.Quit
End If
.....
***** Function: HasRunToday *****
/*
/* Purpose: determines if this script has run today
*/
/*
/* Input:    None
/* Output:   true if has run today false otherwise
*/
*****
Function HasRunToday
    Dim RegScriptKey
    Dim LastRunDate
    Dim objShell
    Set objShell = WScript.CreateObject("WScript.Shell")
```

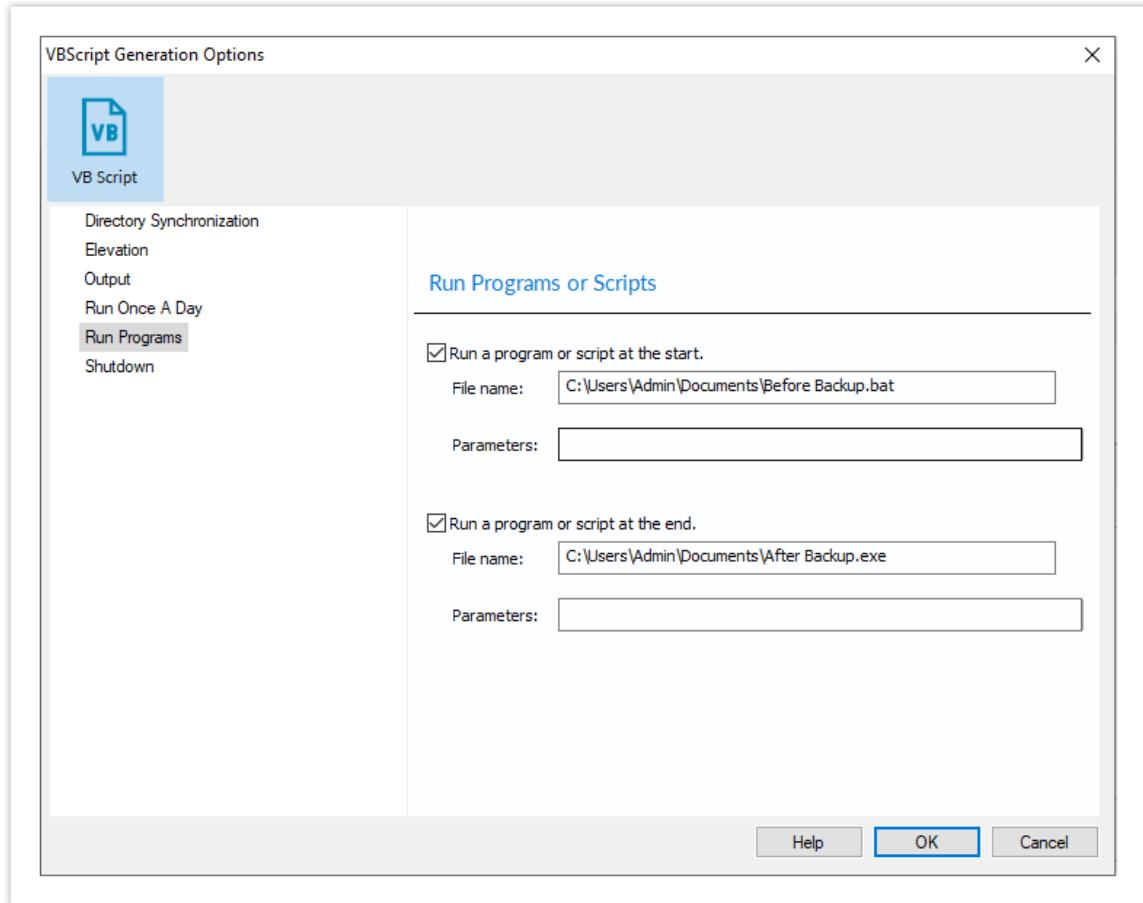
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```
RegScriptKey = "HKCU\SOFTWARE\Macrium\Reflect\Scripts\" & WScript.  
ScriptFullName & "\LastRun"  
'Check if script has run today  
ON ERROR RESUME NEXT  
LastRunDate = objShell.RegRead(RegScriptKey)  
If LastRunDate = cstr(Date) Then  
    HasRunToday = true  
Else  
    objShell.RegWrite RegScriptKey, Date, "REG_SZ"  
    HasRunToday = false  
End If  
Set objShell = nothing  
End Function
```

Property	Value
Run Once a Day	If selected, will only enable this script to run once per day. This is useful for example if you want a backup to happen at first login or shutdown.

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Run Programs



Generated code...

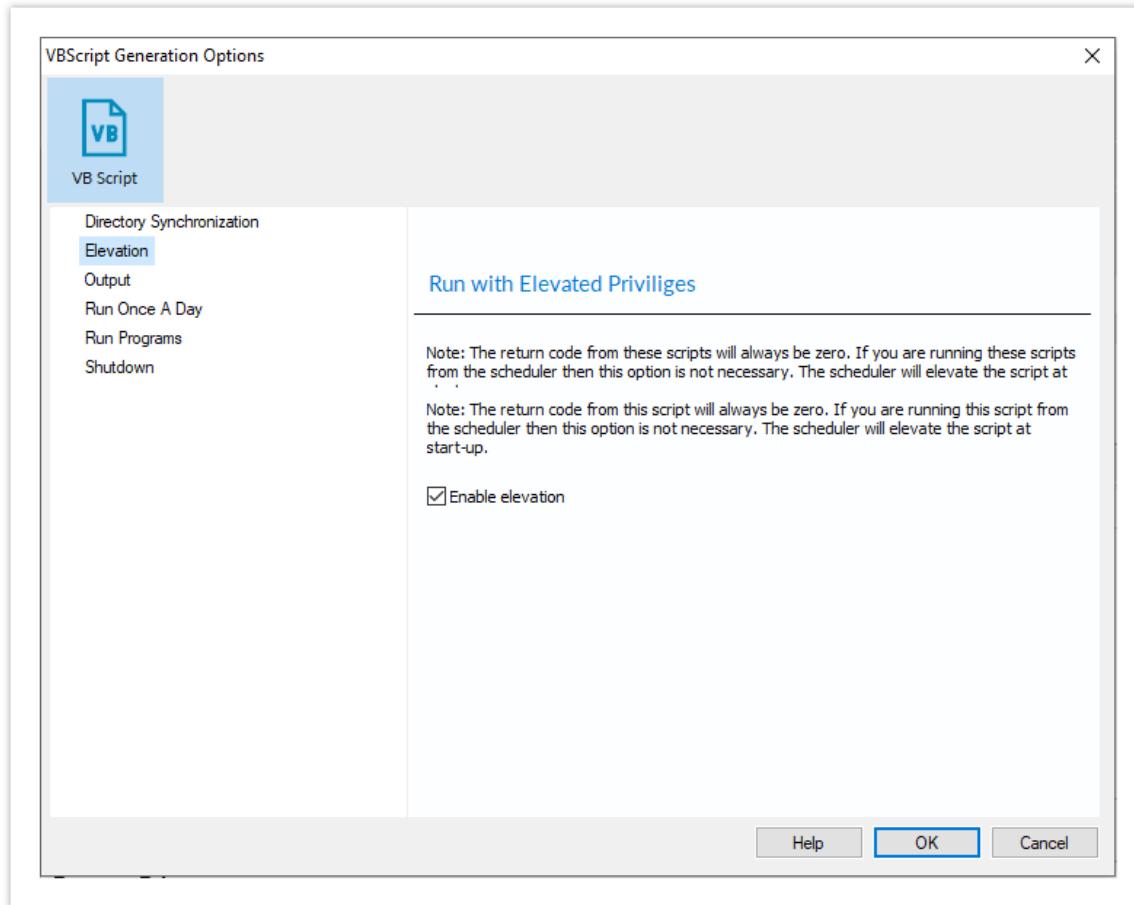
```
' Run program before backup
objShell.Run """C:\Users\Public\Admin\Before backup.bat""", 1, true
' Do the backup
ExitCode = Backup ("""C:\Program Files\Macrium\Reflect\reflect.exe"" -e -w
<BACKUP_TYPE> ""C:\Users\Dev\Documents\Reflect\example.xml""")
' Run program after backup
objShell.Run """C:\users\public\Admin\After backup.exe""", 1, true
```

Property	Value
Run a program or script at the start	Select to enable a program or script to run before the backup starts
File Name	The path and executable file name

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Property	Value
Parameters	Optional command line parameters for the program
Run a program or script at the start	Select to enable a program or script to run when the backup ends
File Name	The path and executable file name
Parameters	Optional command line parameters for the program

Elevation



Generated code...

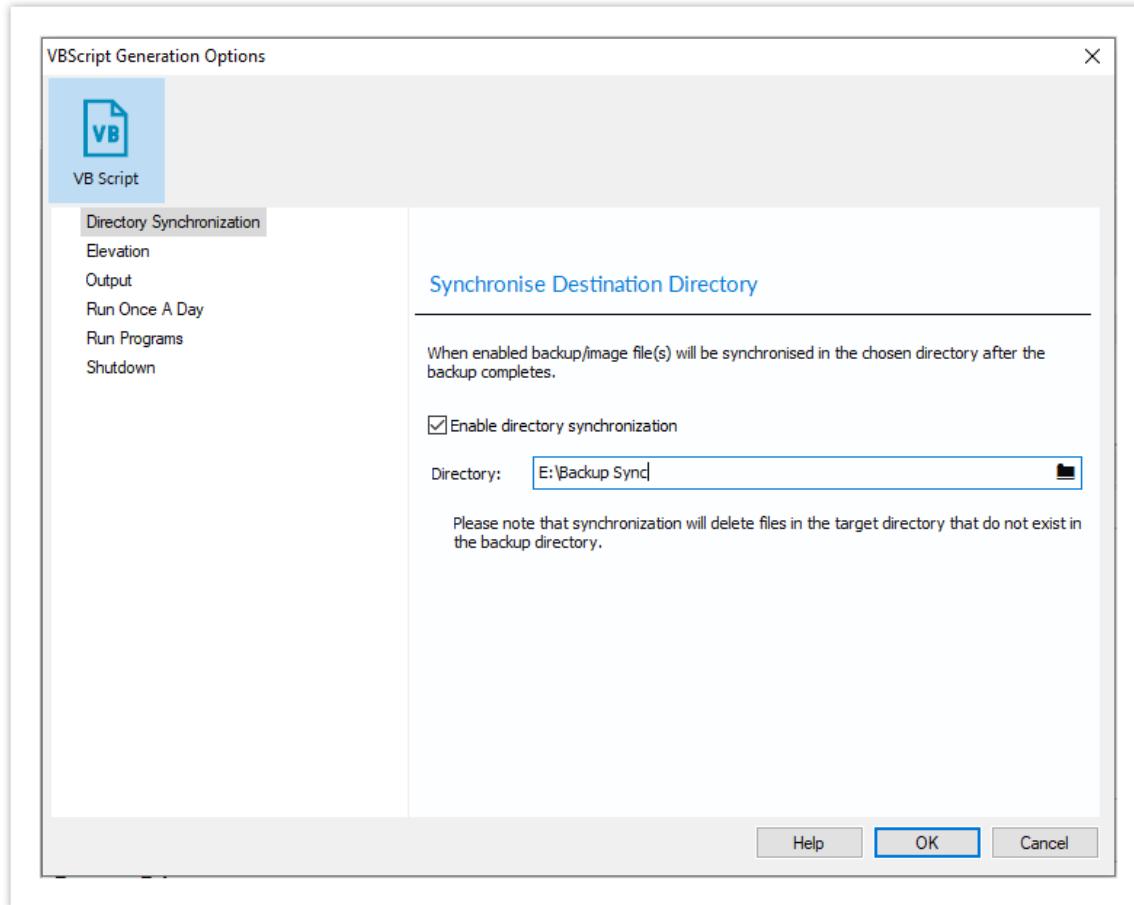
```
Sub VBMain()
    Dim objShell
    Dim ExitCode
    ' Elevate this script for Admin privileges in Vista
```

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```
Elevate
.....
***** Sub:      Elevate *****
<��
<�� Purpose: Elevates this script for Vista UAC.
<�� This means that only one UAC Elevation prompt is displayed and
<�� functions/programs will not fail if they require admin privileges
<��
<�� Input:   None
<�� Output:  None
<��
***** Sub Elevate
<�� Dim ShellApp
<�� Dim objShell
<�� Dim objWshProcessEnv
<�� ' Don't elevate if run from Windows Task Scheduler
<�� If WScript.Arguments.Count > 0 Then
<��     If WScript.Arguments.Item(0) = "-s" then
<��         Exit Sub
<��     End If
<�� End If
<�� Set objShell = WScript.CreateObject("WScript.Shell")
<�� Set objWshProcessEnv = objShell.Environment("PROCESS")
<�� If objWshProcessEnv("ELEVATED_APP") <> "True" Then
<��     objWshProcessEnv("ELEVATED_APP") = "True"
<��     Set ShellApp = CreateObject("Shell.Application")
<��     Call ShellApp.ShellExecute("""" & WScript.FullName & """", """ &
<�� WScript.ScriptFullName & """ & " " & GetBackupTypeParameter, , "runas")
<��     set ShellApp = nothing
<��     Set objWshProcessEnv = nothing
<��     wscript.quit
<�� End If
<�� Set objWshProcessEnv = nothing
<�� Set objShell = nothing
<��
End Sub
```

Property	Value
Enable Elevation	If selected will enable UAC elevation for the entire script. This enables functions and programs to run outside the context of Macrium Reflect without requesting further elevation.

Directory Synchronization



Generated code...

```
SynchroniseDirectories ExitCode, "C:\C++"
.....
*****
/* Function: RobocopyExists
*/
/* Purpose: determines whether the program Robocopy can be called from the
   command line.
*/
/* Input: None
   Output: boolean - true if Robocopy exists
*/
*****
Function RobocopyExists()
  On Error Resume Next
  Dim objShell
  Dim objExec
  Set objShell = WScript.CreateObject("WScript.Shell")
  Set objExec = objShell.Exec ("robocopy.exe", 0)
  If Err.Number = 0 Then
    RobocopyExists = True
  Else
```

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```
    RobocopyExists = False
End If
End Function
*****
/* Function: SynchroniseDirectories
*/
/* Purpose: Copies all files created by the previous backup / image
   to a supplied directory. Uses Macrium environment variables to
   determine which files to copy.
*/
/* Input:   ExitCode - The exit code of the last backup
   strBackupDirectory - Directory to copy to
*/
*****
Function SynchroniseDirectories(Byval ExitCode, Byval strSyncDirectory)
    Dim objShell
    Dim objWshProcessEnv
    Dim strEnvPrefix
    Dim strBackupDirectory
    Dim strCmdLine
    Dim iReturnCode
    Dim fs
    Dim objSyncFiles
    Dim objBackupDirectory
    Dim objSyncDirectory
    Dim objBackupFile
    Dim objSyncFile
    Dim strExtension
    Dim dateBackupFile
    Dim dateSyncFile
    ' Only copy files if backup was successful
    if ExitCode <> 0 Then
        Exit Function
    End If
    Set objShell           = WScript.CreateObject("WScript.Shell")
    Set objWshProcessEnv = objShell.Environment("VOLATILE")
    ' Get the prefix for the last backup set
    strEnvPrefix = objWshProcessEnv("MACRIUM_PREFIX")
    ' Get the directory where we just created a backup
    strBackupDirectory = objWshProcessEnv(strEnvPrefix + "_DIRECTORY")
    If right(strBackupDirectory, 1) = "\" Then strBackupDirectory = left(strBackupDirectory, len(strBackupDirectory)-1)
    If right(strSyncDirectory, 1) = "\" Then strSyncDirectory = left(strSyncDirectory, len(strSyncDirectory)-1)
    If RobocopyExists Then
        strCmdLine = "robocopy ""<SOURCE>"" ""<DESTINATION>"" *.mr* /copy:DAT
/lev:0 /purge /r:0"
    Else
        ' Robocopy does not exist - using xcopy
        Set fs = CreateObject("Scripting.FilesystemObject")
        Set objBackupDirectory = fs.GetFolder(strBackupDirectory)
        Set objSyncDirectory = fs.GetFolder(strSyncDirectory)
        For Each objSyncFile in objSyncDirectory.Files
            strExtension = fs.GetExtensionName(objSyncFile)
            dateSyncFile = objSyncFile.DateLastModified
            If Left(strExtension,2) = "mr" Then
                ' Check if file has been deleted
                If Not(fs.FileExists(strBackupDirectory+"\\"+objSyncFile.name)) Then
                    fs.DeleteFile(objSyncFile)
                Else

```

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```
' Check if file has been modified
Set objBackupFile = fs.GetFile(strBackupDirectory+"\"+
+objSyncFile.name)
dateBackupFile = objBackupFile.DateLastModified
If DateDiff("m", dateBackupFile, dateSyncFile) <> 0 Then
    fs.DeleteFile(objSyncFile)
End If
End If
End If
Next
strCmdLine = "xcopy ""<SOURCE>\*.mr*"" ""<DESTINATION>"" /c /d /h /i /v
/y"
End If
strCmdLine = Replace(strCmdLine,"<SOURCE>", strBackupDirectory)
strCmdLine = Replace(strCmdLine,"<DESTINATION>", strSyncDirectory)
iReturnCode = objShell.Run(strCmdLine,0,true)
if iReturnCode <> 0 then
' Handle synchronisation error
else
' Everything OK
end if
' Clean up
Set objShell          = nothing
Set objWshProcessEnv = nothing
End Function
```

Property	Value
Enable directory synchronization	If enabled will use the MS utility RoboCopy to synchronize the backup target directory with the supplied directory.
Directory	Enter the folder that you want to copy/archive your backup files to

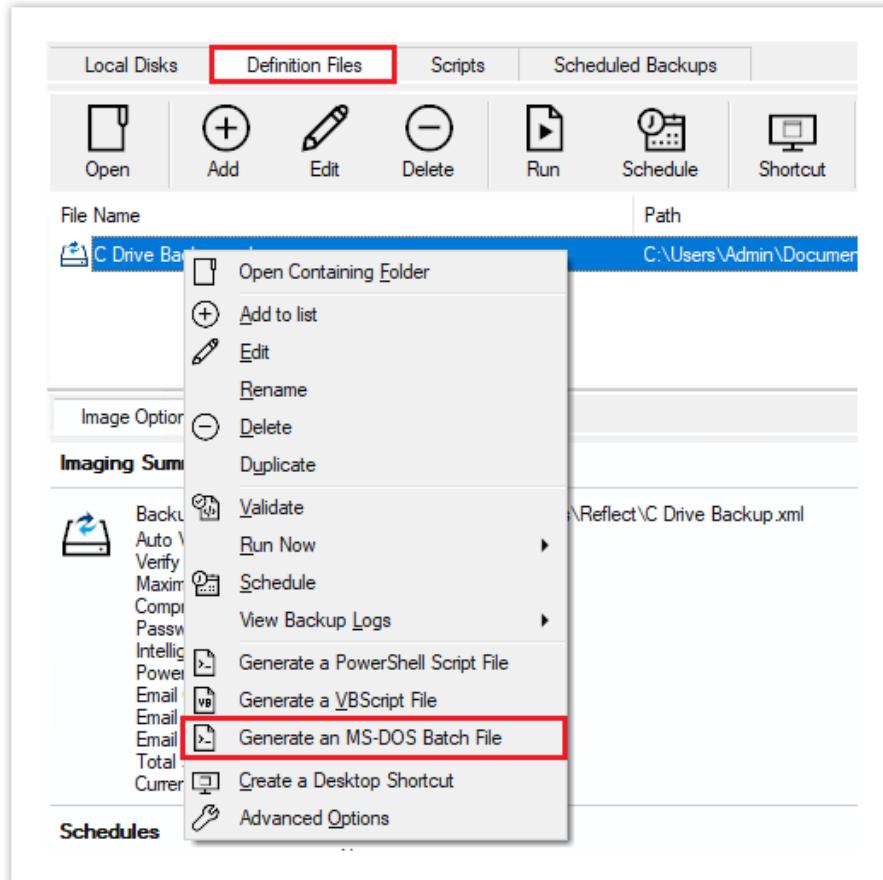
Click '**OK**' to generate the VBScript source file

Generating an MS-DOS batch file

For an example of a generated MS_DOS batch file please see: [Example MS-DOS Batch File](#)

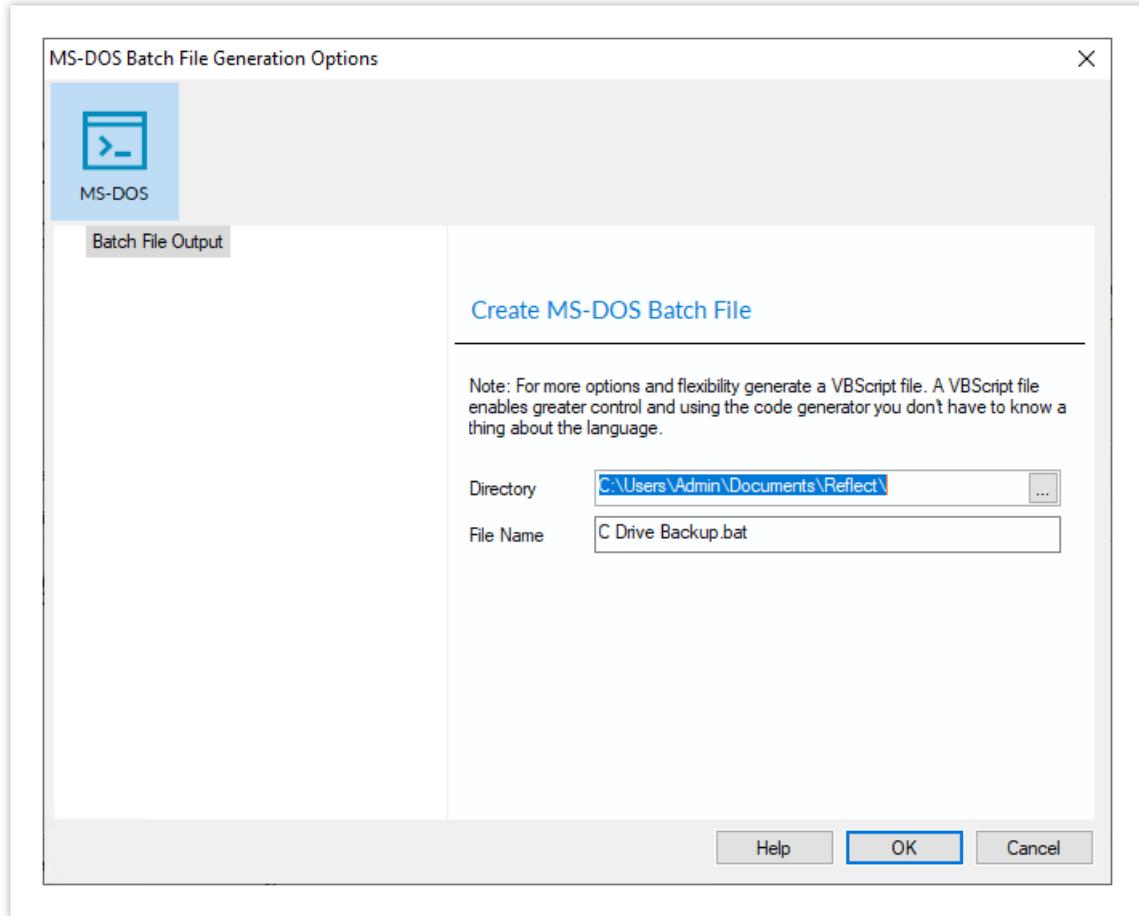
To generate an MS-DOS batch file select the **Definition Files** tab on the main window then right-click on a file and select **Generate an MS-DOS Batch File**.

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This opens the **MS-DOS Batch Generation Options** dialog:

Batch File Output



Generated code...

```
@echo off
REM ****
REM *
REM *
REM * Module Name: FDI.bat
REM *
REM * Abstract: This is a template MSDOS batch file generated by Reflect v5.0
REM *             Modify to add your own functionality if required
REM *
REM *
REM * ****
REM *
:again
"C:\Program Files\Macrium\Reflect\reflect.exe" -e -w -full "C:
\Users\Dev\Documents\Reflect\FDI.xml"
if ERRORLEVEL 3 goto busy
if ERRORLEVEL 2 goto validation_error
if ERRORLEVEL 1 goto backup_error
if ERRORLEVEL 0 goto ok
:busy
REM Will never get here if '-w' switch is used
```

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```
echo A backup or restore operation is in progress
goto again
:backup_error
REM User cancelling a backup or any other error
echo A Backup error has occurred
goto end
:validation_error
REM Command line or XML syntax errors
echo A validation error has occurred
goto end
:ok
echo ok!
goto end
:end
```

Property	Value
Directory	The folder where the batch source file is saved
File Name	The name of the batch source file. This defaults to the XML file name with a .bat extension

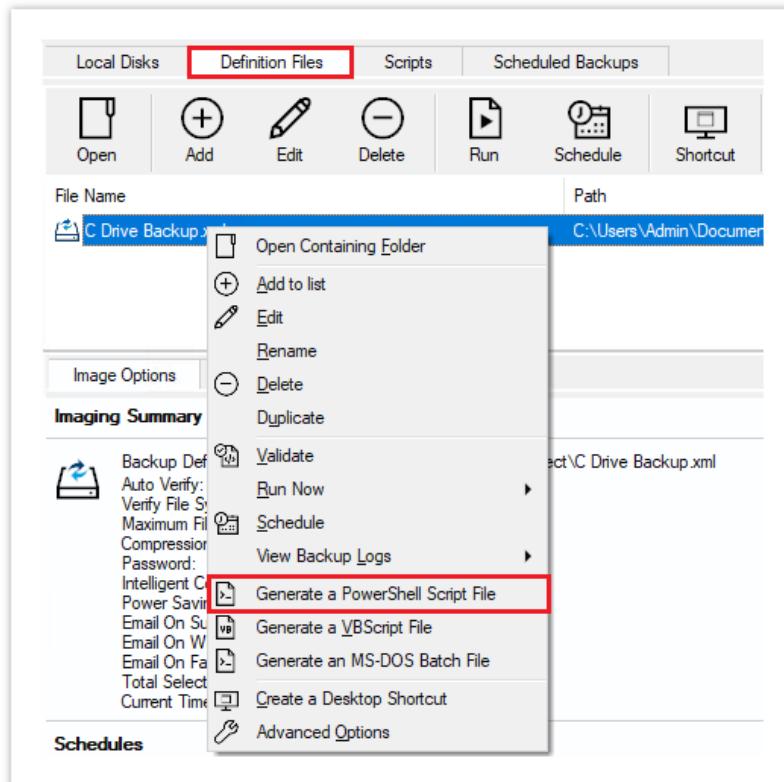
Click **OK** to generate an MS-DOS batch file

Generating a PowerShell source file

For an example of a generated PowerShell source file please see: [Example PowerShell Source File](#)

To generate a PowerShell file select the **Definition Files** tab on the main window then right-click on a file and select '**Generate a PowerShell Script File**'.

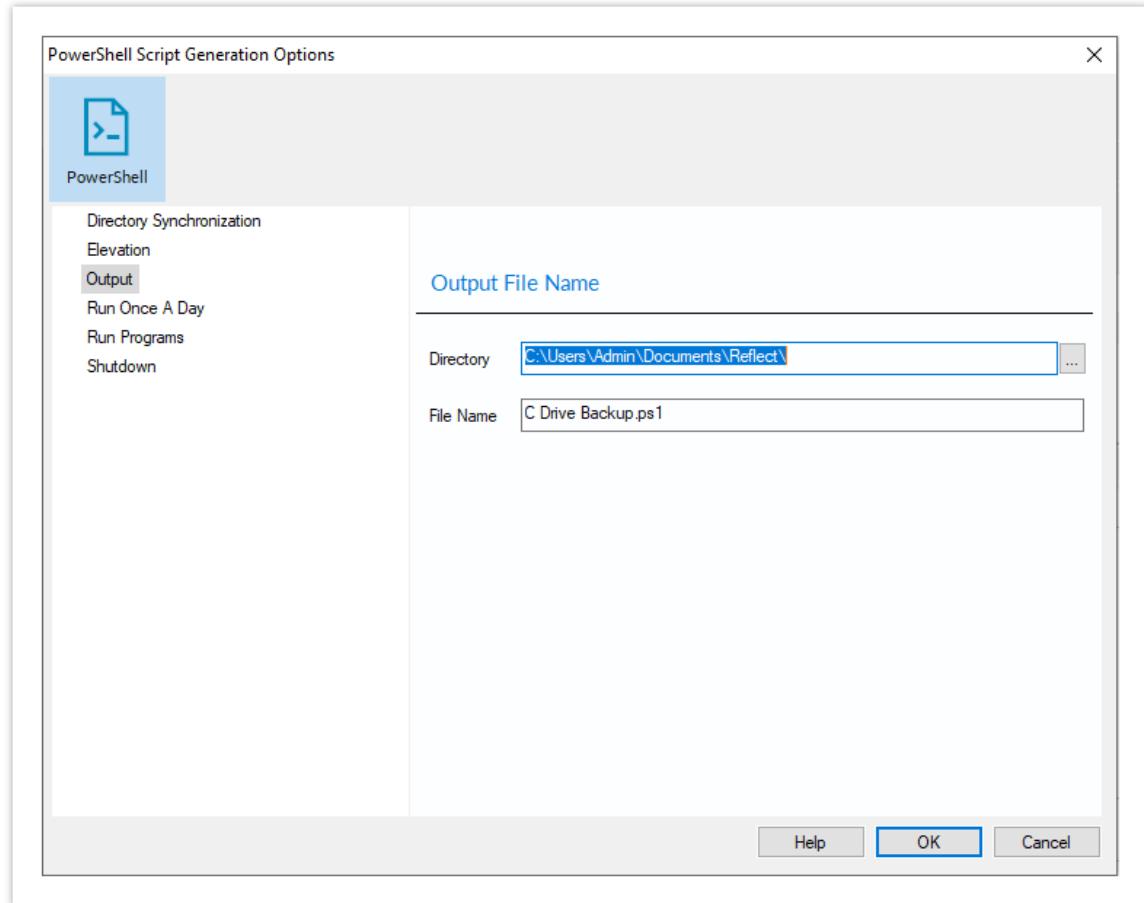
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This opens the **PowerShell Script Generation Options** dialog:

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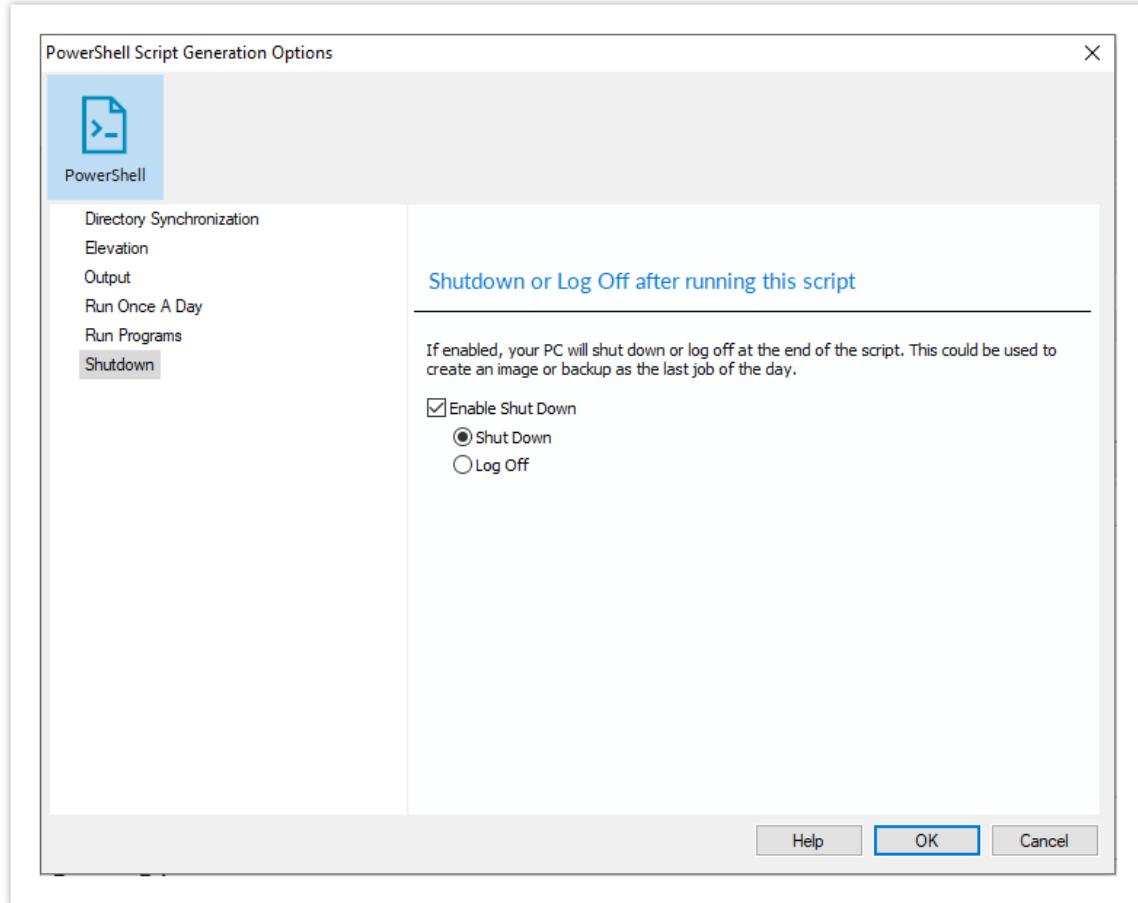
Output



Property	Value
Directory	The folder where the source file is saved
File Name	The name of the PowerShell source file. This defaults to the XML file name with a ..ps1 extension

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Shutdown

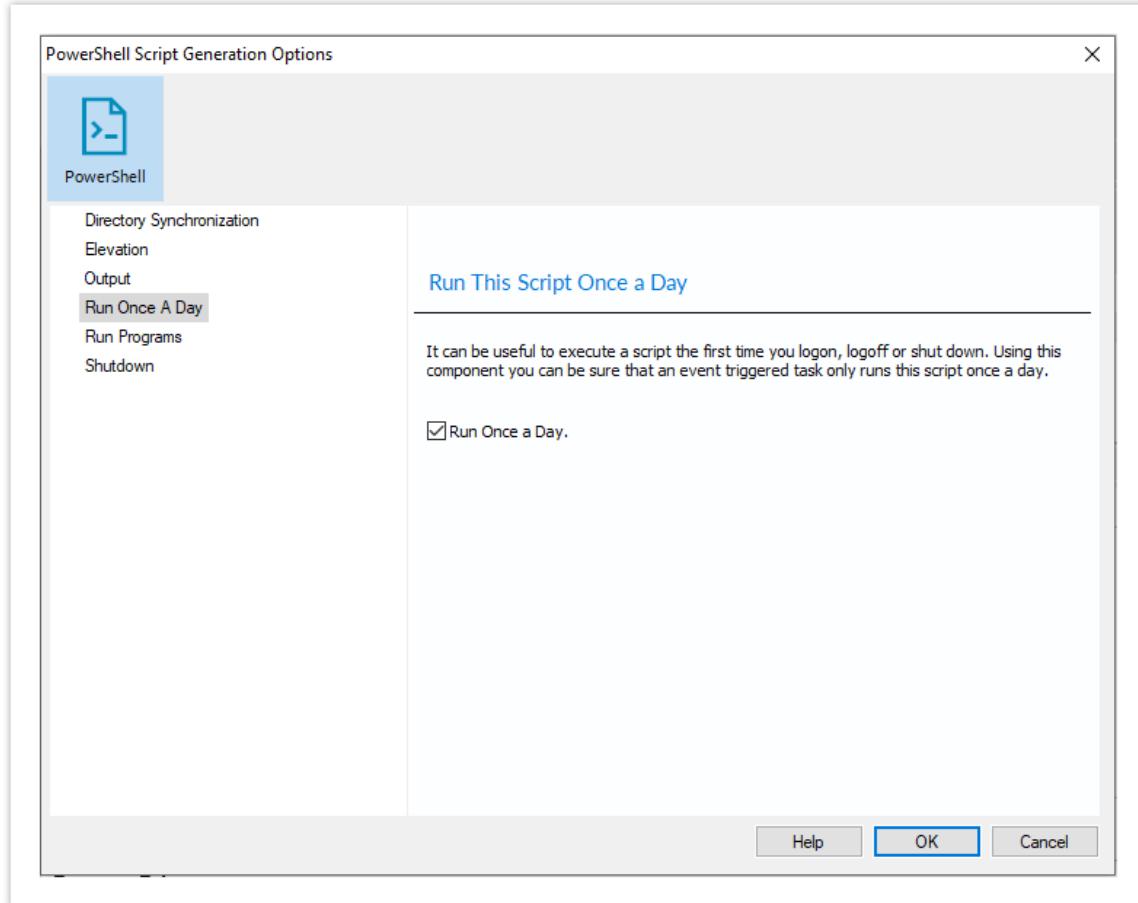


Generated code...

```
Write-Host '* Initiating shutdown...' -NoNewLine;
(Get-WMIOBJECT Win32_OperatingSystem -ComputerName '.' -EnableAllPrivileges).
Win32Shutdown(8);
```

Property	Value
Enable Shut Down	Select to enable this property
Shut down	The PC will shut down at the end of the backup
Log Off	The user will be logged out at the end of the backup

Run Once a Day



Generated code...

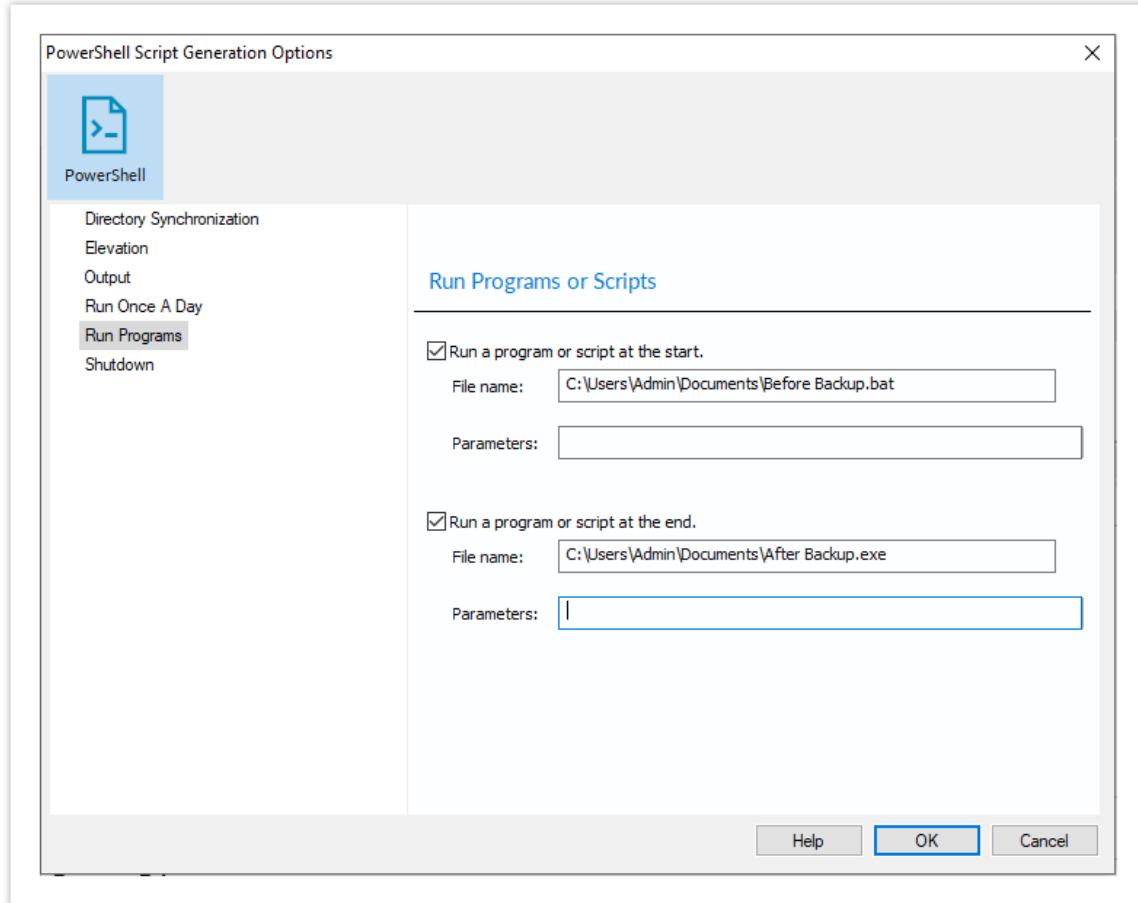
```
if (HasRunToday)
{
    Write-Host ' * Script already executed today. Exiting...';
    Write-Host 'Script finished with exit code 0.';
    Exit 0;
}
.....
#*****
#* Func: HasRunToday
#*
#* Desc: determines if this script has run today
#*
#*****
function HasRunToday()
{
    Write-Host ' * Checking last run time... ' -NoNewLine;
    $strRegPath      = 'HKCU:\Software\Macrium\Reflect\Scripts';
    $boolRanToday   = $false;
    $strDateToday   = Get-Date -UFormat %Y%m%d;
    if (Test-Path $strRegPath)
    {
        $strLastRunTime = Get-ItemProperty $strRegPath LastRunTime;
        if ($strLastRunTime -gt $strDateToday)
        {
            $boolRanToday = $true;
        }
    }
    else
    {
        $boolRanToday = $false;
    }
    Set-ItemProperty $strRegPath LastRunTime $strDateToday;
    return $boolRanToday;
}
```

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```
try
{
    $strLastRunDate = (Get-ItemProperty -Path $strRegPath -Name $strScriptPath -ErrorAction Stop).$strScriptPath
    if ($strLastRunDate -eq $strDateToday)
    {
        $boolRanToday = $true;
    }
} catch { };
}
if (!$boolRanToday)
{
    Set-ItemProperty -Path $strRegPath -Name $strScriptPath -Value $strDateToday;
}
Write-Host 'Done.';
return $boolRanToday;
}
```

Property	Value
Run Once a Day	If selected, will only enable this script to run once per day. This is useful for example if you want a backup to happen at first login or shutdown.

Run Programs



Generated code...

```
Write-Host ' * Executing "at start" program... ' -NoNewLine;
$strRunAtStartApp = 'C:\Users\Public\Admin\Before backup.bat';
$strRunAtStartArgs = '';
if ([string]::IsNullOrEmpty($strRunAtStartArgs))
{
    Start-Process -FilePath $strRunAtStartApp;
}
else
{
    Start-Process -FilePath $strRunAtStartApp -ArgumentList $strRunAtStartArgs;
}

.....
Write-Host ' * Executing "at end" program... ' -NoNewLine;
$strRunAtEndApp = 'C:\Users\Public\Admin\After backup.exe';
$strRunAtEndArgs = '';
if ([string]::IsNullOrEmpty($strRunAtEndArgs))
{
    Start-Process -FilePath $strRunAtEndApp;
}
else
```

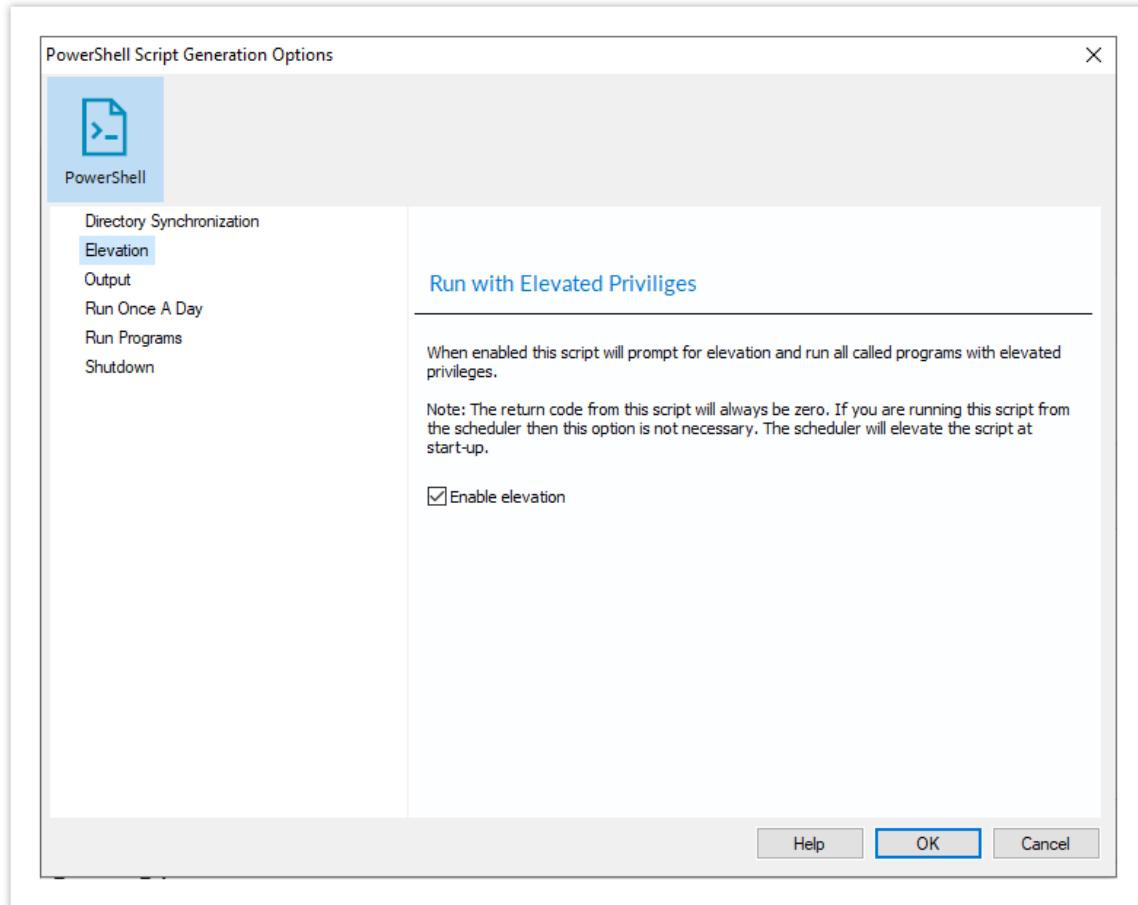
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```
{  
    Start-Process -FilePath $strRunAtEndApp -ArgumentList $strRunAtEndArgs;  
}
```

Property	Value
Run a program or script at the start	Select to enable a program or script to run before the backup starts
File Name	The path and executable file name
Parameters	Optional command line parameters for the program
Run a program or script at the start	Select to enable a program or script to run when the backup ends
File Name	The path and executable file name
Parameters	Optional command line parameters for the program

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Elevation



Generated code...

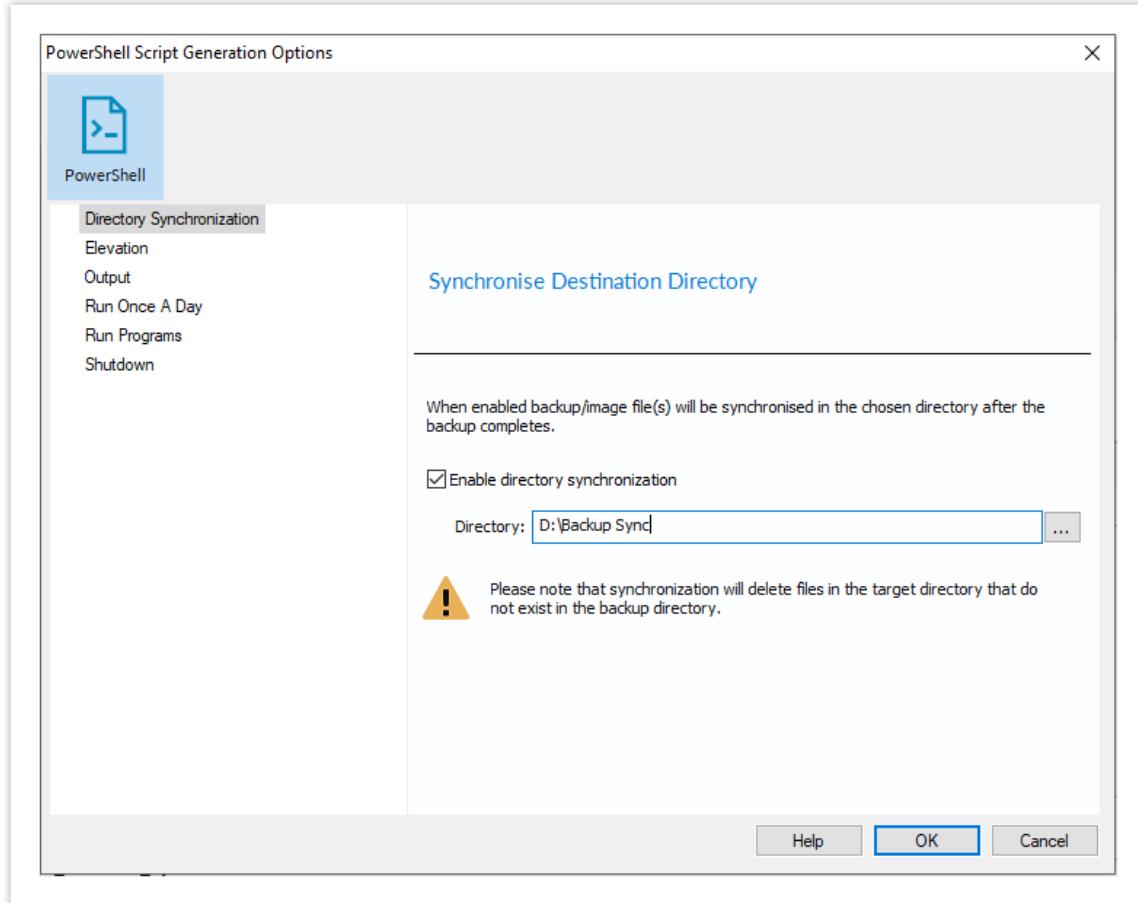
```
function Main()
{
    Write-Host 'PowerShell script for Macrium Reflect Backup Definition File';
    Write-Host "BDF: $strXmlFilePath";
    Elevate;
    .....
#*****
#* Func: Elevate
#*
#* Desc: Elevates this script for UAC.
#*       This means that only one UAC Elevation prompt is displayed and
#*       functions/programs will not fail if they require admin privileges.
#*
#*****
function Elevate()
{
    # Only elevate if not ran from the task scheduler.
    Write-Host '* Checking elevated access rights...' -NoNewLine;
    if (-Not $s)
    {
        # Check to see if we are currently running "as Administrator"
    }
}
```

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```
if (!([Security.Principal.WindowsPrincipal]::Get_Current().IsInRole([Security.Principal.WindowsBuiltInRole]"Administrator"))
{
    $ElevatedProcess = new-object System.Diagnostics.ProcessStartInfo "PowerShell";
    # Specify the current script path and name as a parameter
    $strType = GetBackupTypeParameter;
    $ElevatedProcess.Arguments = "-ExecutionPolicy Bypass & '" + $script:MyInvocation.MyCommand.Path + "' $strType";
    # Indicate that the process should be elevated
    $ElevatedProcess.Verb = "runas";
    # Start the new process
    [System.Diagnostics.Process]::Start($ElevatedProcess);
    # Exit this unelevated script with exit code for "Error: Not elevated"
    Exit 3;
}
Write-Host 'Done.';
```

Property	Value
Enable Elevation	If selected will enable UAC elevation for the entire script. This enables functions and programs to run outside the context of Macrium Reflect without requesting further elevation.

Directory Synchronization



Generated code...

```
if ($iExitCode -eq 0) # if backup completed successfully...
{
    $strBackupDir = GetLastBackupPath;
    if (! [string]::IsNullOrEmpty($strBackupDir))
    {
        SynchroniseDirectories $strBackupDir 'D:\Archive';
    }
}
.....
#*****
#* Func: SynchroniseDirectories
#*
#* Desc: Copies all Macrium Reflect files to a supplied directory.
#*
#*****
function SynchroniseDirectories($strSrcDir, $strDstDir)
{
    Write-Host ' * Synchronising directories... ' -NoNewLine;
    if (Get-Command robocopy -ErrorAction SilentlyContinue)
    {
        # robocopy is available...
    }
}
```

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```

# /copy:DAT - D:Data
#             A:Attributes
#             T:Time stamps
# /purge      - deletes destination files and directories that no longer
#                 exist in the source
# /lev:0       - Does not copy subdirectories
&robocopy $strSrcDir $strDstDir *.mr* /copy:DAT /lev:0 /purge /r:0 | Out-Null
}
else
{
    # Fall back to xcopy...
    # Delete files from the target directory not present in the source directory
    $strDstDirChildren = $strDstDir + "\*";
    Get-ChildItem $strDstDirChildren -include "*.*" | Foreach-Object {
        $strMaybeDeletedSrcFile = $strSrcDir + '\' + $_.Name;
        if (-not (Test-Path $strMaybeDeletedSrcFile))
        {
            Remove-Item $_
        }
        else
        {
            $SrcFileTime = [datetime](Get-ItemProperty -Path $strMaybeDeletedSrcFile -
Name LastWriteTime).lastwritetime;
            $DstFileTime = [datetime](Get-ItemProperty -Path $_.FullName
Name LastWriteTime).lastwritetime;
            $SrcFileTimeString = $SrcFileTime.ToString("yyyMMddHHmmss")
            $DstFileTimeString = $DstFileTime.ToString("yyyMMddHHmmss")
            if ($SrcFileTimeString -ne $DstFileTimeString)
            {
                Remove-Item $_
            }
        }
    }
    # /c - Continues copying even if errors occur.
    # /d - Date check; only copies if file does not exist or is older.
    # /h - Copies hidden and system files.
    # /i - If the destination does not exist, and you are copying more than one
    #       file, this switch assumes that the destination is a folder.
    # /v - Verifies each new file.
    # /y - Overwrites existing files without prompting.
    &xcopy $strSrcDir\*.mr* $strDstDir /c /d /h /i /v /y | Out-Null
}
Write-Host 'Done.';
}

```

Property	Value
Enable directory synchronization	If enabled will use the MS utility RoboCopy to synchronize the backup target directory with the supplied directory.
Directory	Enter the folder that you want to synchronize your backup files to

Click '**OK**' to generate the PowerShell source file

Backup Folder Synchronization

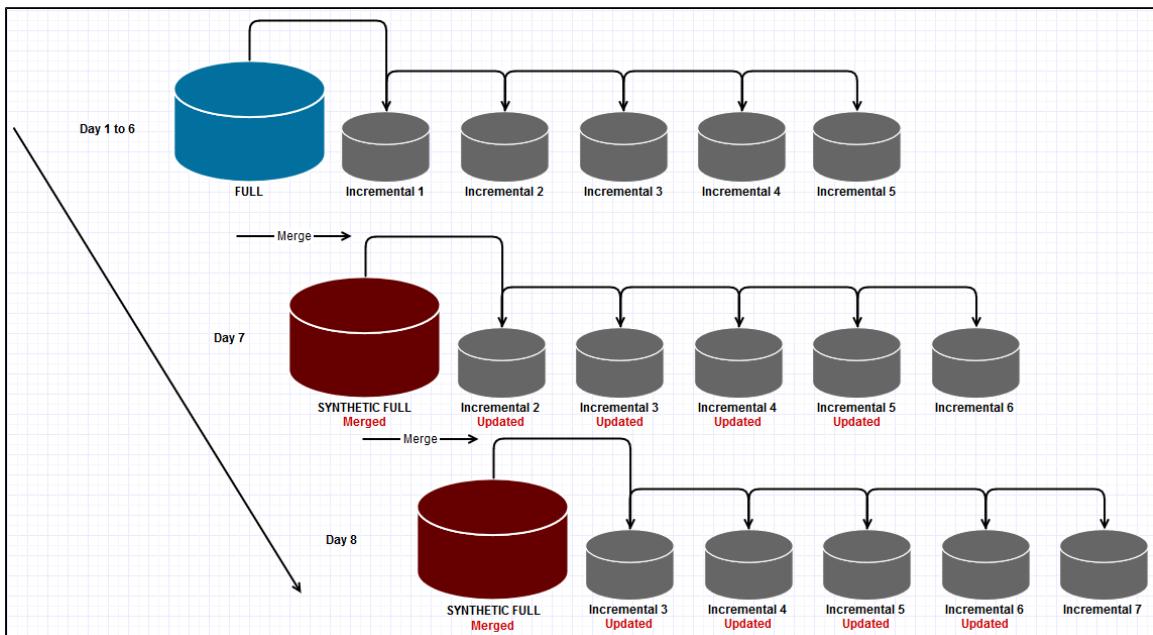


Note: This article refers to backup sets that are **not** using **Delta Incremental indexes**. Please see [Delta Indexes for Incremental Backups](#)

All backups apart from **MS Exchange** and **SQL** can use Delta Incremental indexes

When backup sets are consolidated by either creating Synthetic Full images or merging Incremental images, subsequent Incremental images in the chain are updated to reflect the consolidation. This can be observed by looking at the file modification time stamps in Windows Explorer.

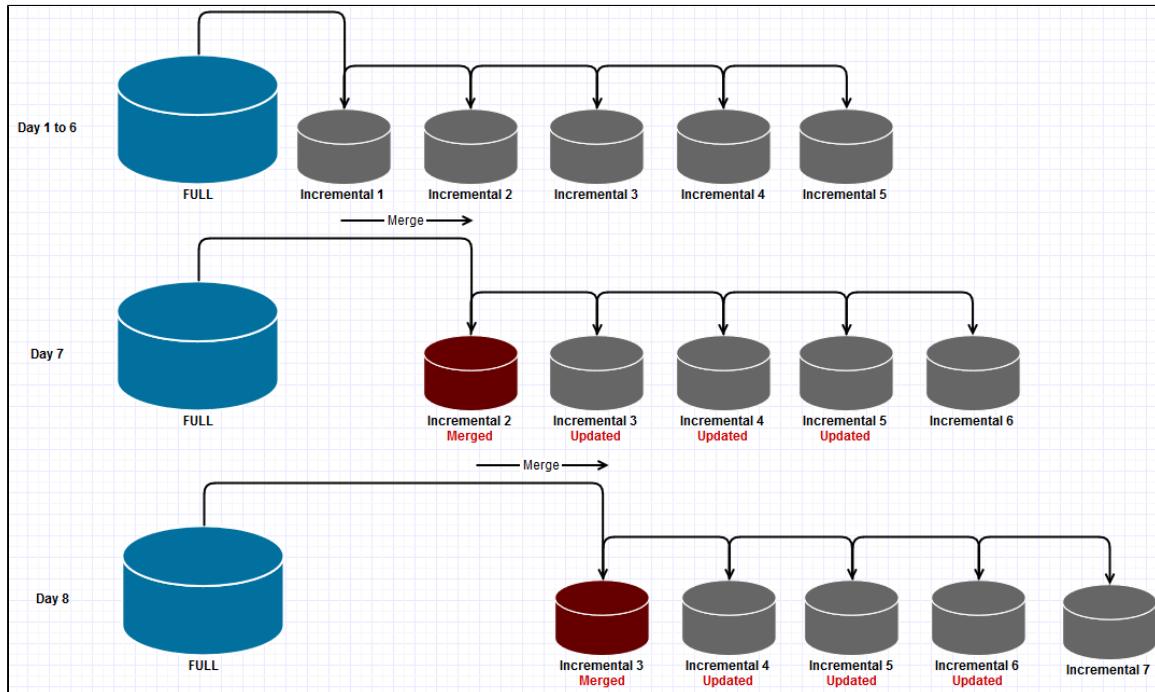
Example 1: Synthetic Full - Retain 5 Incrementals



In this example, when the 6th Incremental is created the Full image is merged with the first Incremental and existing Incremental images 2 to 5 are updated to indicate that Incremental 1 is no-longer in the backup chain by modifying the file index. This process is repeated for each subsequent Incremental that is run.

Example 2: Incremental Merge - Retain 5 Incrementals

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In this example, when the 6th Incremental is created, the first Incremental is merged with the second and existing Incremental images 3 - 5 are updated to indicated that Incremental 1 is no-longer in the backup chain by modifying the file index. This process is repeated for each subsequent Incremental that is run.



When creating duplicate copies of Image files it is essential to **synchronize all files in the backup set** rather than just copy the most recently created file.

Using RoboCopy to synchronize folders

Windows ships with a file copy utility called '**Robust File Copy**' or **RoboCopy**. Robocopy can easily synchronize two folders and ensure that copies are kept up to date.

The following command line will synchronize all Macrium Reflect files in "D:\BackupFolder" with "E:\BackupSyncFolder"

```
Robocopy "D:\BackupFolder" "E:\BackupSyncFolder" *.mr* /copy:DAT /lev:0 /purge
```

Switch	Description
.mr	Only copy Macrium Reflect .mrimg and .mrbak files
/copy:DAT	Copy Data, Attributes, and Time stamps
/lev:0	Copy only this folder. Do not copy lower level folders

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Switch	Description
/purge	Delete destination files and directories that no longer exist in the source.

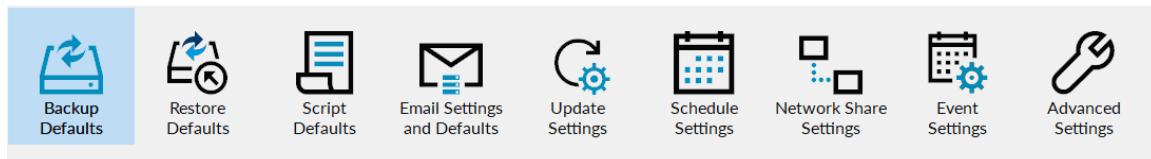
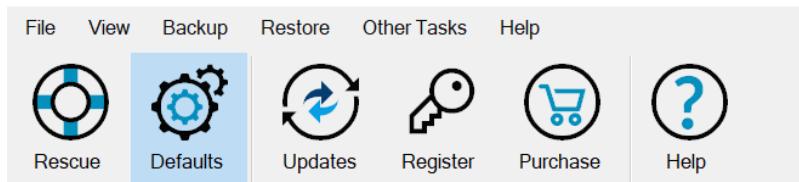
Macrium Reflect can generate VBScript and PowerShell scripts to automatically synchronize your backup sets directly after each run.

VBScript	Generating a VBScript source file
PowerShell	Generating a PowerShell source file

Defaults and Settings

The Defaults and Settings dialog enables modification of Backup Definition file defaulted values as well as application wide settings.

Take the '**Other Tasks**' > '**Edit Defaults and Settings..**' menu option, or **press the 'Defaults' toolbar button**.



- Backup Defaults
- Restore Defaults
- Script Defaults
- Email Settings and Defaults
- Update Settings
- Schedule Settings
- Network Share Settings
- Event Settings
- Advanced Settings

Backup Defaults

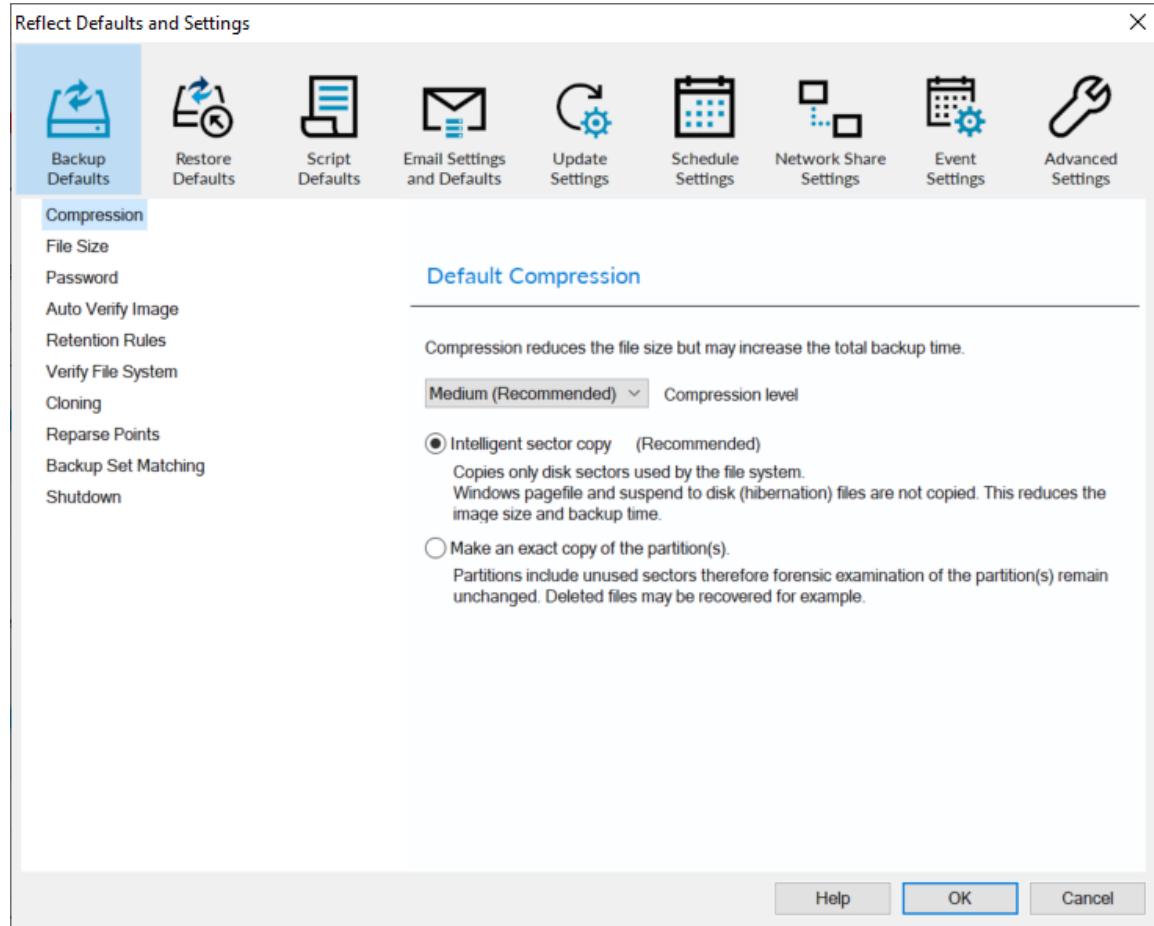


Note: New Backup Definitions will use the default values set here. **Existing backups definitions will not be affected.**

- Compression
 - File Size
 - Password
 - Auto Verify Image
 - Retention Rules
 - Verify File System
 - Cloning
 - Reparse Points
 - Backup Set Matching
 - Shutdown
-

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Compression



Backup files can be reduced in size without compromising data integrity. Compression results may vary depending on compressibility of the source data, e.g., a standard Windows install OS partition will compress to around 60-70% of its original size. The compression effectiveness for user data partitions and files will depend on the types of files being backed up. Files that won't compress further include most audio and video files, as well as existing compressed file such as .zip, .tar, .7z etc.

Compression Level	Description
None	Backup without compressing.
Medium (Recommended)	Medium compression generally provides the best compromise for performance and file size.
High	High compression may make backups take considerably longer to complete but the difference in file size may be marginal.

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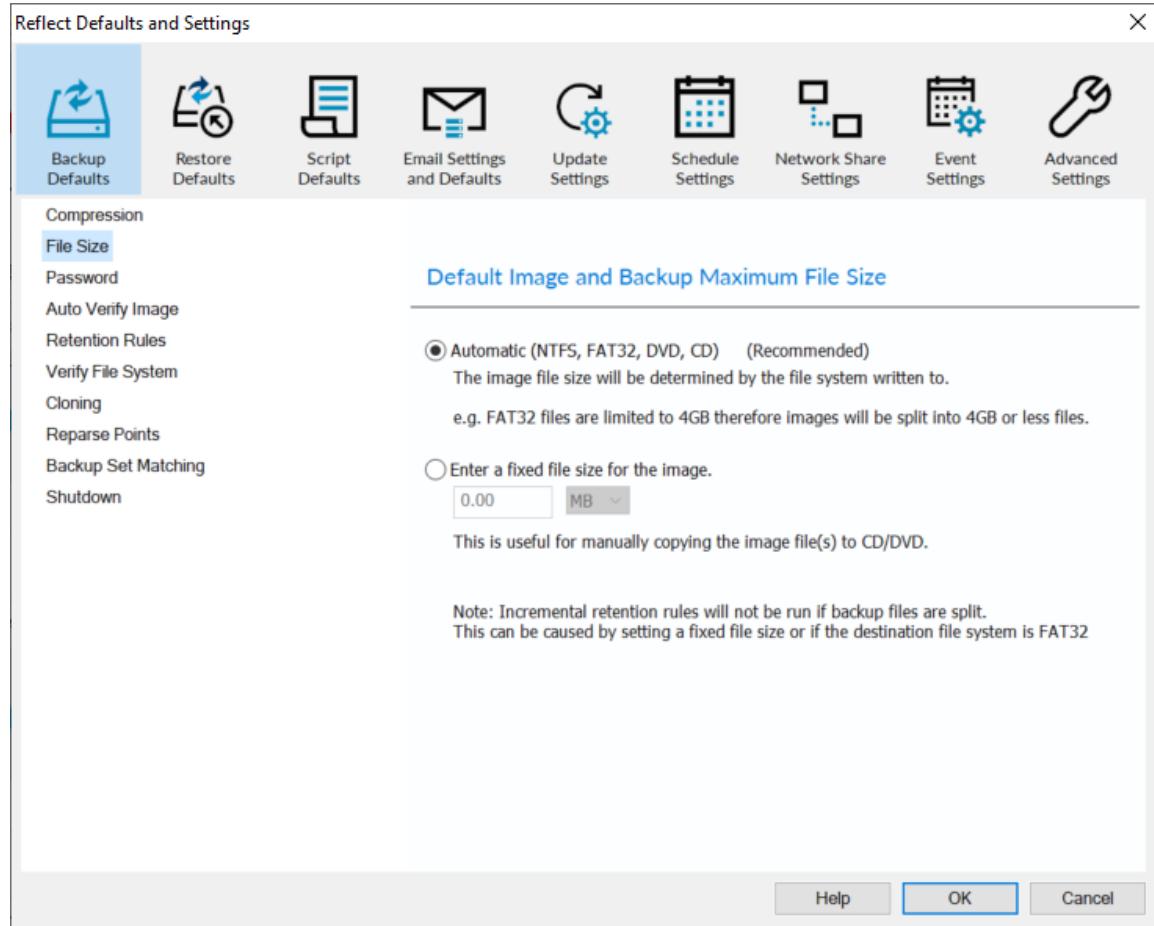
Macrium Reflect uses a very fast, real-time, *streaming block compression algorithm. This will not provide the same overall compression ratio as common compression utilities such as 7-Zip which use, much slower, whole file data compression techniques.

*All 'mountable' backup files, such as those created by Macrium Reflect, require discreet blocks of data to be compressed and decompressed 'on the fly'. This enables images and backup files to be incremented and mounted as drives in Windows Explorer,

Option	Description
Intelligent Sector Copy	Only backup data blocks that are being used by files on the disk. This significantly reduces the time it takes for backups to complete and reduces the size of the backup files. The data blocks in Pagefile (pagefile.sys) and hibernation (hiberfil.sys) files will be excluded from images. Data blocks in these files files are temporary and not required when Windows starts. These files will be visible in the imaged file system, but will take up zero space in the image file.
Forensic Copy	Backup all data blocks. This may significantly increase the size of image files. e.g., An image of a 1TB file system with only 1GB in use will contain 1TB of data blocks prior to any compression.

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File Size

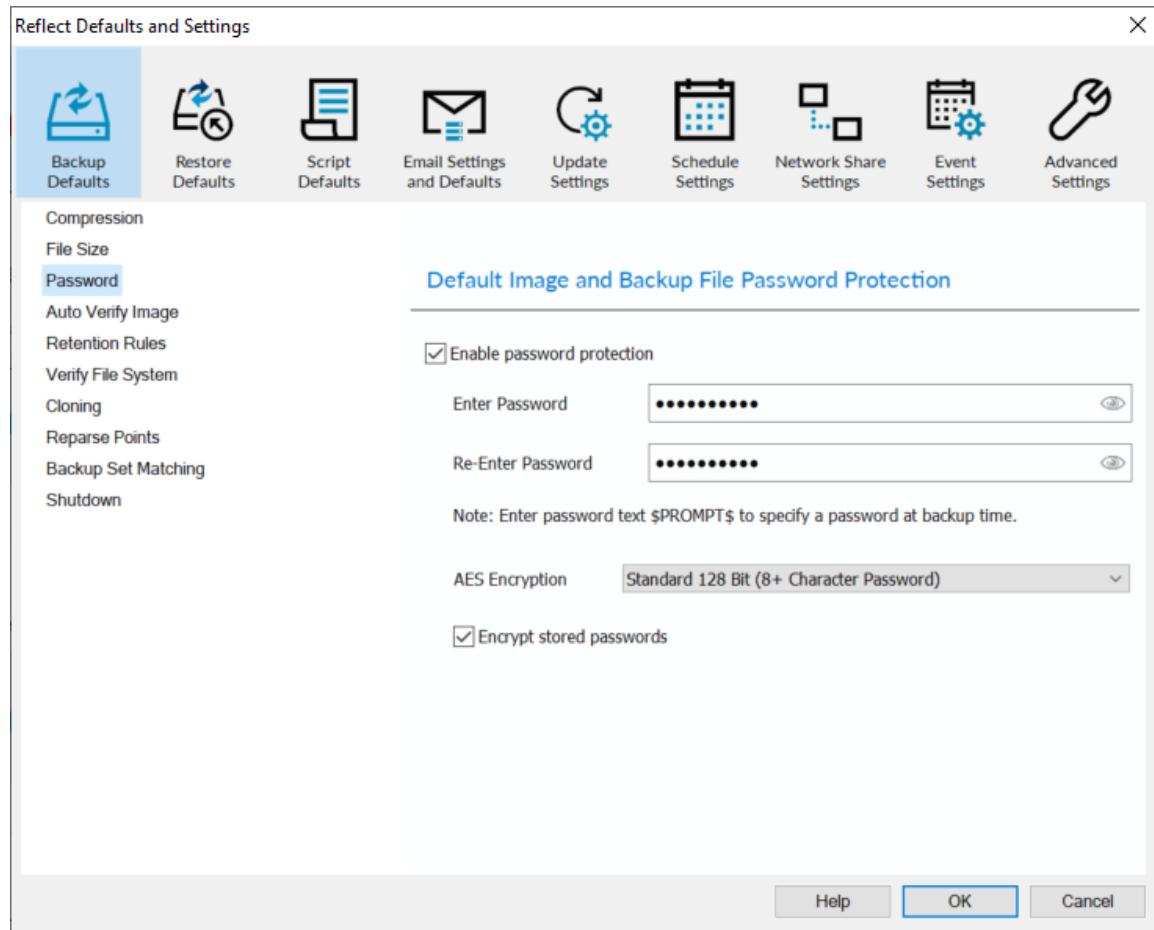


Incremental Retention Rules will not be run if backup files are split. This can be caused by setting a fixed size or if the destination file system is FAT32.

Option	Description
Automatic (Recommended)	Let the system decide on how large the images are going to be created dependent on file system (NTFS, FAT32, DVD, CD) e.g. FAT32 files are limited to 4GB therefore images are going to be split into 4GB or less files.
Fixed file size	Create Images that will be split into many fixed size files. This is useful when copying Image files to optical media or to some cloud storage providers.

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Password



With the **Password** option turned on all the images created will require a password before they can be browsed or restored.

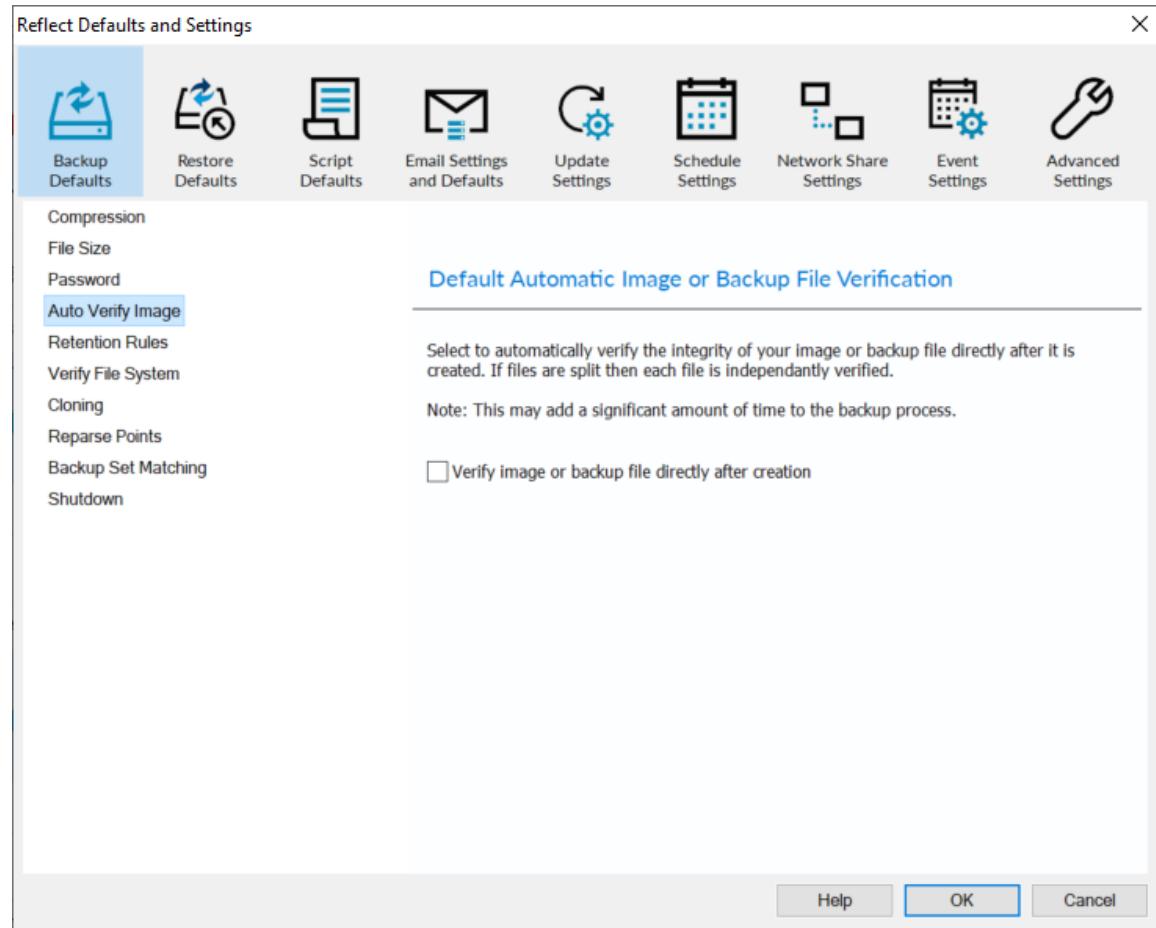
Enter Password:	The minimum password length is determined by the selected AES encryption level. Long passwords are much more secure than shorter passwords and can easily be constructed and remembered by adding together phrases and words that are unique to your memory. Passwords are not saved to backup files. Macrium Reflect uses standard PBKDF2 key derivation functions with 260K iterations to save an irreversible hash of the password. To view existing saved passwords, click the 'eye' icon in the password edit field. After entering valid Windows Administrator credentials, the password will be shown in plain text.
AES Encryption	
None	No encryption and the password can be any length.

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Standard 128 Bit	This is the default and requires a password containing at least 8 characters.
Medium 192 Bit	Requires a password containing at least 16 characters.
High 256 Bit	Requires a password containing at least 32 characters.
Encrypt stored passwords	<p>Passwords are stored in backup definition files to enable unattended backups to run. Select this option to encrypt your passwords in the xml file using a steganographically hidden asymmetric key.</p> <p>To prevent unauthorized access we recommend that backup definition files are saved to a secure location on your file system.</p> <p>If having a reversible encrypted password saved on your system presents an unacceptable security risk then enter the password \$PROMPT\$ in the password field. Once typed, the letters become visible and running backup definitions with this password will enforce manually creating and enter a password whenever the backup is run. Please note that it will not be possible to schedule unattended backups in this case:</p> 

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Auto Verify Image

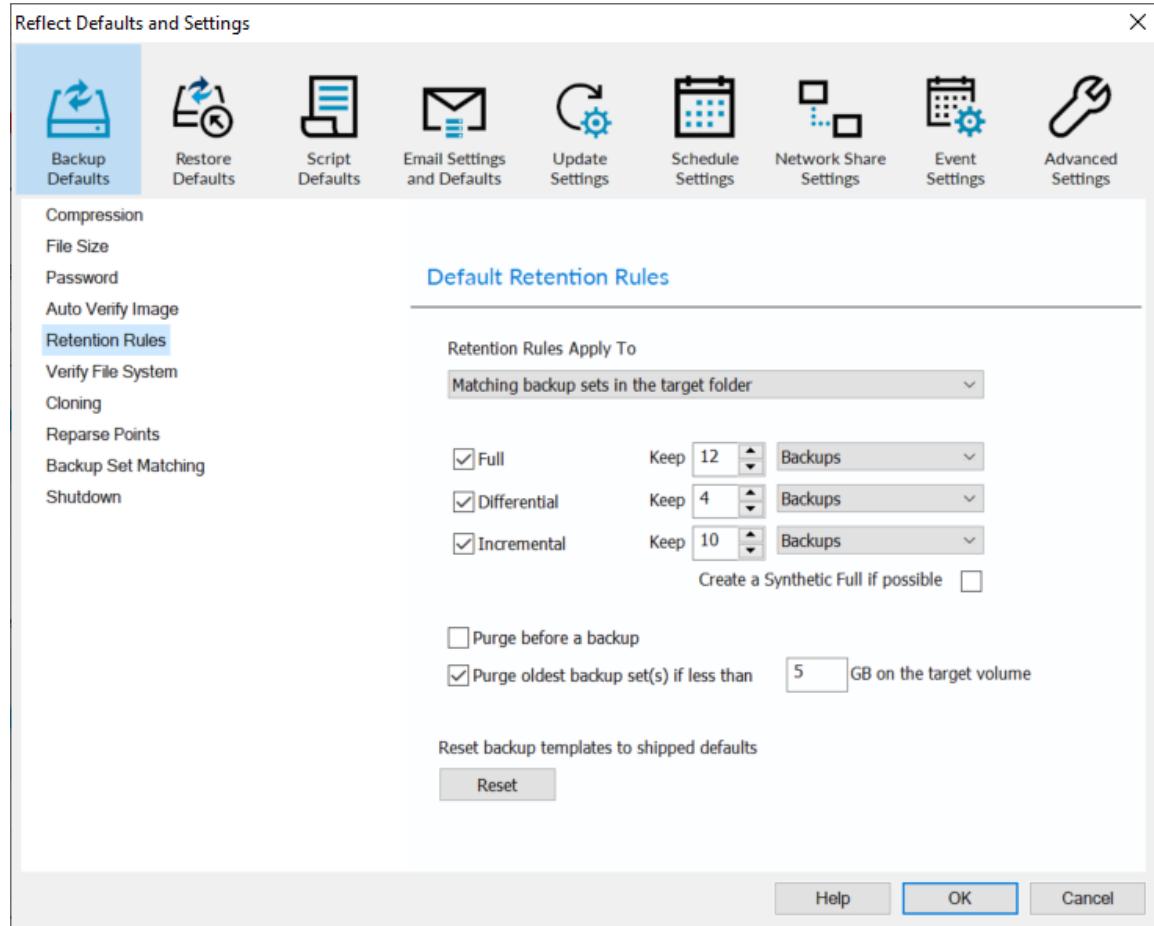


Option	Description
Verify image	Images will be verified automatically when the backup completes. <div style="border: 1px solid #ccc; padding: 5px;">i Note: This can add a significant amount of time to the backup process.</div>

For more information on image verification please see [Understanding Image Verification Failures](#)

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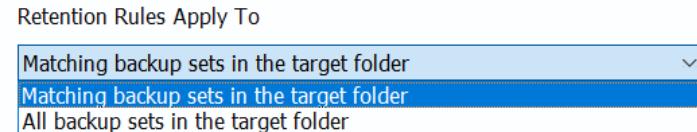
Retention Rules



Macrium Reflect retention rules provide a powerful and flexible way to manage the lifetime and storage space used by your backups.

Choose how backups are matched, and how retention rules are applied to the target folder

Retention rules are applied to the target folder of the backup by selecting one of two options:



Similar backup sets in the target folder.	Disk Images are purged if they contain exactly the same Partitions as the current Image. Partitions are identified using the unique Disk ID stored in sector 0 of the disk and the Partition sector offset . Note: For GPT disks the unique GPT disk GUID is used instead of the Disk ID For File and Folder backups retention rules are applied according to the File and Folder ' Backup Set Matching ' selection.
--	--

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All backup sets in the target folder.	<p>All backup sets in the target folder of the same type (Disk Image or File and Folder) are purged according the retention rules.</p>
--	--

Select the age or number of backup types that you wish to keep

Retention Rules Apply To

Matching backup sets in the target folder

<input checked="" type="checkbox"/> Full	Keep	12	▲	▼	Backups	▼
<input checked="" type="checkbox"/> Differential	Keep	4	▲	▼	Backups	▼
<input checked="" type="checkbox"/> Incremental	Keep	10	▲	▼	Backups	▼

Create a Synthetic Full if possible

Purge before a backup

Purge oldest backup set(s) if less than GB on the target volume

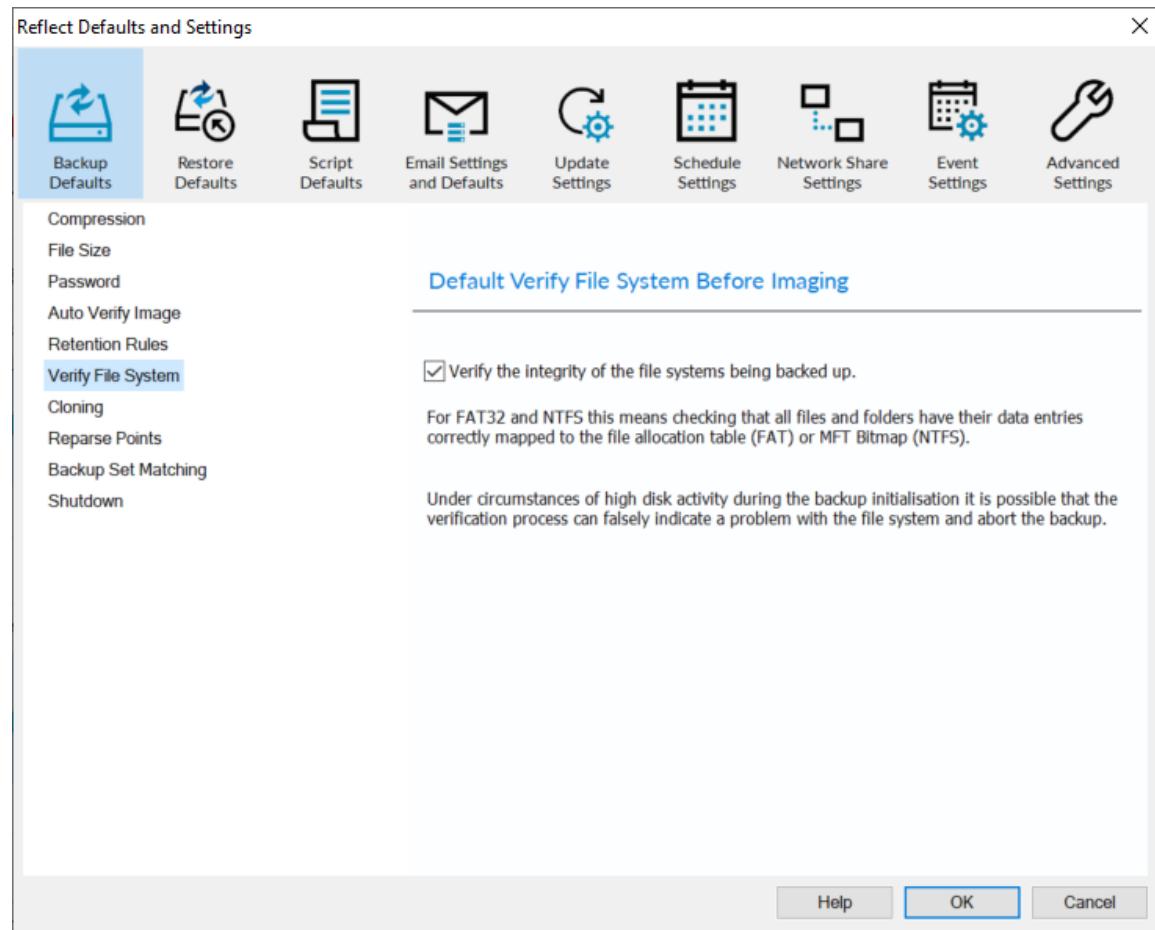
Option	Description
Full	When deleting Full backups all linked incremental and Differential backups in the same backup chain (set) are also deleted. This operation will delete the entire backup set.
Differential	When deleting Differential backups all linked incremental backups in the same backup chain (set) are also deleted.
Incremental	<p>When deleting Incremental backups the integrity of the backup set is maintained by ensuring that the chain is never broken. This is achieved by merging older Incremental backups when required.</p> <p>In the example below, before retention, there is 1 Full backup, 1 Differential backup and 6 Incremental backups. The retention rules are set to retain 4 incremental backups. After retention, the most recent 4 incremental backups are retained. Deleting the oldest 2 incrementals would cause the backup chain to be invalid as the oldest retained incremental requires the previous 2 incremental backups to complete the chain. To ensure backup integrity the 2 older incremental backups are consolidated with it to create a new incremental backup.</p>

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Option	Description																																													
	<p>F = Full D = Differential I = Incremental</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25px; text-align: center;">M</td><td style="width: 25px; text-align: center;">T</td><td style="width: 25px; text-align: center;">W</td><td style="width: 25px; text-align: center;">T</td><td style="width: 25px; text-align: center;">F</td><td style="width: 25px; text-align: center;"></td><td style="width: 25px; text-align: center;">M</td><td style="width: 25px; text-align: center;">T</td><td style="width: 25px; text-align: center;">W</td><td style="width: 25px; text-align: center;">T</td><td style="width: 25px; text-align: center;">F</td><td style="width: 25px; text-align: center;"></td><td style="width: 25px; text-align: center;">M</td><td style="width: 25px; text-align: center;">T</td><td style="width: 25px; text-align: center;">W</td></tr> <tr> <td style="text-align: center;">F</td><td></td><td></td><td></td><td></td><td></td><td style="text-align: center;">D</td><td style="text-align: center;">I</td><td style="text-align: center;">I</td><td style="text-align: center;">I</td><td style="text-align: center;">I</td><td></td><td style="text-align: center;">F</td><td style="text-align: center;">I</td><td style="text-align: center;">I</td></tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td style="text-align: center;">--</td><td style="text-align: center;">-></td><td style="text-align: center;">I</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>	M	T	W	T	F		M	T	W	T	F		M	T	W	F						D	I	I	I	I		F	I	I							--	->	I						
M	T	W	T	F		M	T	W	T	F		M	T	W																																
F						D	I	I	I	I		F	I	I																																
						--	->	I																																						
Create a Synthetic Full if possible	When purging Incremental backups, if the backup set only contains a Full backup followed by Incremental backups , then this option causes the Full backup to be 'rolled forward' to create a Synthetic Full backup . This is also known as Incremental Forever .																																													
Run the purge before the backup	Select this option to run the retention rules before the current backup. Note: in Macrium Reflect v5 the current backup set wasn't included in the purge calculation when purging before the current backup. In v6 the current backup set IS included. This means that if you set the retention count to 1 Full backup then all of your backups will be deleted and a new Full backup created.																																													
Delete oldest backup set (s) if less than n GB	Automatically remove the oldest backup set(s) in the target folder if the free space on the drive drops below the GB threshold. Note: The free space threshold is actioned dynamically. If the free space available drops below the threshold then the running backup is temporarily paused while older backup sets are purged.																																													

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Verify File System



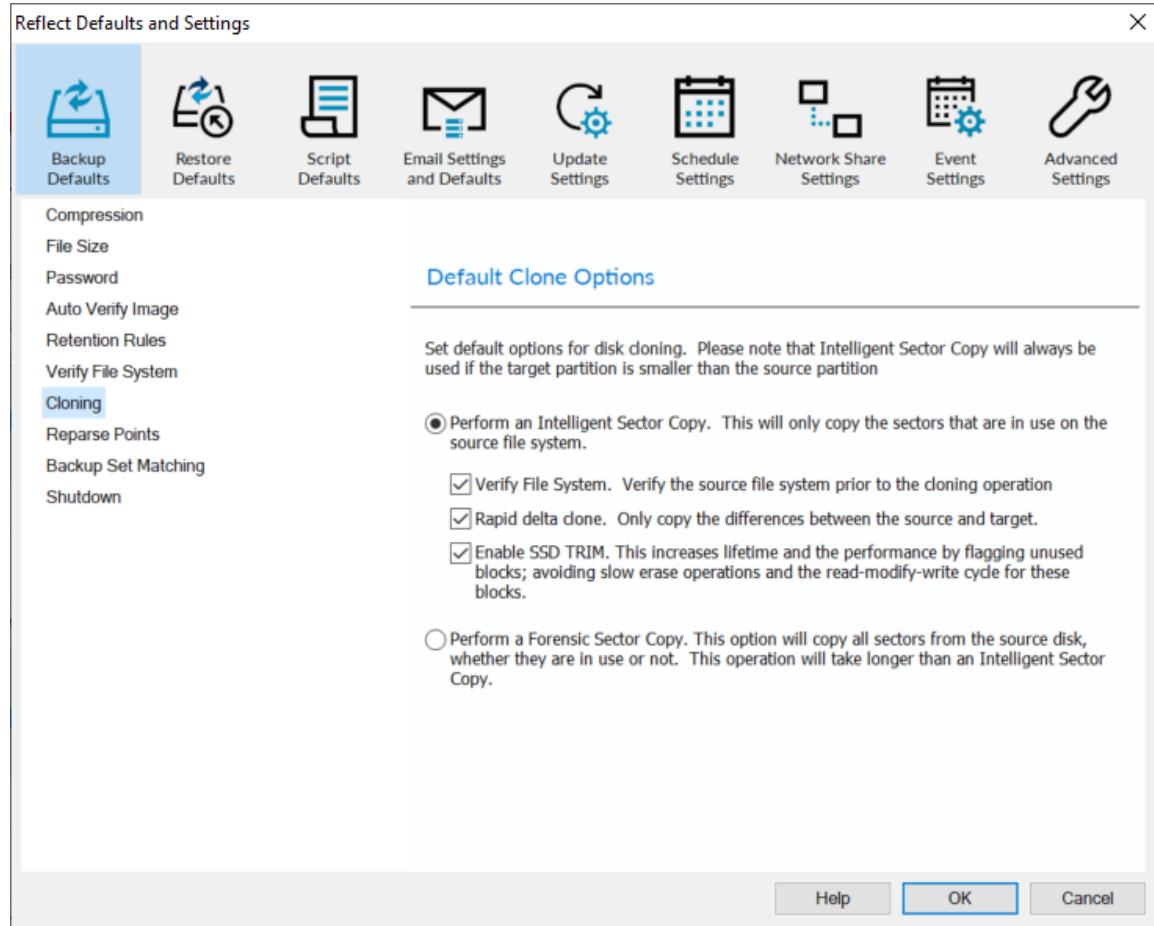
Verify File System is used to check the integrity of the file system before a backup.

Macrium Reflect will automatically verify the integrity of FAT32 and NTFS file systems being backed up. This means checking that all files and folders have their data entries correctly mapped to the file allocation table (FAT) or \$MFT Bitmap (NTFS).

This is a comprehensive check, and similar in functionality to the MS-DOS chkdsk command that may increase the time taken to complete a backup.

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Cloning



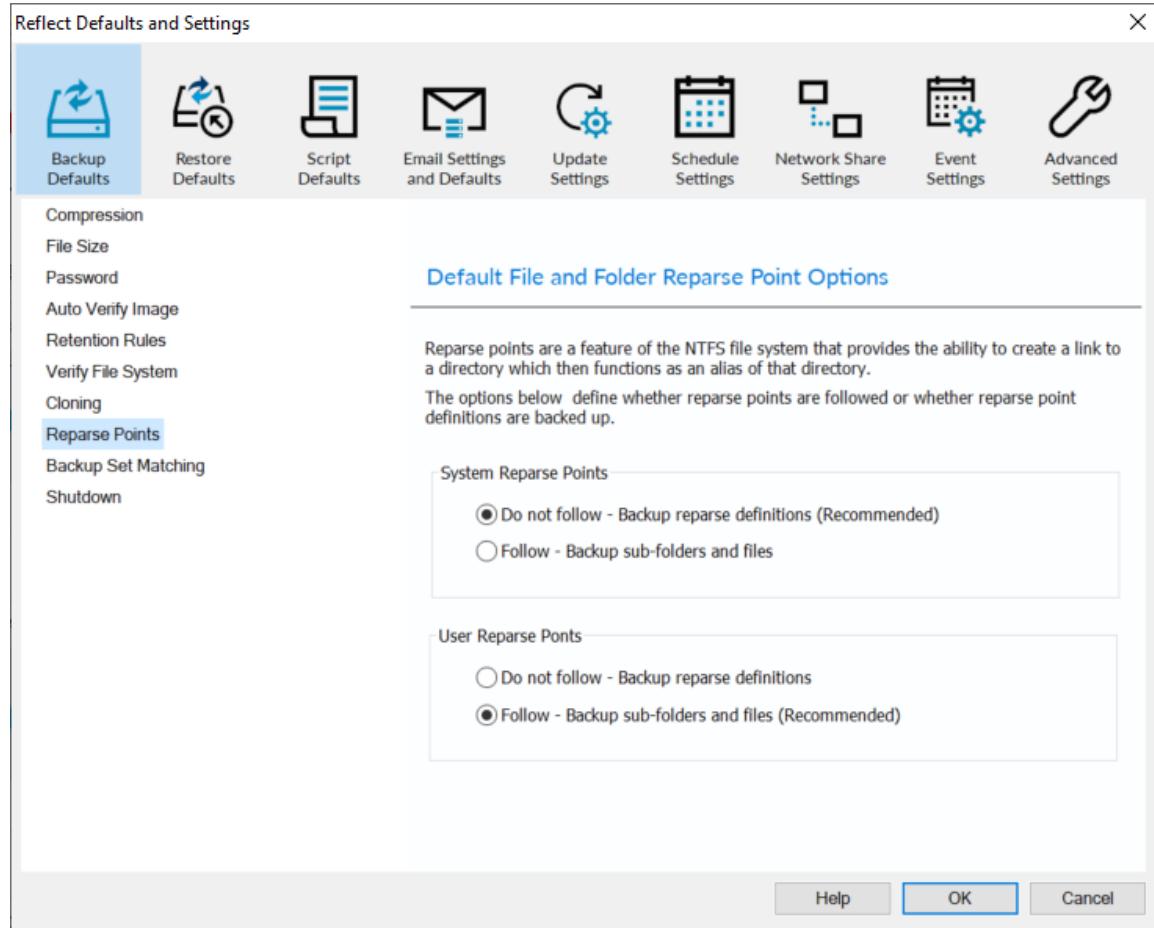
Option	Description							
Perform an Intelligent Sector Copy	<p>Only backup the sectors that are being used by data on the disk. Pagefile (pagefile.sys) and hibernation (hiberfil.sys) will be excluded.</p> <p>This reduces the time it takes for the clone to complete.</p> <table border="1"> <thead> <tr> <th>Option</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Verify File System</td> <td>Reflect will verify the integrity of your file system; Verification check that all files and folders data entries are correctly mapped to the file allocation table (FAT) or MFT Bitmap (NTFS)</td> </tr> <tr> <td>Rapid Delta Clone</td> <td></td> </tr> </tbody> </table>		Option	Description	Verify File System	Reflect will verify the integrity of your file system; Verification check that all files and folders data entries are correctly mapped to the file allocation table (FAT) or MFT Bitmap (NTFS)	Rapid Delta Clone	
Option	Description							
Verify File System	Reflect will verify the integrity of your file system; Verification check that all files and folders data entries are correctly mapped to the file allocation table (FAT) or MFT Bitmap (NTFS)							
Rapid Delta Clone								

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Option	Description
	<p>As with Rapid Delta Restore (RDR) the concept of RDR has been something that has been thought about for quite some time here at Macrium Software. We wanted to build a clone solution that would effectively and rapidly copy only the differences between the source and target file systems. The advantage of this is obvious, RDC offers similar a performance increase as an Incremental disk image offers over a Full image and enables regular clones to be a viable and fast DR solution.</p> <p>How does it work?</p> <p>The NTFS file system resident on the clone source is compared with file system on the target disk. The two file systems are first verified that they originated from the same format command and then the target NTFS file system structures are analyzed for differences. All the NTFS file system structures are copied to the target disk and any that do not exist or have been modified on the target disk cause the data records for each NTFS file or object to be copied as well. The result is an 'Incremental' clone applying only file system changes detected between the source and the target.</p> <p>Note: RDC works with NTFS file systems only. All other file systems will perform a full clone</p> <p>Note: RDC is not available when shrinking partitions during a clone.</p>
	<p>Enable SSD TRIM This features provides automated SSD optimization resulting enhanced SSD performance and longevity. Writing to an unused block is much quicker than an in-use block as it avoids both the slow erase operation and the read-modify-write cycle. This results an increase of both the lifetime and the performance of the device. It is effective for all windows operating systems, even those that support SSD trim natively as the file system driver can only TRIM blocks on de-allocation; it cannot TRIM blocks written by another process. It is also effective for USB attached SSDs.</p>
<p>Perform a Forensic Sector Copy</p>	<p>Backup every sector. This can add a significant amount of time to the backup process.</p>

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Reparse Points



Reparse points are a feature of the NTFS file system that provides the ability to create a link to a directory which then functions as an alias of that directory.

e.g. Reparse point is the folder "Documents and Settings" which when followed points (or expands) to a number of other folders. If followed then all folders the reparse point "contents" will be included in the backup.

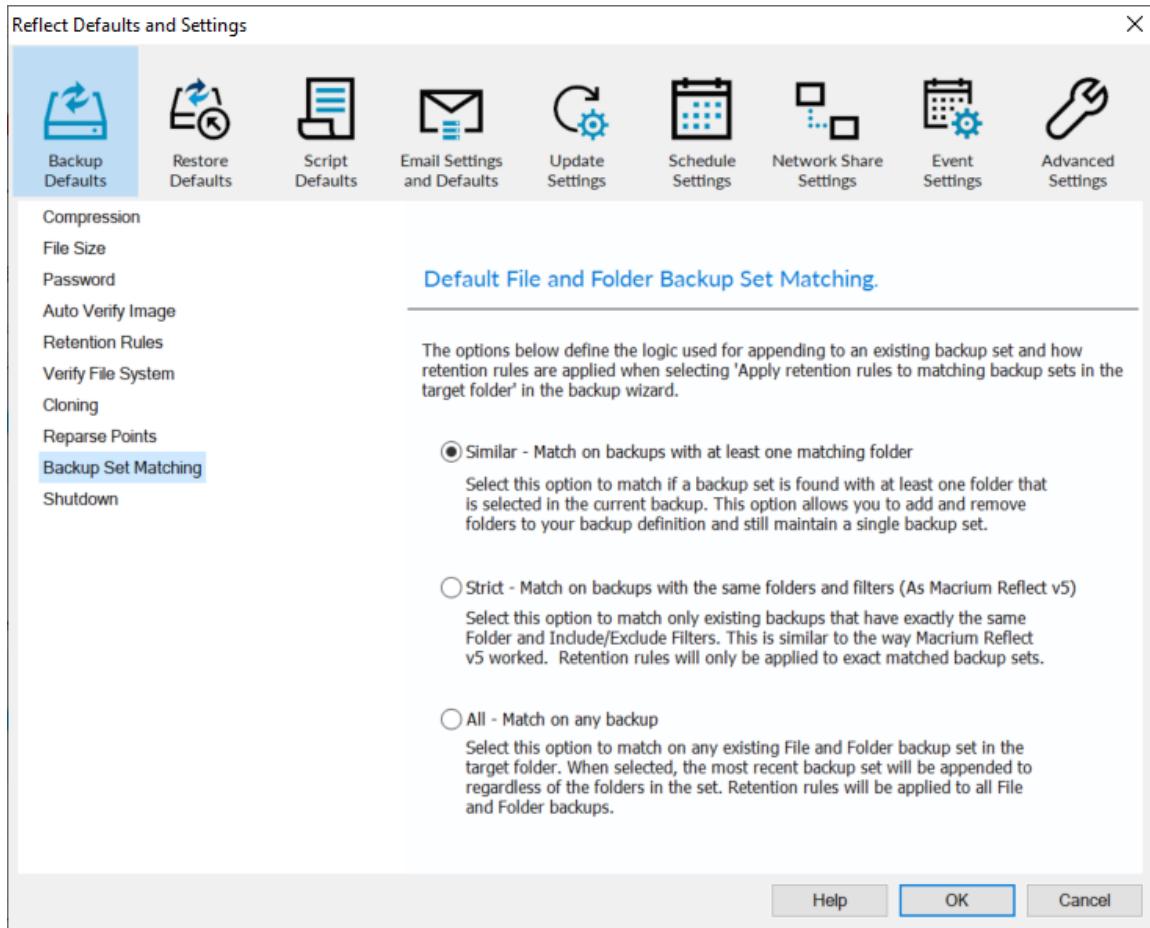
The options below define whether reparse points are followed or whether reparse point definitions are backed up:

Option	Description	
System Reparse Points	Do not follow	Only backup the Reparse Definitions (Recommended)
	Follow	Backup all the Reparse Points
User Reparse Points	Do not follow	Backup the Reparse Definitions

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Option	Description	
	Follow	Backup all the Reparse Points (Recommended)

Backup Set Matching



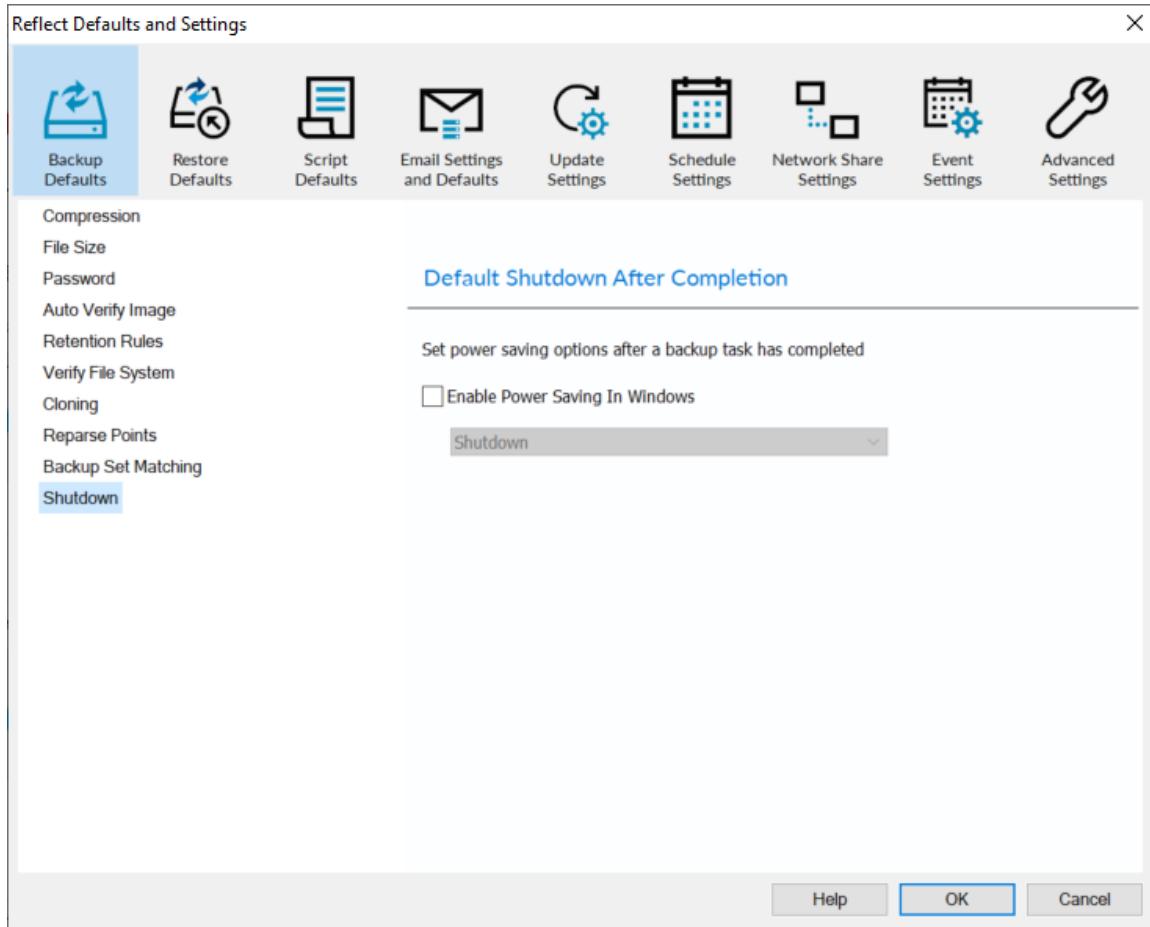
The options below define the logic used for appending to an existing backup set and how retention rules are applied when selecting '**Apply retention rules to matching backup sets in the target folder**' in the backup wizard.

Option	Description
Similar - Match on backups with at least one matching folder	Add and remove folders in your backup definition and still maintain a single backup set.
Strict - Match on backups with the same folders and filters	Retention rules will only be applied to exact matched backup sets.

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Option	Description
All - Matching on any backup	Retention rules will be applied to all File and Folder backup sets.

Shutdown



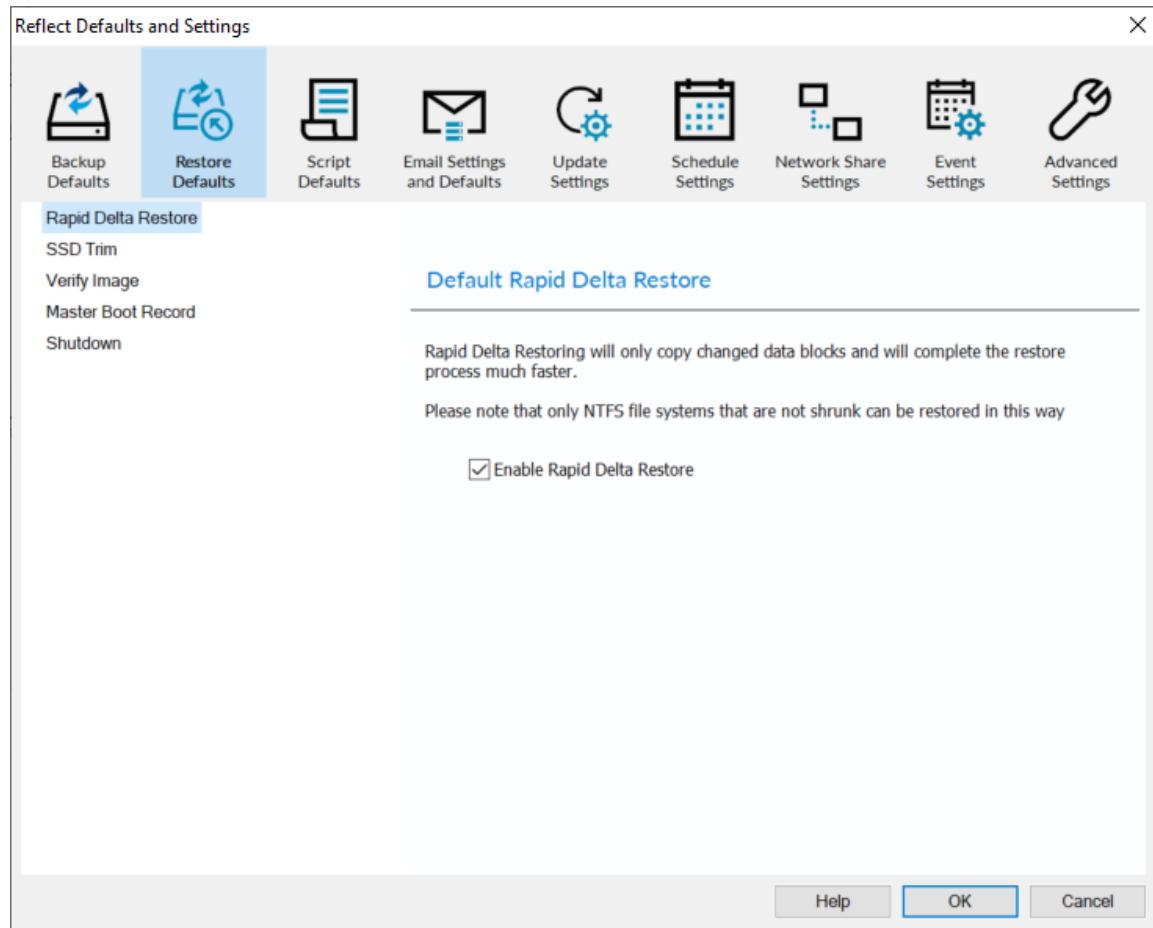
Option	Description
Shutdown	This will Shutdown your computer after the backup is complete. A sub-option can be enabled to Force the shutdown process - All programs will be forced to close without being queried.
Hibernate	This will Hibernate your computer after the backup is complete
Suspend	This will put your computer to Sleep after the backup is complete.

Restore Defaults

- Default Rapid Delta Restore
- Default SSD Trim
- Default Verify Before Restoring
- Default Master Boot Record Restore
- Default Shutdown After Completion

Default Rapid Delta Restore

Rapid Delta Restore will only restore the changed data blocks and not the whole backup file.



Enabling Rapid Delta Restore decreases the time it will take to restore a backup. Only NTFS file systems that are not shrunk can be restored this way.

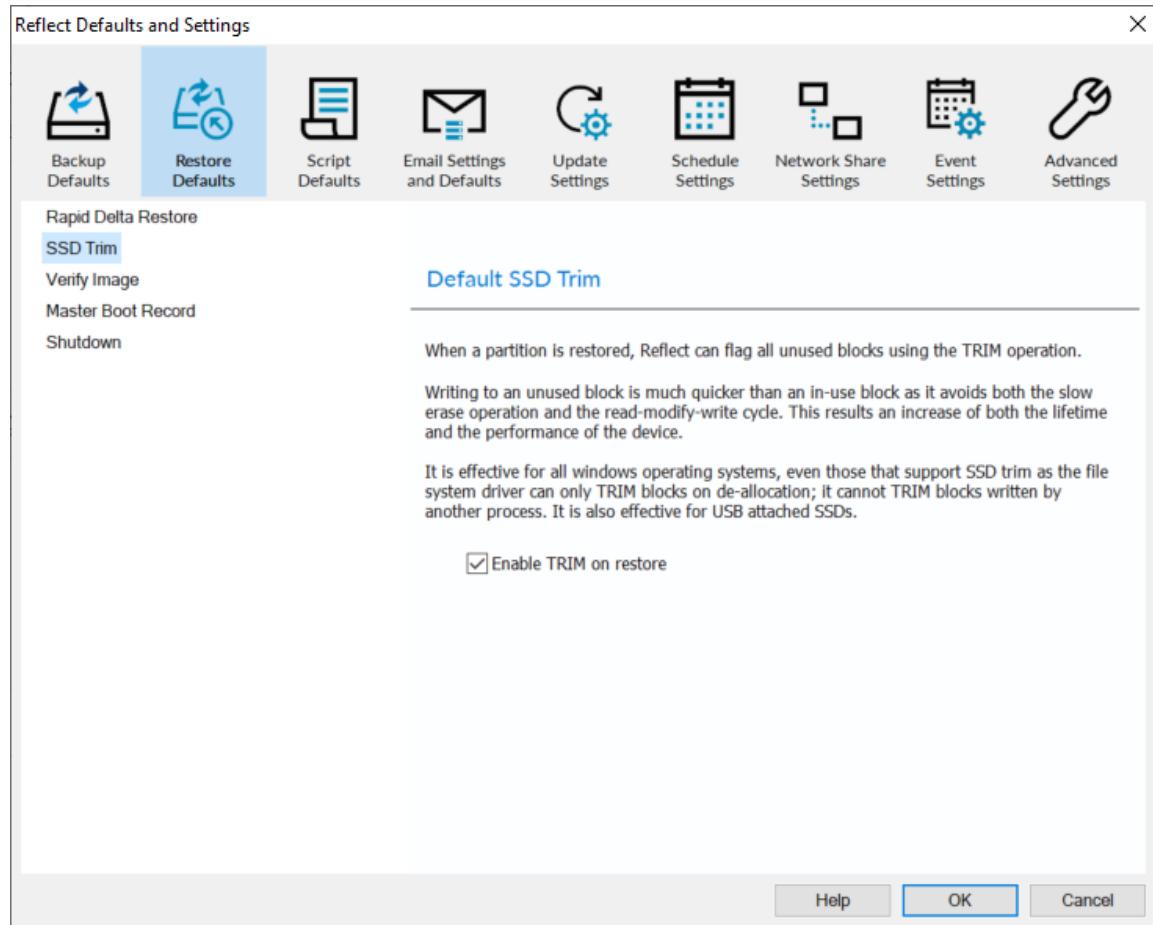


To find out more about RDR please click [here](#).

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Default SSD Trim

SSD Trim option enables SSD TRIM on restore.



When a partition is restored, Reflect can flag all unused blocks using the TRIM operation.

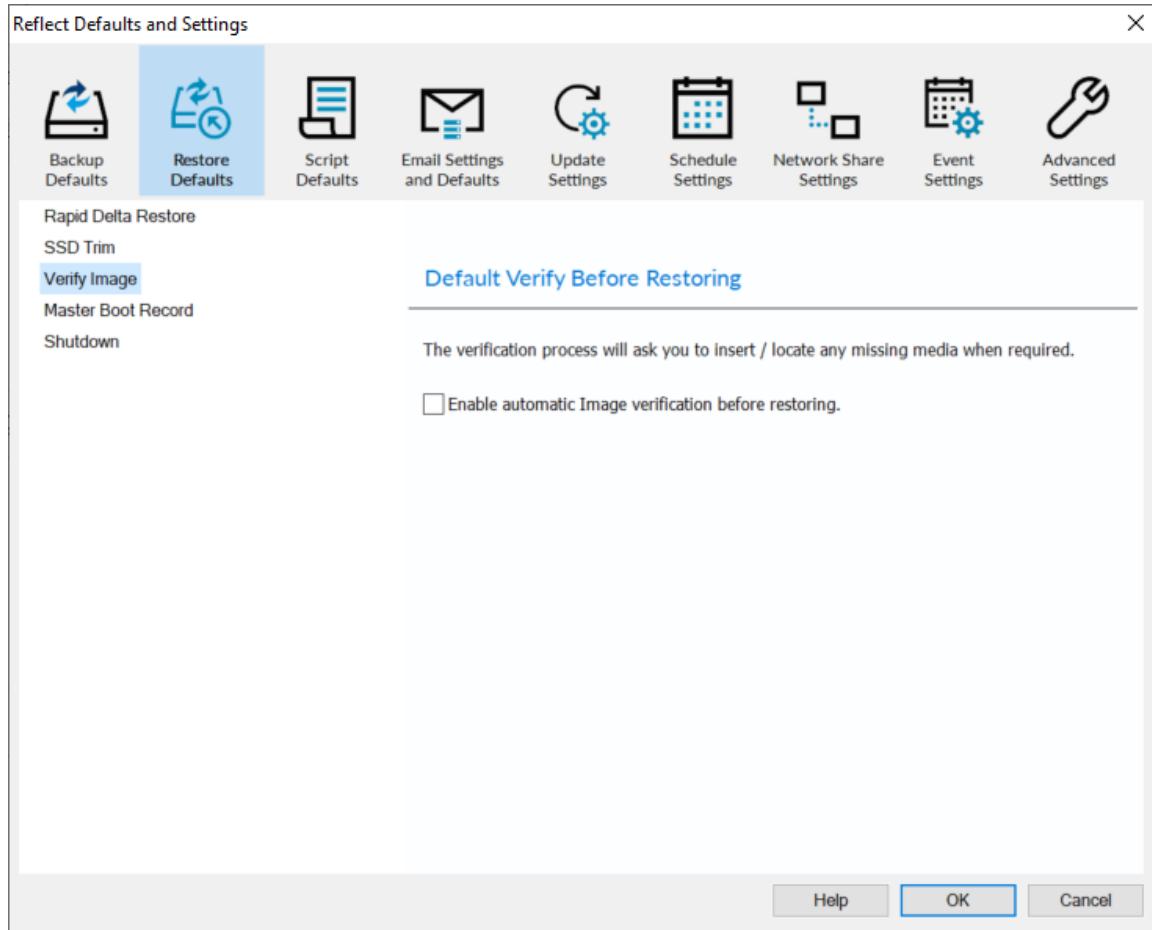
Writing to an unused block is much quicker than an in-use block as it avoids both the slow erase operation and the read-modify-write cycle. This results an increase of both the lifetime and the performance of the device.

It is effective for all Windows operating systems, even those that support SSD trim as the file system driver can only TRIM blocks on de-allocation; it cannot TRIM blocks written by another process. It is also effective for USB attached SSDs.

Default Verify Before Restoring

Verify Image option verifies images before restoring.

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Enabling verification will increase the restore time significantly.



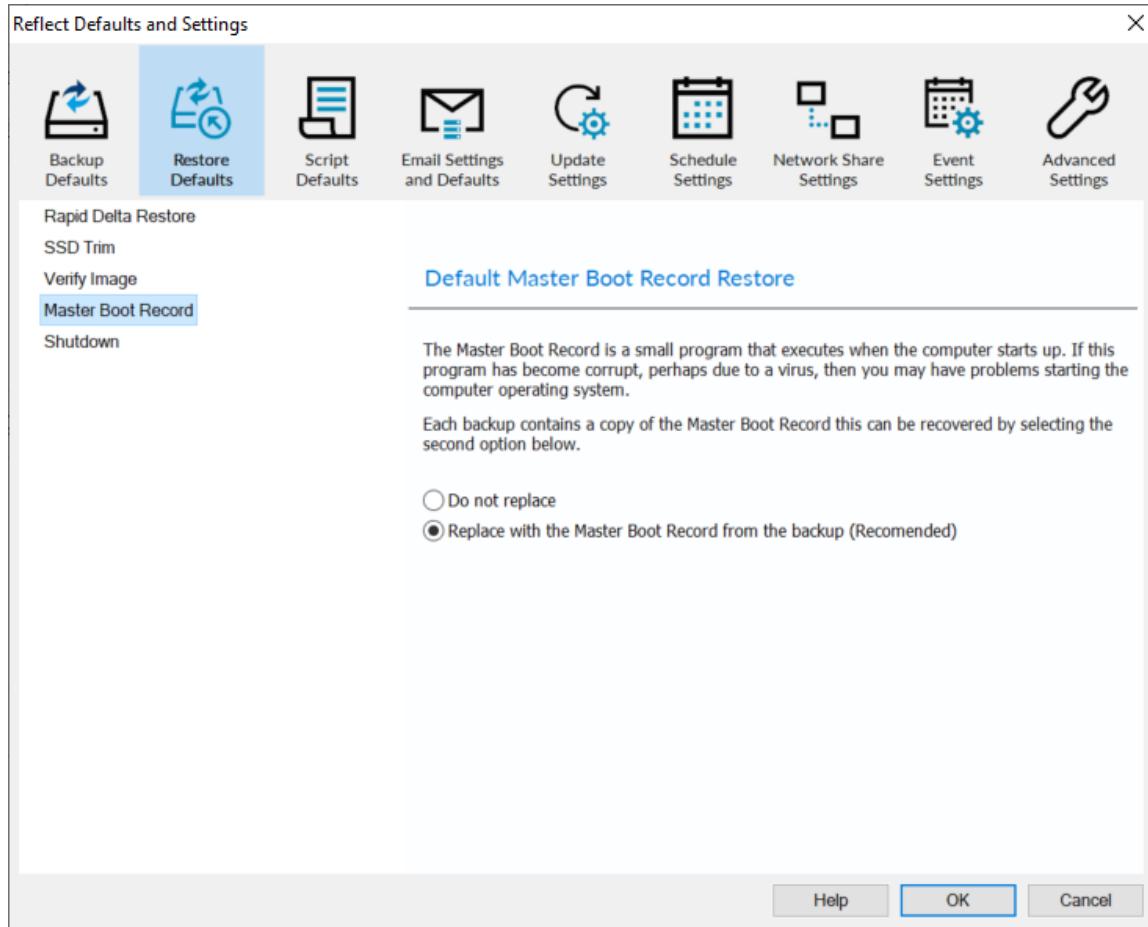
The verification process will ask you to insert / locate any missing media when required.

Default Master Boot Record Restore

Master Boot Record options select whether to recover and replace the Master boot record (sector 0) and the remainder of **Track 0** from the backup.

Track 0 is sector 0 through to 63, and is usually unused from sector 1 for an MBR disk

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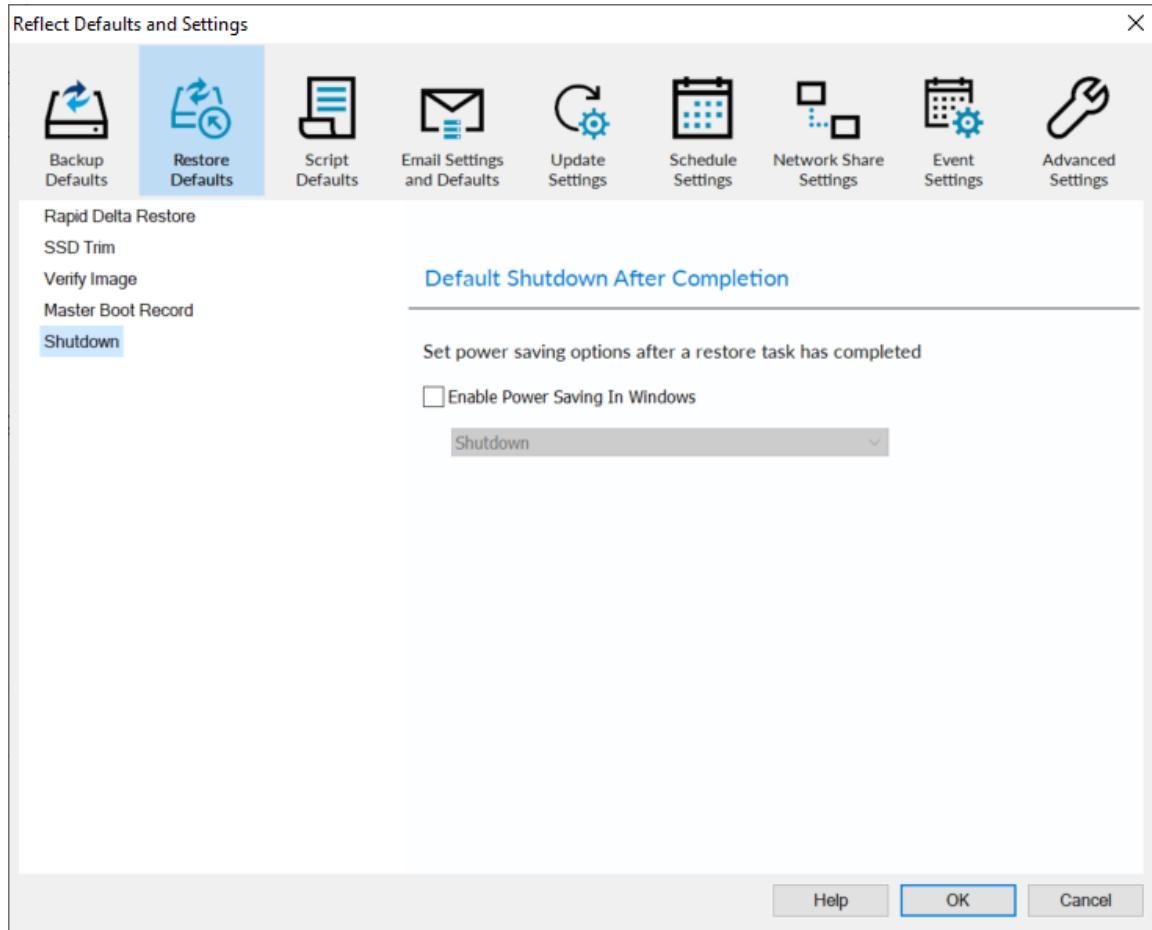
For MBR disks, the partition table in the first sector is always recalculated to align with the restored partition(s)

For GPT disks, this option has no effect.

Default Shutdown After Completion

Determines if the PC should **Shutdown, Hibernate, Suspend or Reboot** after the restore has completed.

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Select 'Enable' to default the selected option.

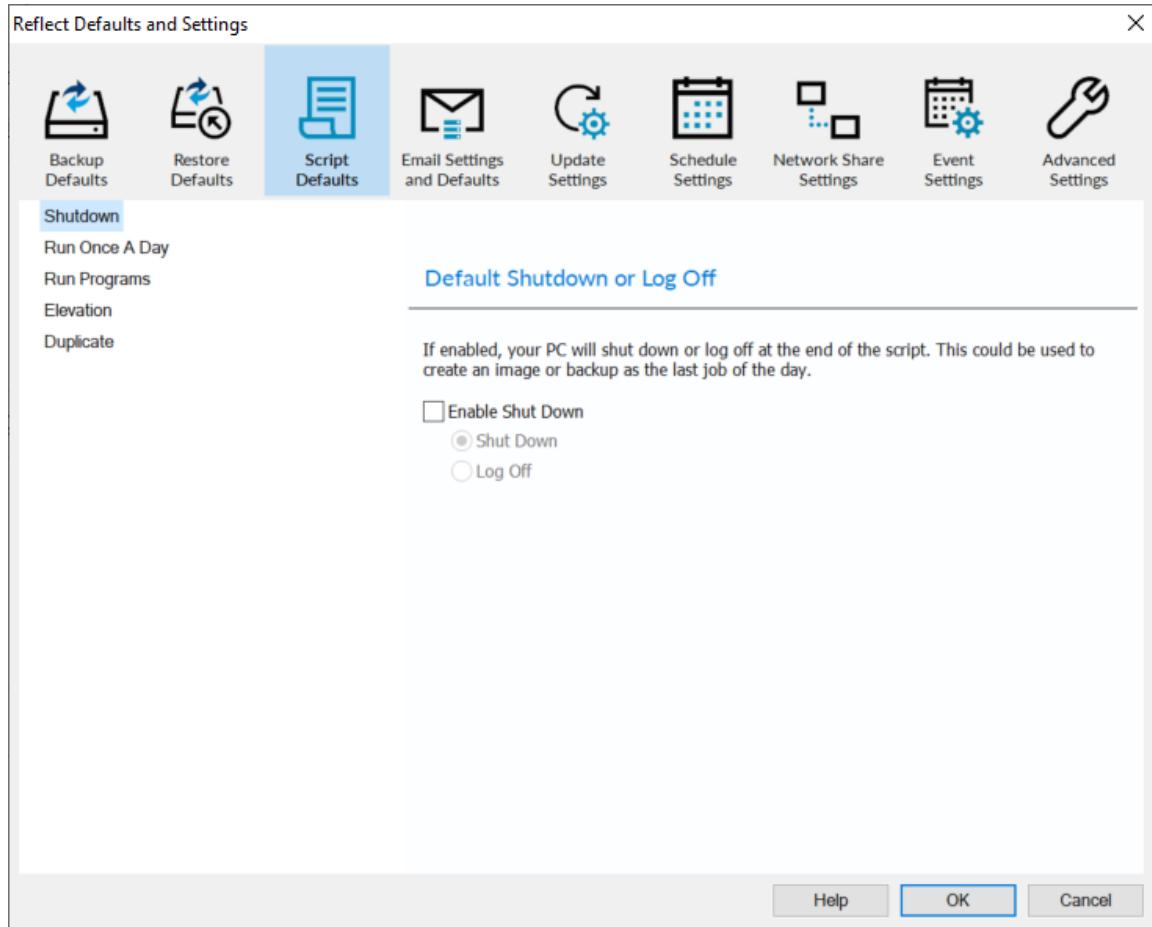
Script Defaults

- Default Shutdown or Log Off
- Default Run Once a Day
- Default Run Programs and Scripts
- Default Script Elevation
- Default Directory Synchronization

Default Shutdown or Log Off

Sets whether the PC should shutdown or log off at the end of the script.

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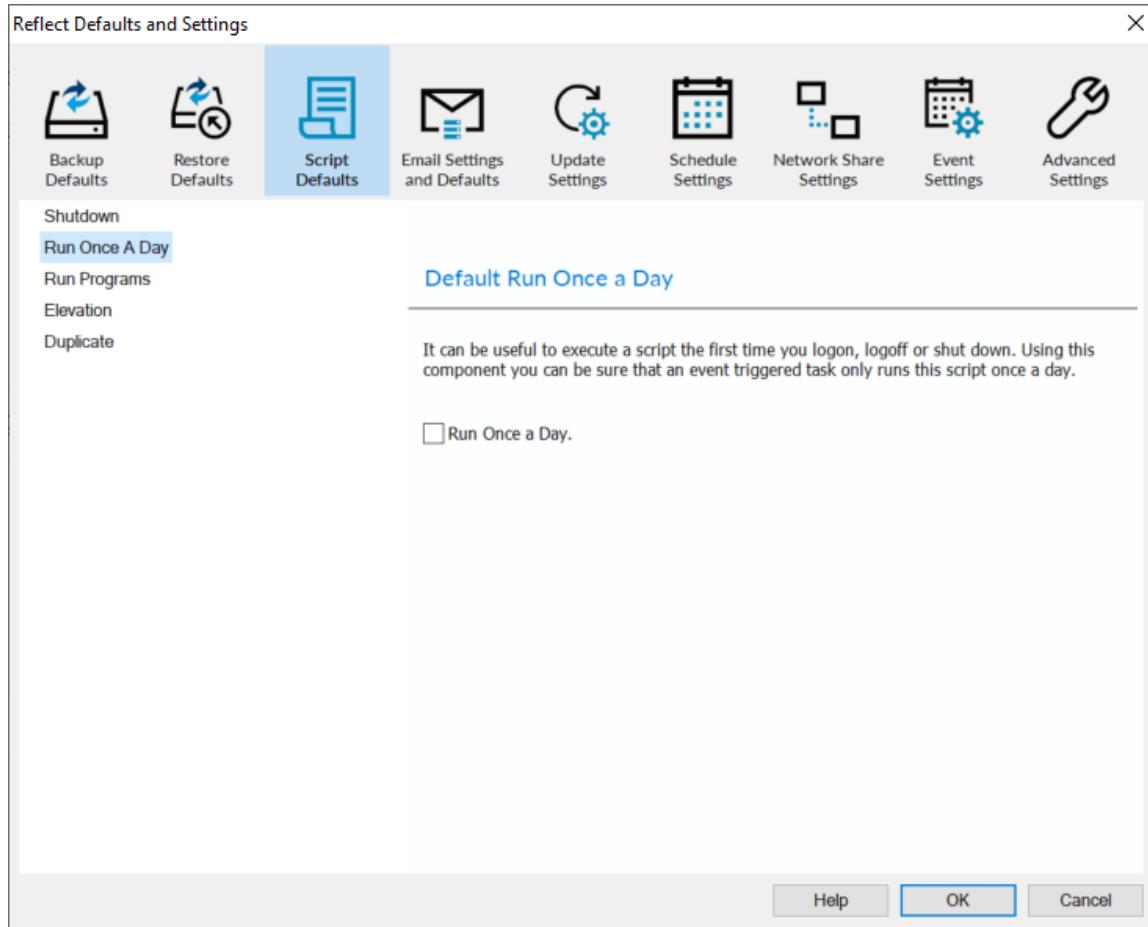


This could be used when creating a backup as the last job of the day.

Default Run Once a Day

Whenever the script is triggered, either manually or on schedule, it will only execute the first time for each day.

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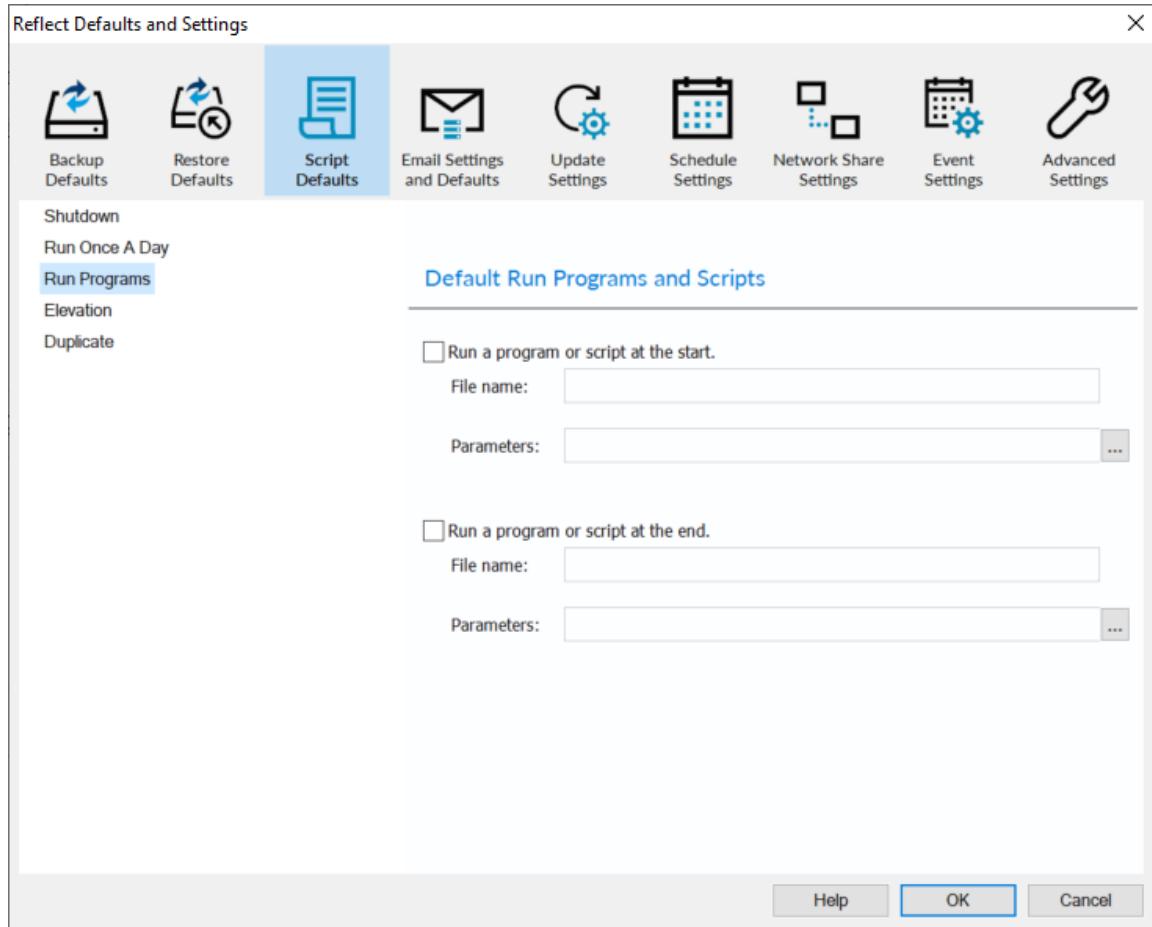


For example, this could be useful if you want a backup to happen at first login or shutdown.

Default Run Programs and Scripts

Select programs or scripts to run at the start or end of the script.

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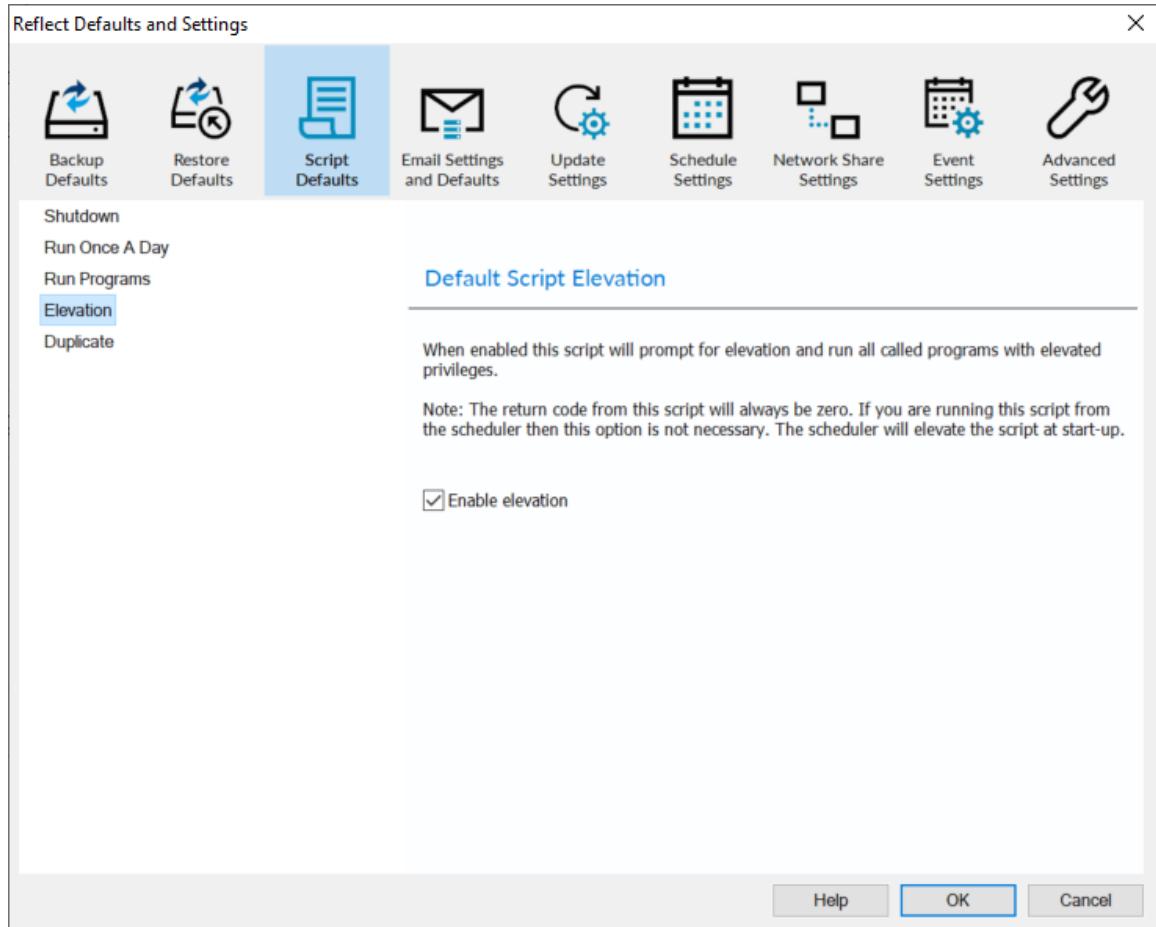


Option	Description
File name	Write the path and executable file name that you wish to run at the start of the script.
Parameters	Include optional command line parameters for the program.
File name	Write the path and executable file name that you wish to run at the end of the script.
Parameters	Include optional command line parameters for the program.

Default Script Elevation

Elevate the script at the beginning of execution. This ensures that all Programs and Script called will already be elevated.

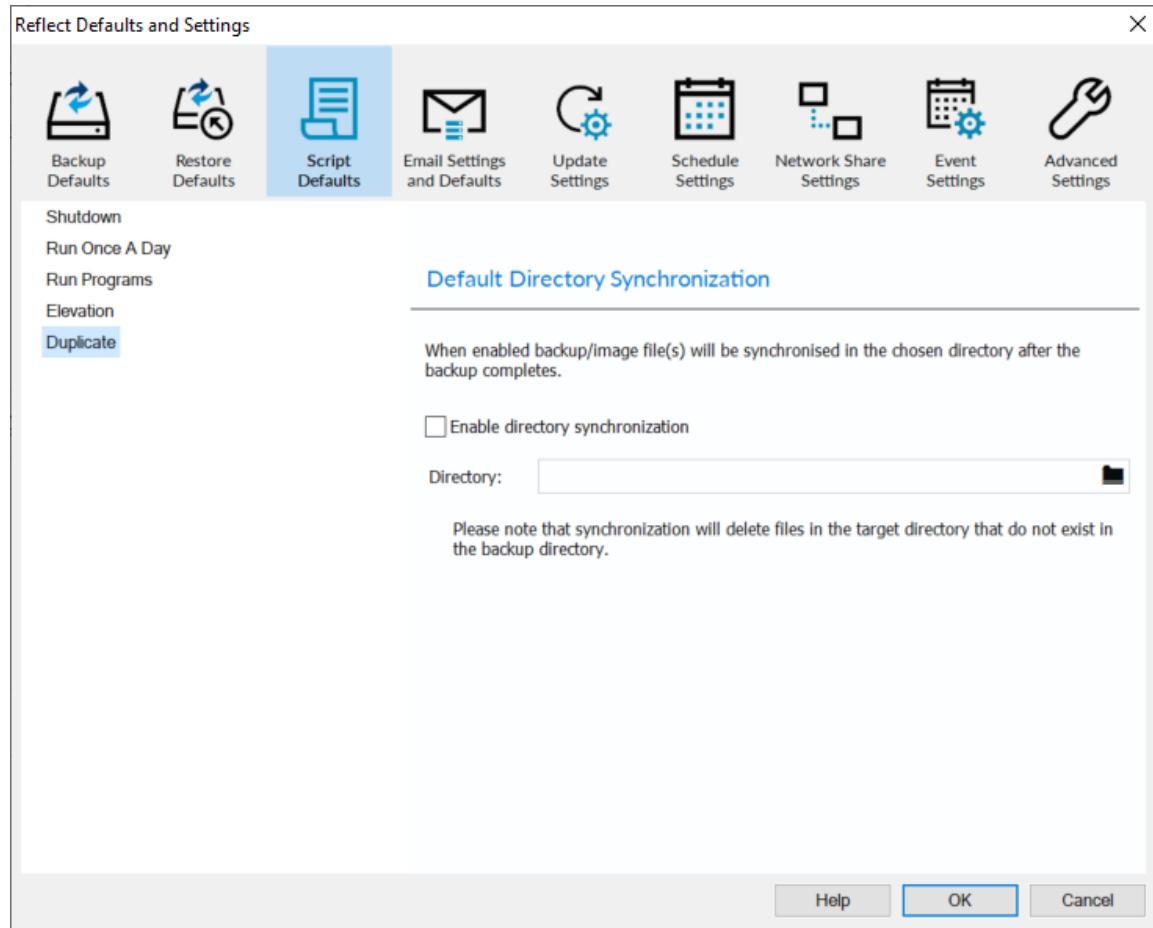
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The return code will always be zero. If you are running scripts from the scheduler then this option is not necessary. The Task Scheduler will elevate the script at startup.

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Default Directory Synchronization



Directory	Enter the target folder for the copy/archive.
Enable file copy	If enabled the backup will create a copy of the files from the backup to the supplied destination.

Directory Synchronization will embed MS RoboCopy calls to the script

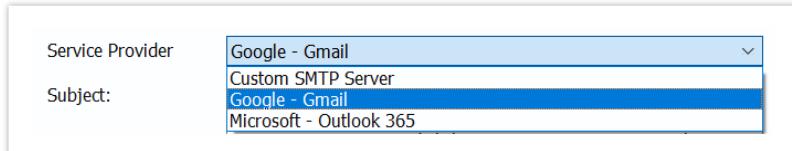
Email Settings and Defaults

- Custom SMTP Server
- Google - Gmail and Microsoft Outlook 365
- Default Email Success, Warning and Failure

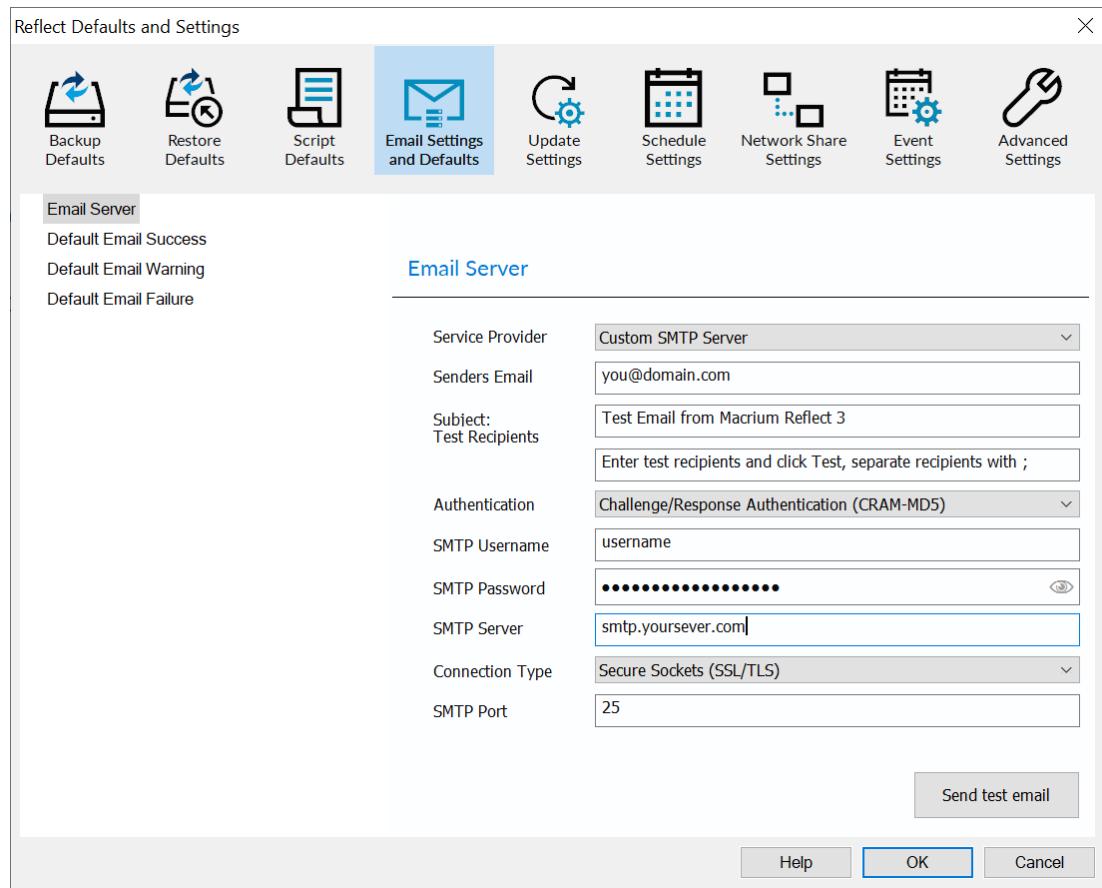
Emails can be sent for backup completion notifications, software update notifications and for add-hoc emails of logs and support contact.

Macrium Reflect v8.0 User Guide

You can choose to manually configure your Email SMTP server, or use your Google or Microsoft account to send Emails using Gmail or Outlook 365



Custom SMTP Server



Option	Description
Senders Email	The Email address of the sender. This is normally required to be the same domain as your ISP.
Authentication	Authentication options are set by your email provider/server.

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Option	Description
	<p>Note: If you do not know your authentication settings, try Auto Detect.</p>
SMTP Username	The user name associated with your e-mail account. This is essentially your email address.
SMTP Password	This is the password for your e-mail Server.
SMTP Server	This is the outgoing / SMTP Server setting or IP address.
Connection Type	Contact your ISP for the correct setting A screenshot of a dropdown menu with four options: "Secure Sockets (SSL/TLS)", "Plain Text (No Security)", "Secure Sockets (SSL/TLS)" (which is highlighted with a blue background), and "Transport Layer Security (STARTTLS)". <p> Note: These settings can be found from your email provider.</p>
SMTP Port	This is associated with Connection Type and is the port number that the SMTP server is listening on. <p> Note: These settings can be found from your email provider.</p>
Test Recipients	This option is used to test the configured settings; enter your e-mail address in that field and click Test to send a test message to your email.

Google - Gmail and Microsoft Outlook 365

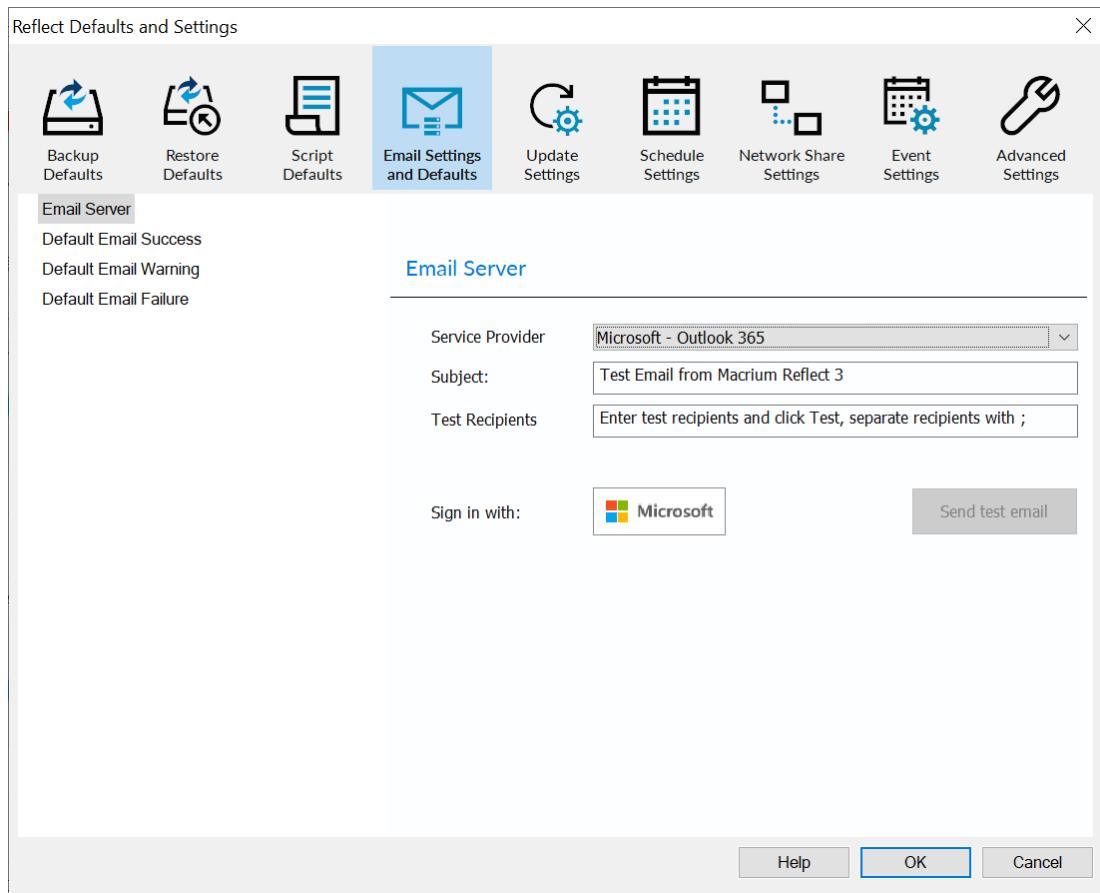
Macrium Reflect v8.0 includes OAuth 2.0 to authenticate Macrium Reflect to send emails using your **Microsoft** or **Gmail** account. It's easy to setup and uses your account sign in, including two factor if enabled, to securely authenticate.



Note: OAuth 2.0 authentication tokens are stored locally. **We don't see or store any authentication information on our servers.**

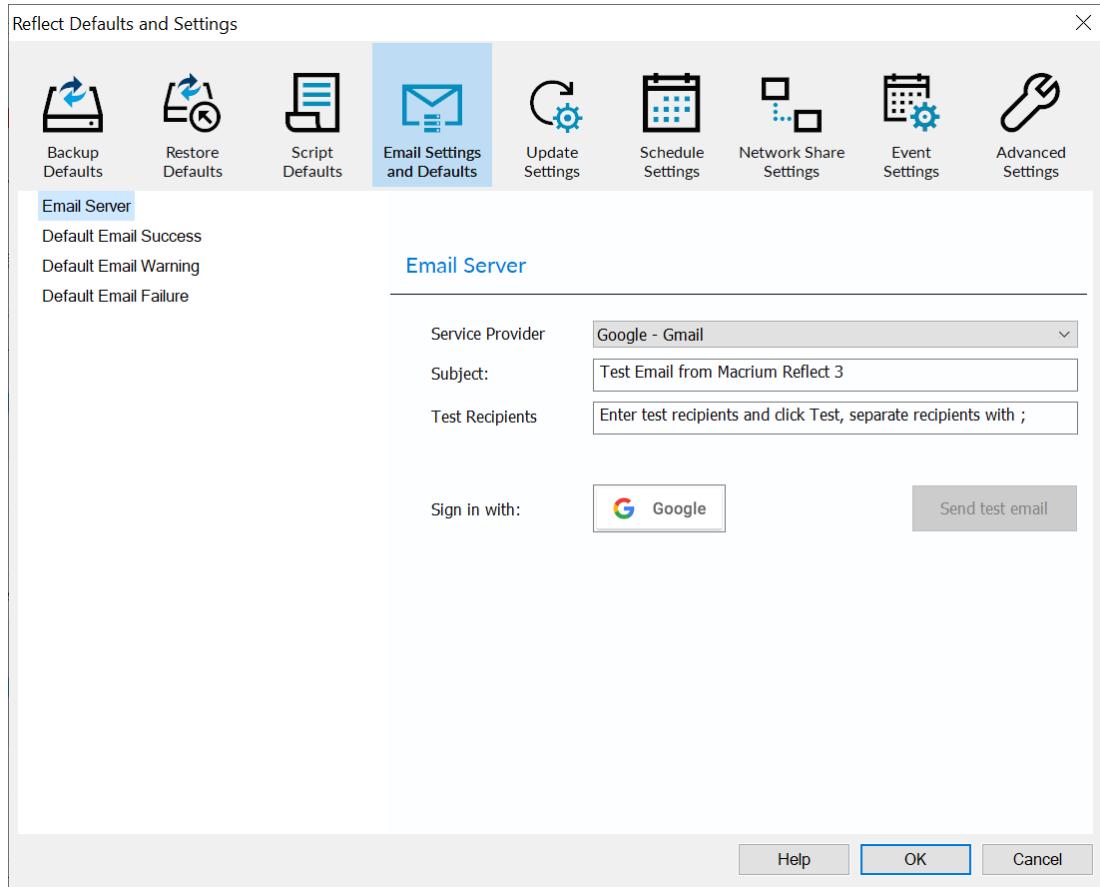
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Microsoft - Outlook 365



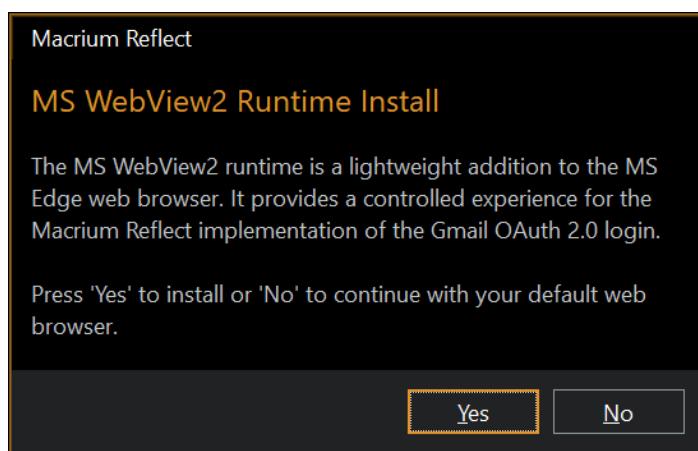
Google - Gmail

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The first time you sign in you will be prompted for a one time download and install of the [WebView2 distribution installer](#).

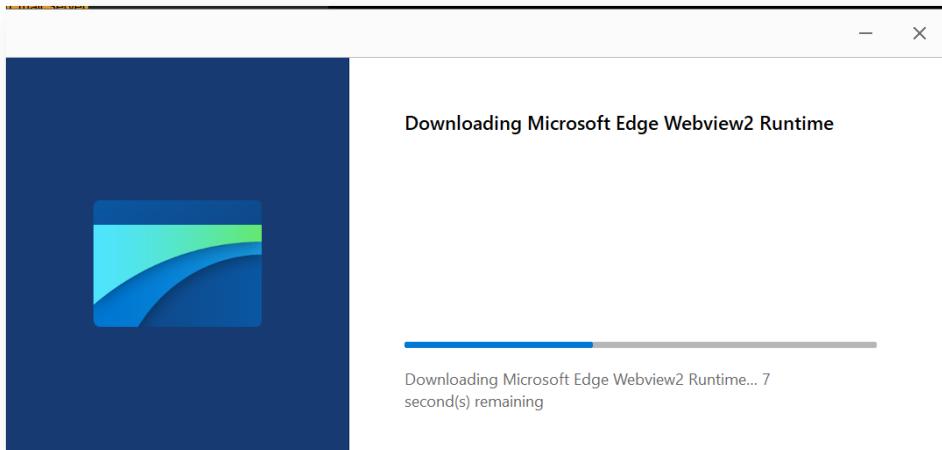
This is a lightweight MS Edge Chromium web browser that provides a controlled experience for the Macrium Reflect implementation of the OAuth 2.0 login.



Click 'Yes' to install or 'No' to continue with your web browser.

If you click 'No' you will be taken out of Macrium Reflect to continue in your default web browser.

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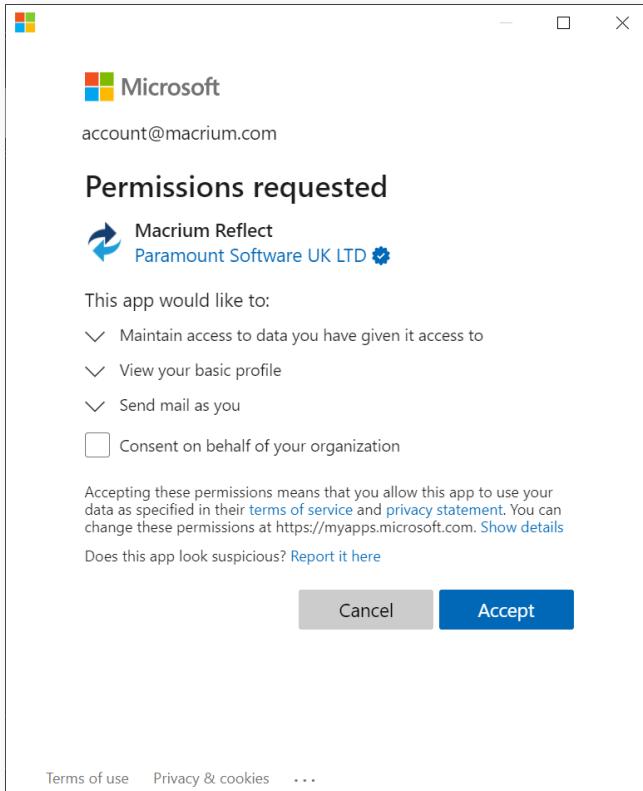
Once WebView2 installation is complete a web sign in dialog opens. **Follow the normal sign in procedure for either Microsoft or Google**, completing two factor authorization as necessary.

You'll be prompted to accept permissions to allow Macrium Reflect to send emails on your behalf.



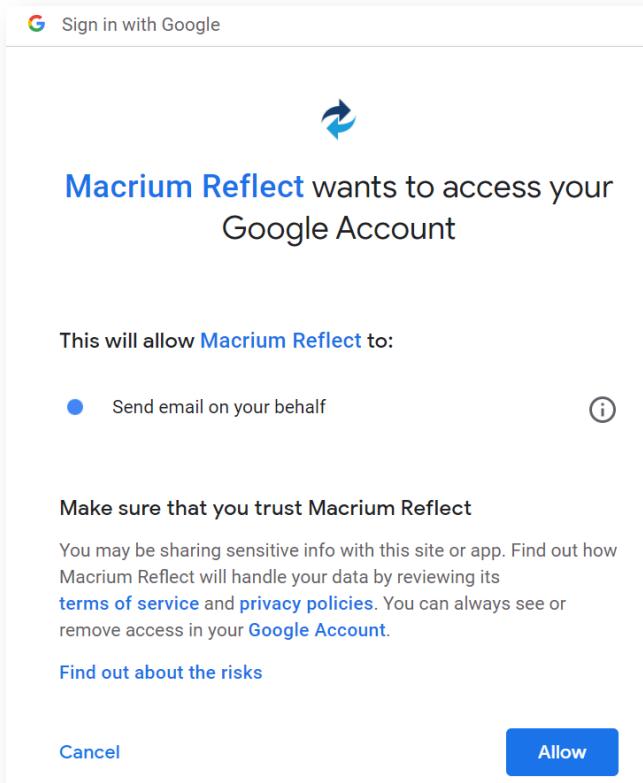
Note: These are the absolute minimum permissions required to send emails. We don't require or request anything else

For Microsoft Click 'Accept'



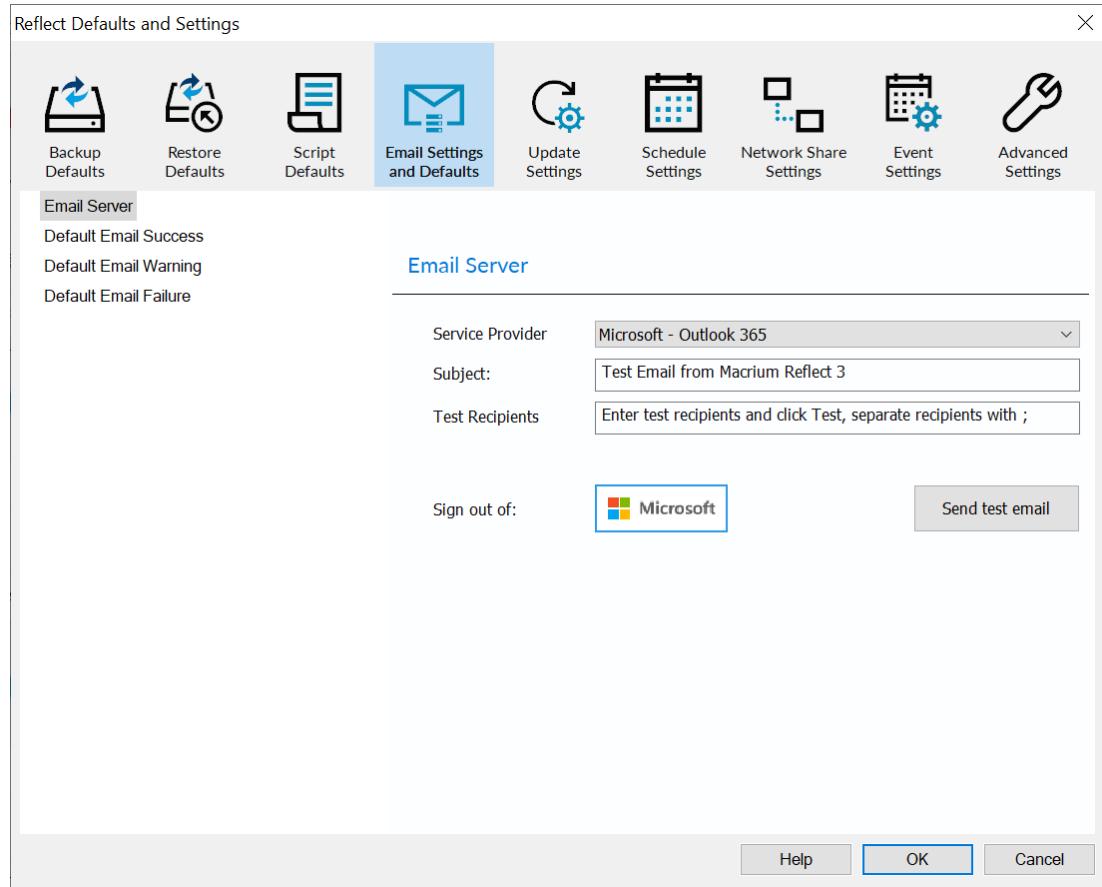
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For Google click 'Allow'

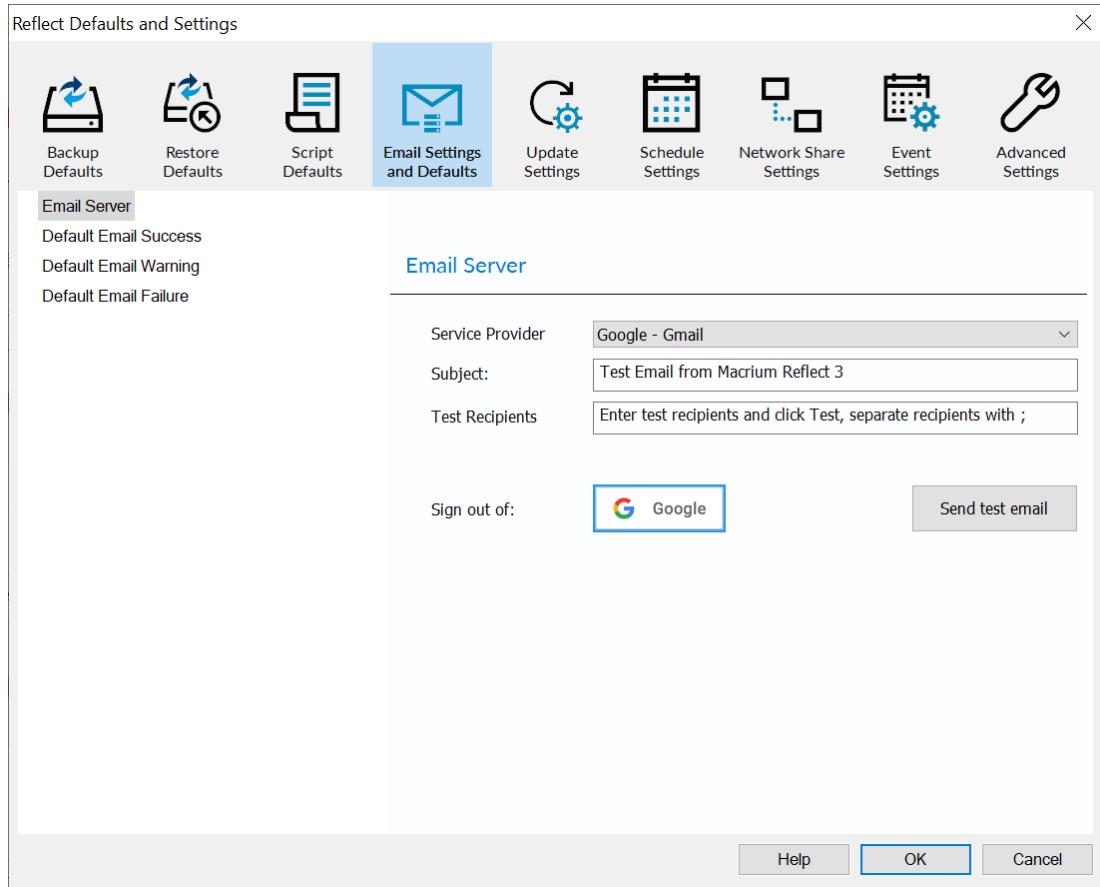


That's it! You're now setup to use Gmail or Microsoft as the service provider to send your backup completion emails.

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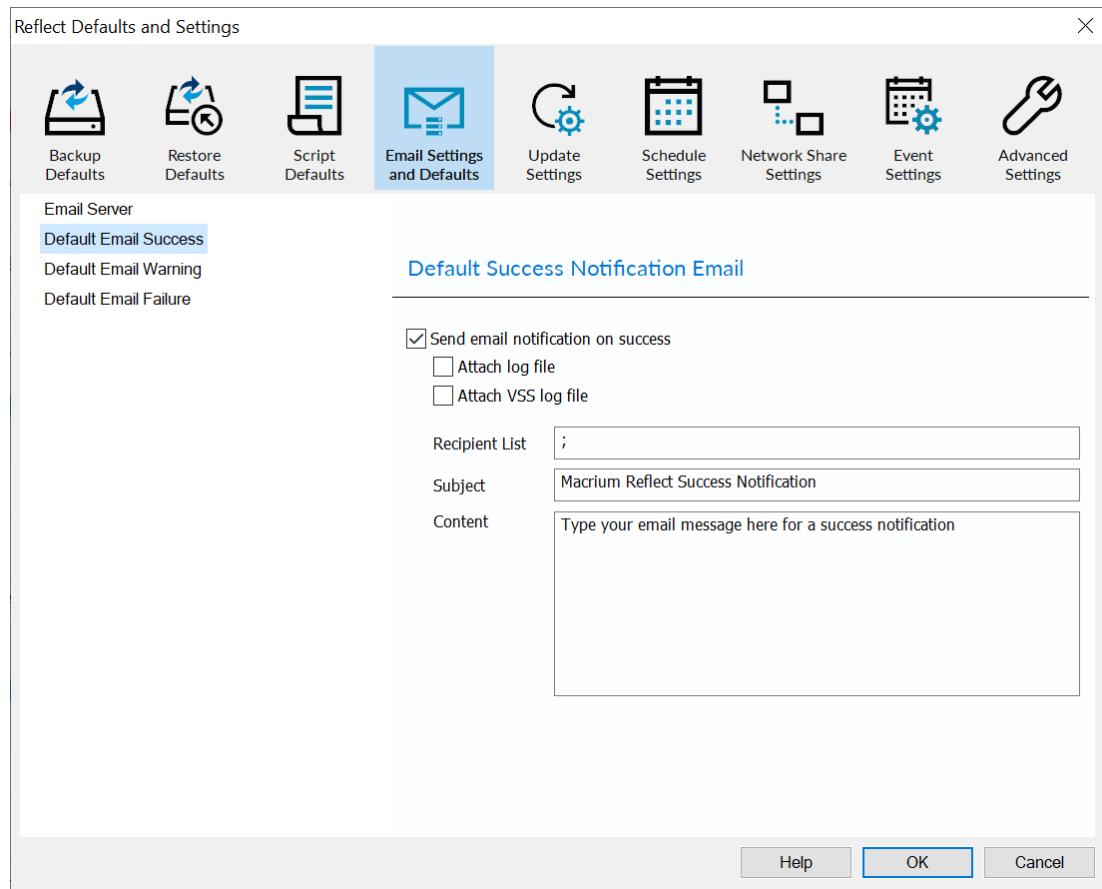


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Default Email Success, Warning and Failure



Option	Description
Attach log file	Attach the HTML backup log file.
Attach VSS log file	Attach the VSS log if VSS was involved in the backup.
Include Cancellations	Email Failure setting. Also send an Email for cancelled backups.
Recipient List	Separate multiple Email addresses with ';' name@domain.com; name2@domain.com
Subject	Enter your own text in these fields to identify the backup job.
Content	

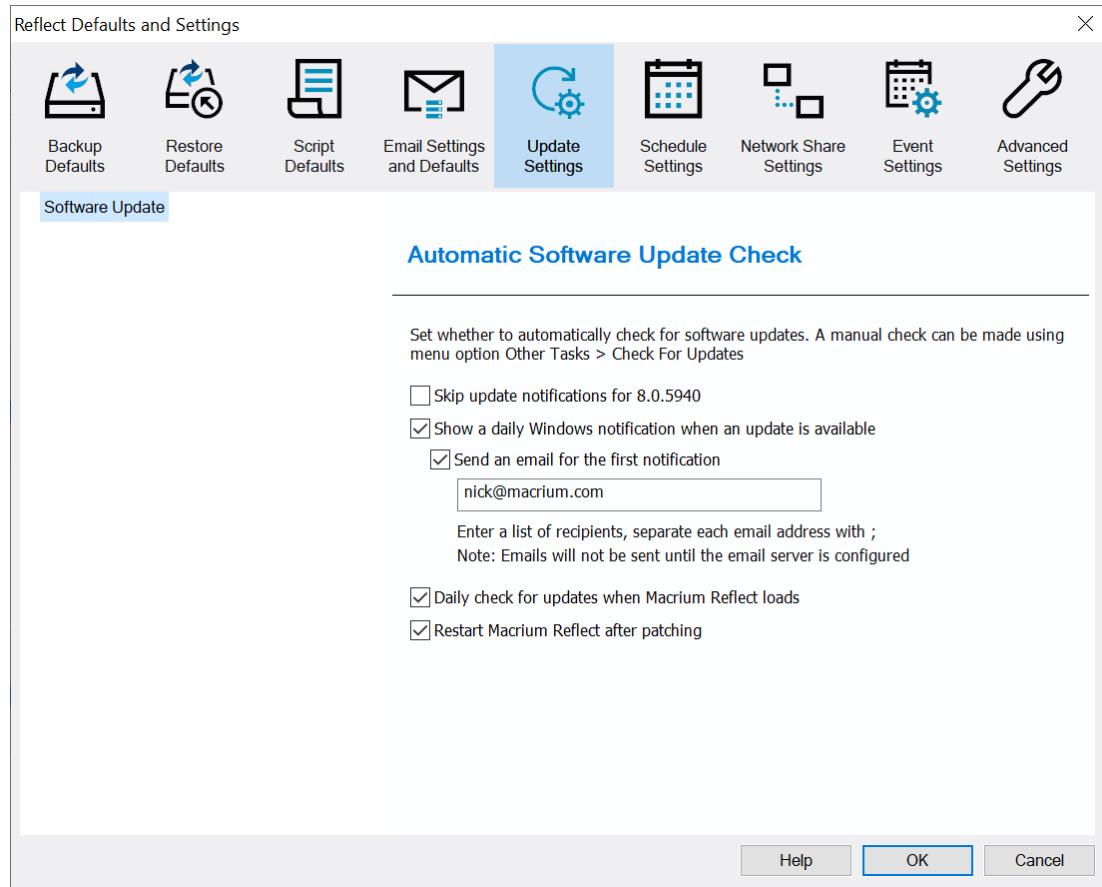
Update Settings



Update Settings can be accessed by clicking 'Configure' in the Windows toast notification, or by taking 'Other tasks' > 'Edit Defaults and Settings' > 'Update Settings'



Note: Notifications must be set 'On' in the Windows 10 Notifications Center to receive update notifications, however, emails, if configured, will be sent regardless.

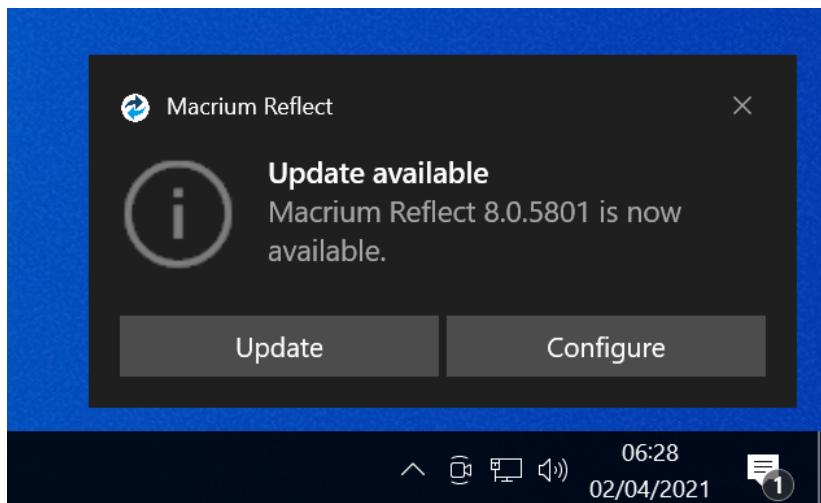


Skip update notifications for v8.x.	This check box is only visible if the current installation is out of date. If checked, then Windows toast notifications, and the daily check when Reflect starts, will be suppressed for the release version in the check box text.
Show a daily Windows notification when an update is available	When an update is available, a Windows toast notification will persist above the task bar notification area until dismissed, or Macrium Reflect is updated. If dismissed, then the notification will not show for the rest of the current day..

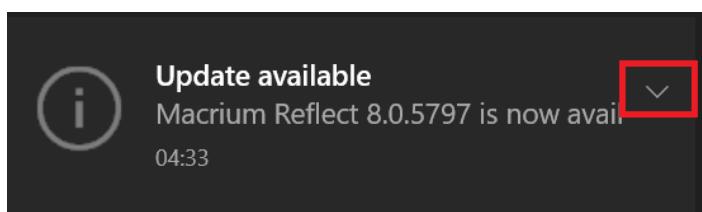
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Send an email for the first notification	An email informing of the available update will be sent to the recipient list when the first notification for the update is shown. Please ensure that the email server/provider is configure by clicking the 'Settings' button.
Daily check for updates when Macrium Reflect starts	When Macrium Reflect starts for the first time each day, an update check will display the update download dialog if a later version is found. Applies only when interactively starting Macrium Reflect with the user interface visible.
Restart Macrium reflect after patching	If the update is supplied as a binary patch rather than a full installer, Macrium Reflect will automatically restart after successful patching.

Notifications for Macrium Reflect software updates are handled slightly differently in v8.0. Previously, a Windows notification would be shown every hour if Macrium Reflect wasn't at the latest version. We've changed this to show a persistent, but dismissible, Windows toast notifications when an update is available. Once dismissed, the notification won't be shown again for that day. There's also a new option to skip all future notification for the current latest release.



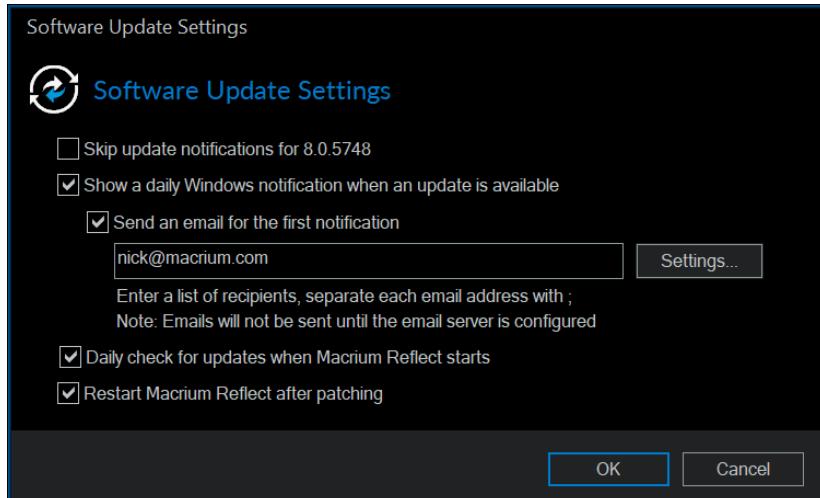
Note: If the buttons are hidden in the notification history list, then **click the down arrow** to reveal:



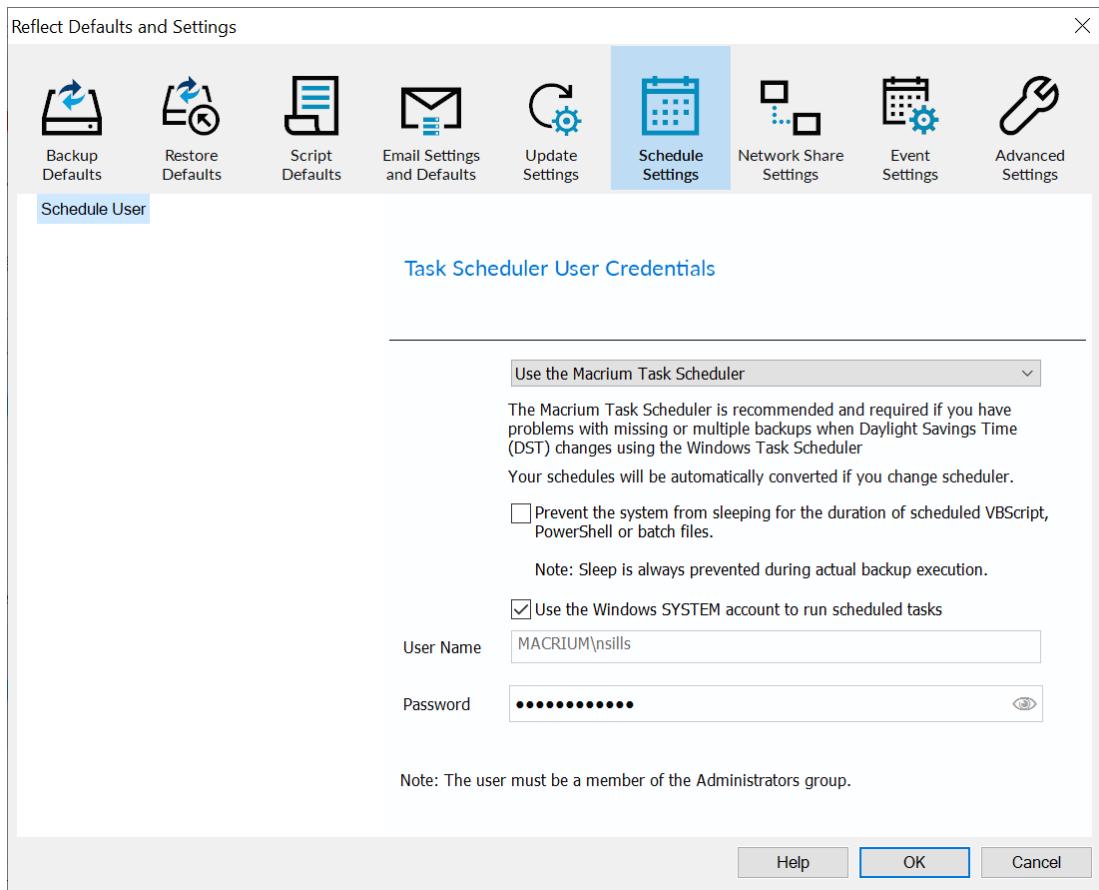
Click 'Update' to download.

Click 'Configure' to open the Software Update Settings dialog:

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Schedule Settings



Using the dropdown list you can switch between **'Use the Macrium Tasks Scheduler' (MTS)** and **'Use the Windows Tasks Scheduler' (WTS)**. Conversion of tasks will begin immediately after **'OK'** is pressed.

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We've integrated MTS into Macrium Service to replace the default Windows Task Scheduler (WTS). WTS has been the only method for scheduling Macrium Reflect backups for many years, but unfortunately it's been plagued with reliability problems surrounding Daylight Savings Time (DST) changes and no-longer provides the quality of operation required by Macrium Reflect.



By default Macrium Reflect uses MTS and the Windows SYSTEM account to schedule backups. If you are having problems with your scheduled backups accessing network shares then you can change to use any local or domain Administrator account on your system.

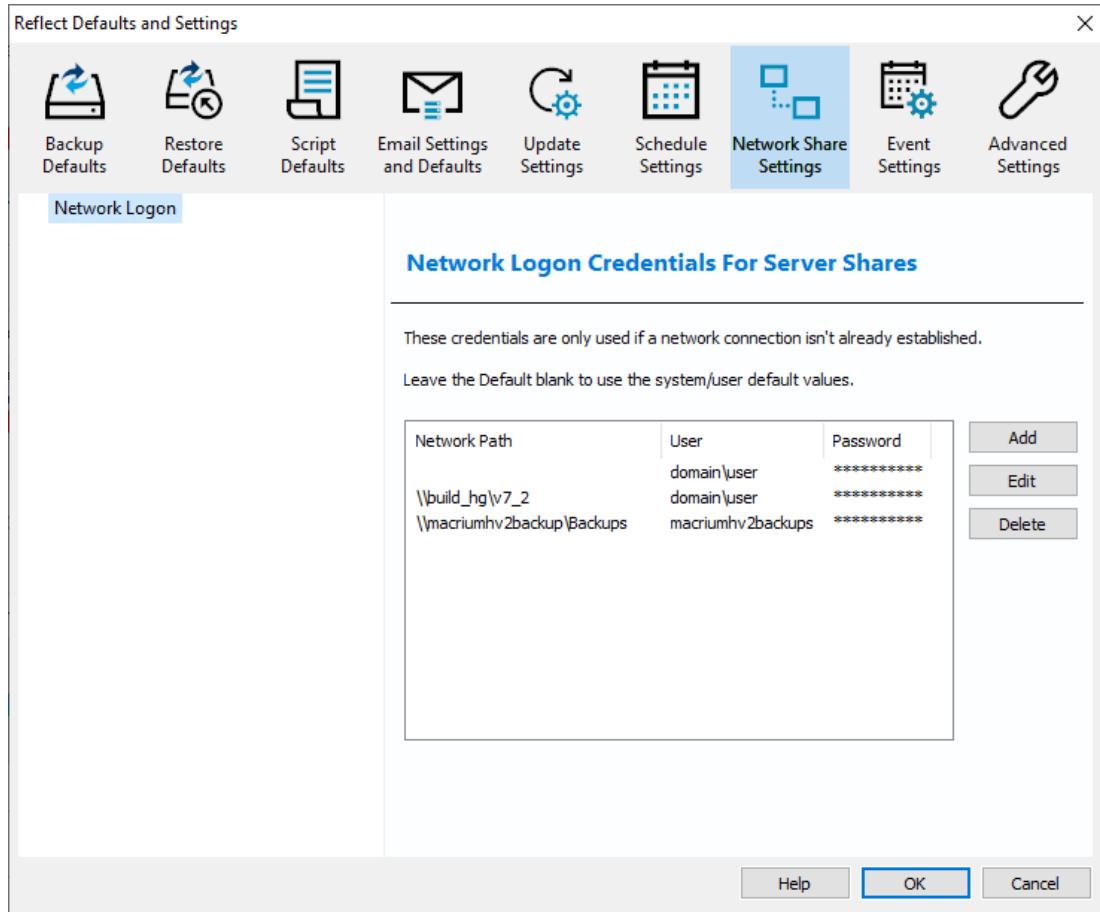
Prevent the system from sleeping for the duration of scheduled VBScript, PowerShell or batch files

MTS Only - When enabled, the PC will be prevented from sleeping for the entire duration of the scheduled script. This can be useful if your script is waiting for an event, such as a network destination to become available before running a backup.

Network Share Settings

Windows contains a [Network Credentials cache](#) that enables network authentication details (User name and password) to be saved and re-used to logon automatically. However, scheduled tasks are run in Windows 'batch mode' and do not have access to saved credentials. Because of this, you must enter network login details in the Macrium Reflect defaults to enable scheduled tasks to access and write to password-protected network shares.

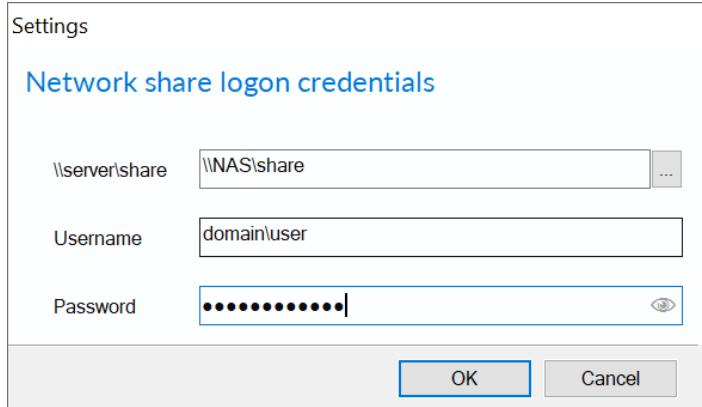
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Option	Description
Add	Add network logon details for a new network location
Edit	Edit an existing location. Note: The ' Default ' location logon details will be used for all shares that aren't explicitly added.
Delete	Remove logon credentials

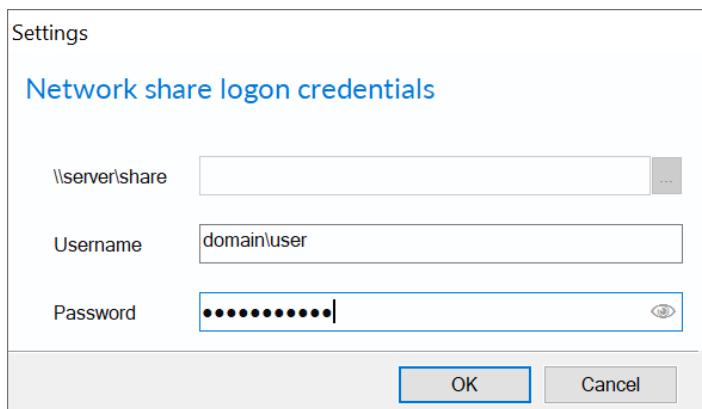
Add / Edit

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Option	Description
\\Server\\share	Enter the UNC path to the root of the network share. Do not enter any sub-folders in the path
Username	Enter the authenticated user that has access to the share
Password	Enter the user's password.

You can also select **Default** and click **Edit** to provide default credentials to be used for all network shares:



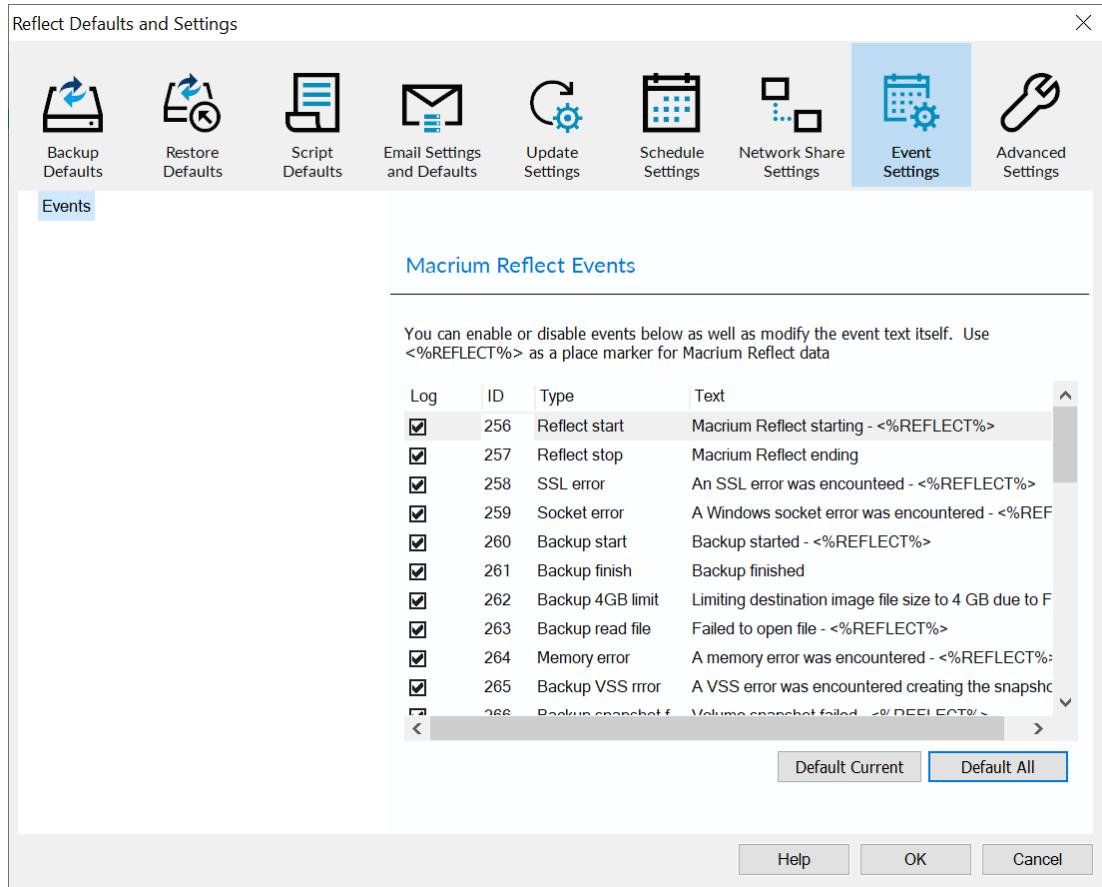
Event Settings

Enable or disable Windows Events generated by Macrium Reflect.



Applies to Macrium Reflect Workstation, Server and Server Plus only.

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Note: The placeholder text <%REFLECT%> is used to populate the event message with runtime information from Reflect at the time the event was created.

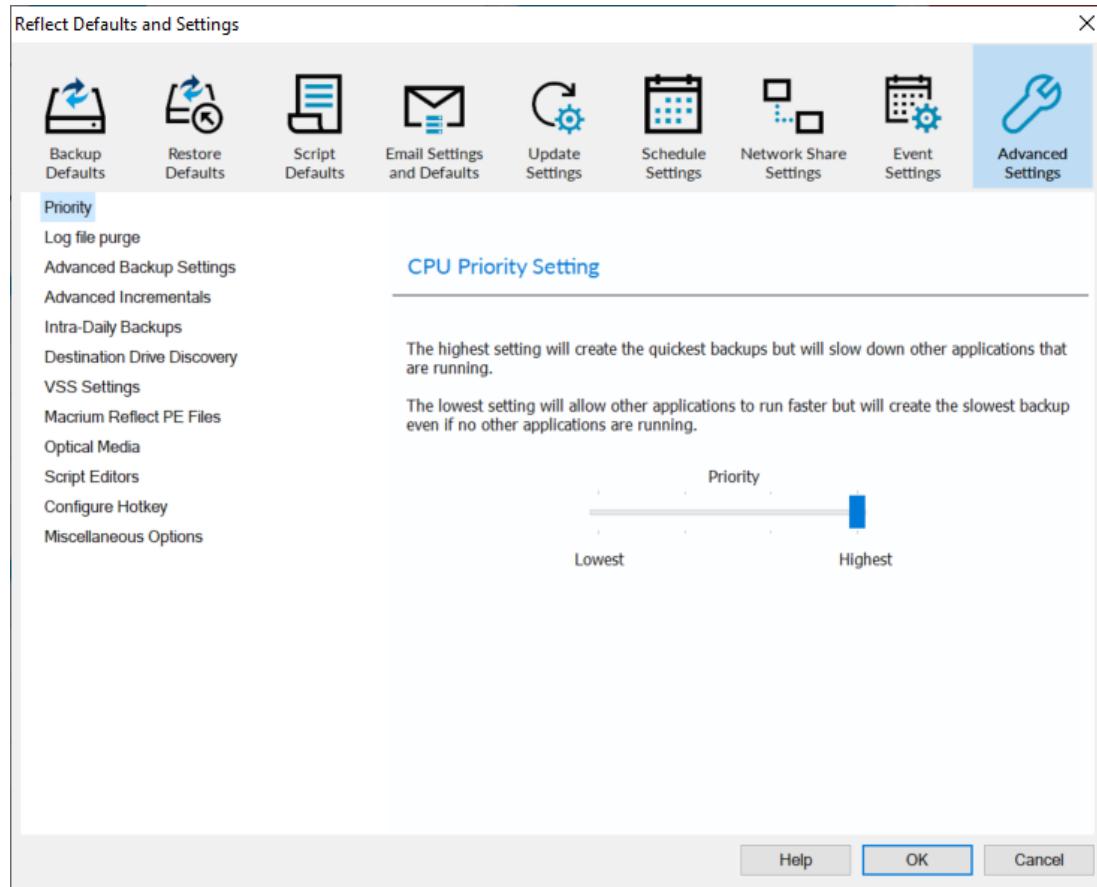
Advanced Settings

- CPU Priority Setting
- Purge Log File Settings
- Advanced Backup Settings
- Advanced Incremental Settings
- Stealth Mode for Intra-Daily Backups
- Destination Drive Discovery
- VSS Settings
- Macrium Reflect PE File Location
- CD/DVD Burner Troubleshooting
- Script Editors
- Configure Hotkey

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- Miscellaneous Options

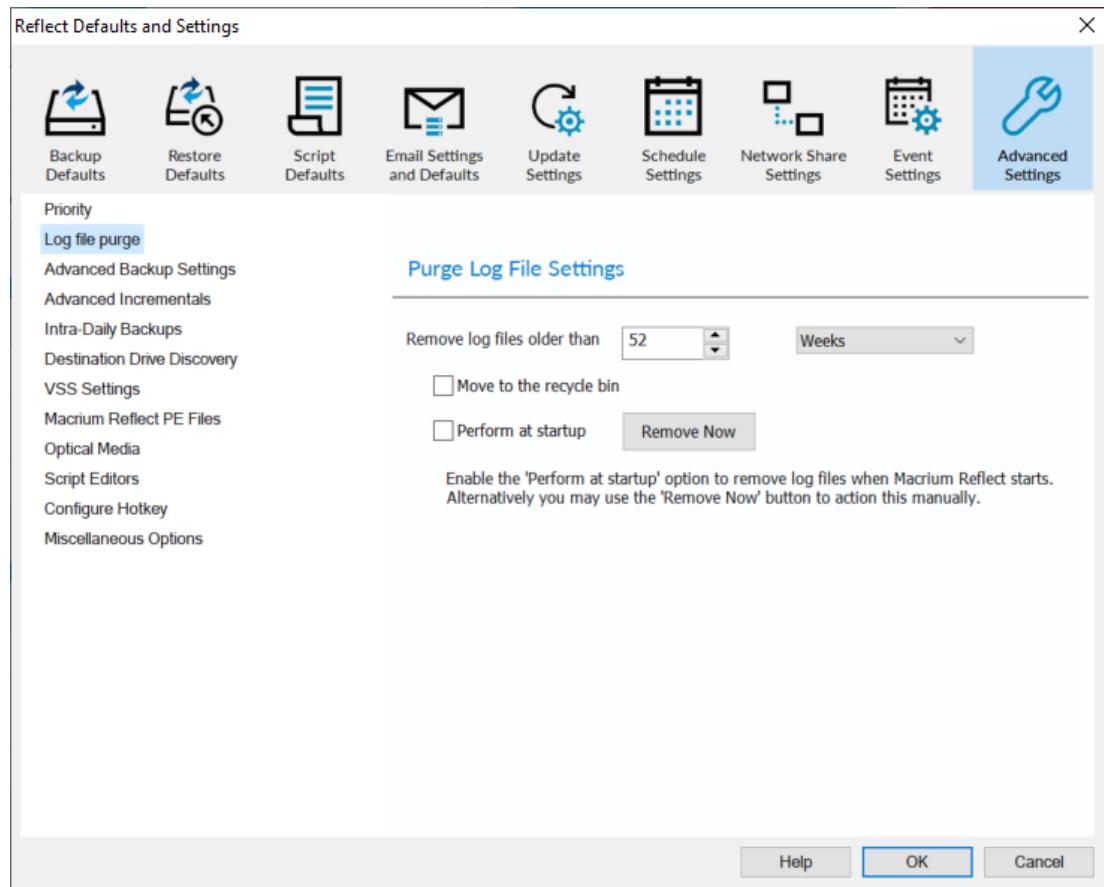
CPU Priority Setting



The CPU priority level updates the process and thread priority for the currently running backup. The lowest level will allow other processes on your system to use CPU cycles in preference to the running backup, whereas the highest priority may cause other processes to wait for available CPU time. There's no 'correct' level, it depends on the demands you require of the PC workload. The default setting is 'Highest'.

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Purge Log File Settings

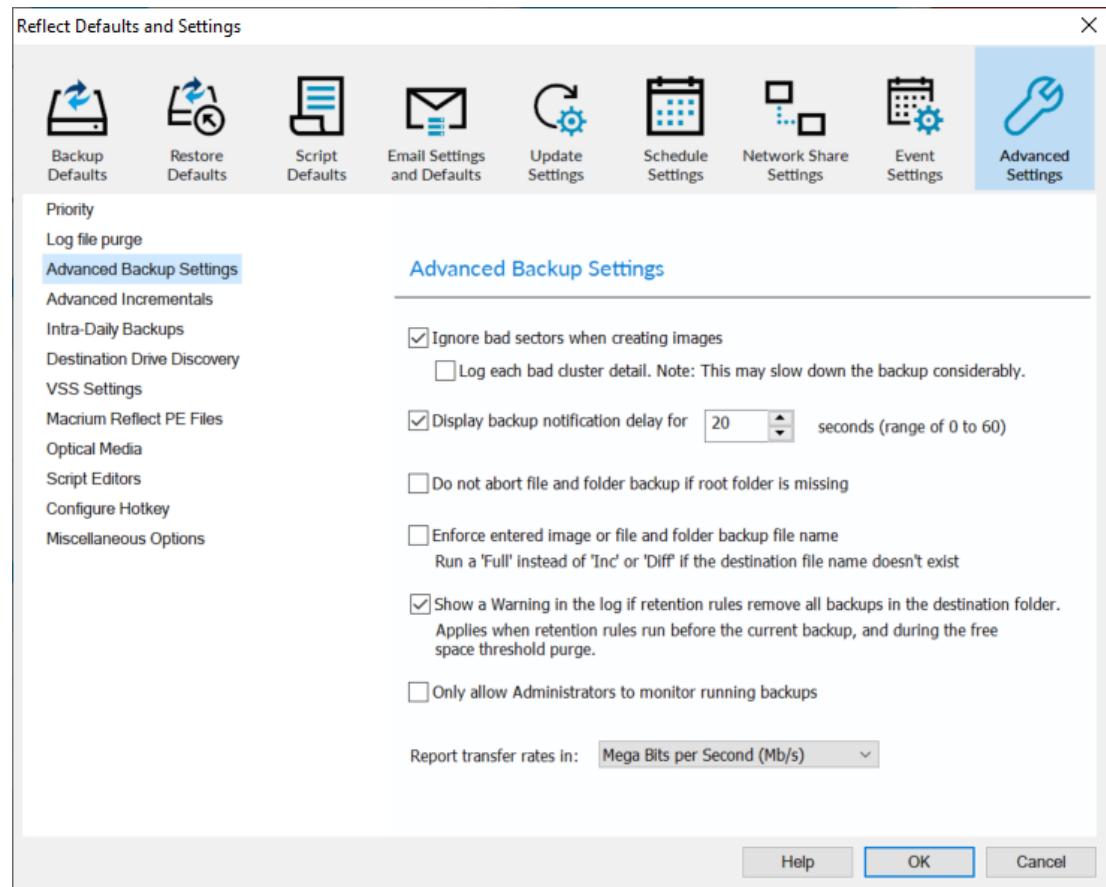


Option	Description
Remove log files	Choose number of days of weeks
Move to Recycle Bin	Deleted logs will be moved to the Recycle Bin.
Perform at startup	Logs will be deleted when Reflect starts up.

You can press the **Remove Now** button to remove the logs manually at any time.

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Advanced Backup Settings

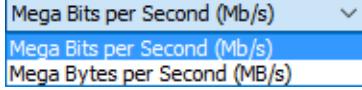


Option	Description
Ignore bad sectors when creating images.	Damaged disks may still be imaged if this option is selected.
Display backup notification delay for	Changes the time the 'Backup task' delay window is displayed before a scheduled backup starts.

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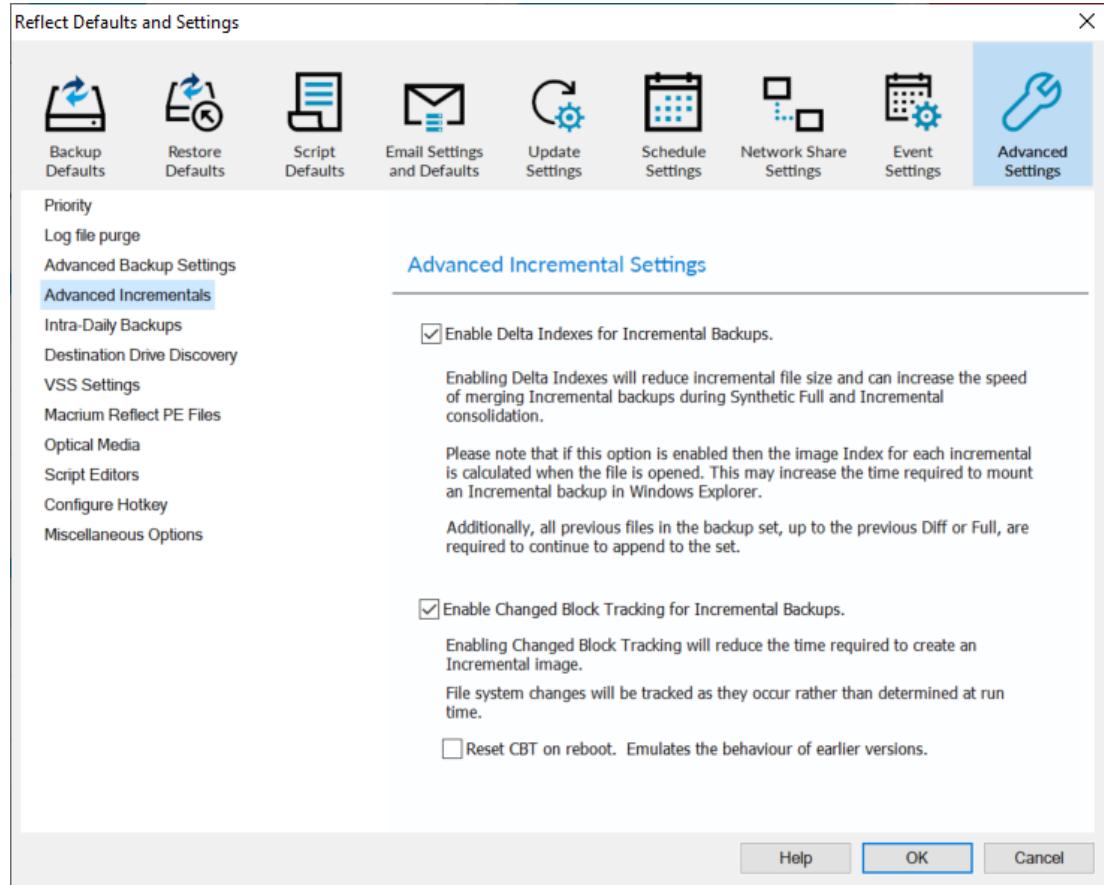
Option	Description
	<p>Backup Task</p>  Definition file 'System.xml' is about to run <p>Click 'OK' to continue, 'Cancel' to abort</p> <p>Postpone this backup task for</p> <div style="border: 1px solid #ccc; padding: 2px; width: fit-content;"> <input style="border: none; background-color: inherit; color: inherit; font-size: inherit; margin-right: 10px;" type="button" value="Do not postpone"/> </div> <p>This dialog will close in 16 seconds</p> <div style="border: 1px solid #ccc; width: fit-content; height: 10px; background-color: #008000; margin-bottom: 5px;"></div> <div style="display: flex; justify-content: space-between;"> <div style="flex: 1;"> <input style="margin-right: 10px;" type="checkbox" value="Do not show this message again"/> </div> <div style="flex: 1; text-align: right;"> <input style="border: 1px solid #0070C0; padding: 2px 10px; margin-right: 10px;" type="button" value="OK"/> <input style="border: 1px solid #ccc; padding: 2px 10px;" type="button" value="Cancel"/> </div> </div>
	<div style="border: 1px solid #ccc; width: fit-content; margin-bottom: 10px;"> <input style="border: none; background-color: inherit; color: inherit; font-size: inherit; margin-right: 10px;" type="button" value="Do not postpone"/> <input style="border: 1px solid #0070C0; background-color: #0070C0; color: white; padding: 2px 10px; margin-right: 10px;" type="button" value="Do not postpone"/> <input style="border: none; background-color: inherit; color: inherit; font-size: inherit; margin-right: 10px;" type="button" value="10 Minutes"/> <input style="border: none; background-color: inherit; color: inherit; font-size: inherit; margin-right: 10px;" type="button" value="30 Minutes"/> <input style="border: none; background-color: inherit; color: inherit; font-size: inherit; margin-right: 10px;" type="button" value="1 Hour"/> <input style="border: none; background-color: inherit; color: inherit; font-size: inherit; margin-right: 10px;" type="button" value="4 Hours"/> </div> <div style="border: 1px solid #ccc; padding: 10px; margin-bottom: 10px;"> (i) Note: Clicking 'Do not show this message again' will uncheck the default setting here. </div>
Do not abort a file and folder backup if a root folder is missing.	<p>Enabling this option will allow your File and Folder backup to continue even if a root folder of the backup is missing.</p>
Enforce an entered image or File and Folder backup file name.	<p>Normally, if you run an Incremental or Differential image of say drive 'C', the target folder is searched for a recent backup set for the same source (Drive 'C'). The backup set is then appended to. The file name you have chosen for the backup will not be used in this matching process.</p> <p>If you enter your own file name and select " Enforce entered image or file and folder backup file name" then only backup sets using the same backup definition file name and for the same source will be appended to, if none is found then a new full will be created.</p>

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Option	Description
Show a warning in the log if retention rules remove all backups in the destination folder.	<p>If enabled, and all backups in the destination folder are deleted due to retention rules set prior to the backup starting, or the free space threshold is reached, then a warning message is shown in the log and the backup completes with a warning status.</p> <div data-bbox="536 534 576 579" style="border: 1px solid #ccc; border-radius: 50%; padding: 2px 5px; margin-right: 10px;"></div> <p>Note: The Warning will not be triggered if the Retention rules are explicitly set to retain 1 Full image and set to run before the backup. In this case, it is expected that there will be no backups before the current backup runs.</p>
Only allow Administrators to monitor running backups	<p>For multi-user systems, such as terminal servers, ReflectMonitor will not run for non-administrator accounts if selected.</p>
Report transfer rates.	<p>Will allow you to change the way transfer rates are reported in.</p> 

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Advanced Incremental Settings



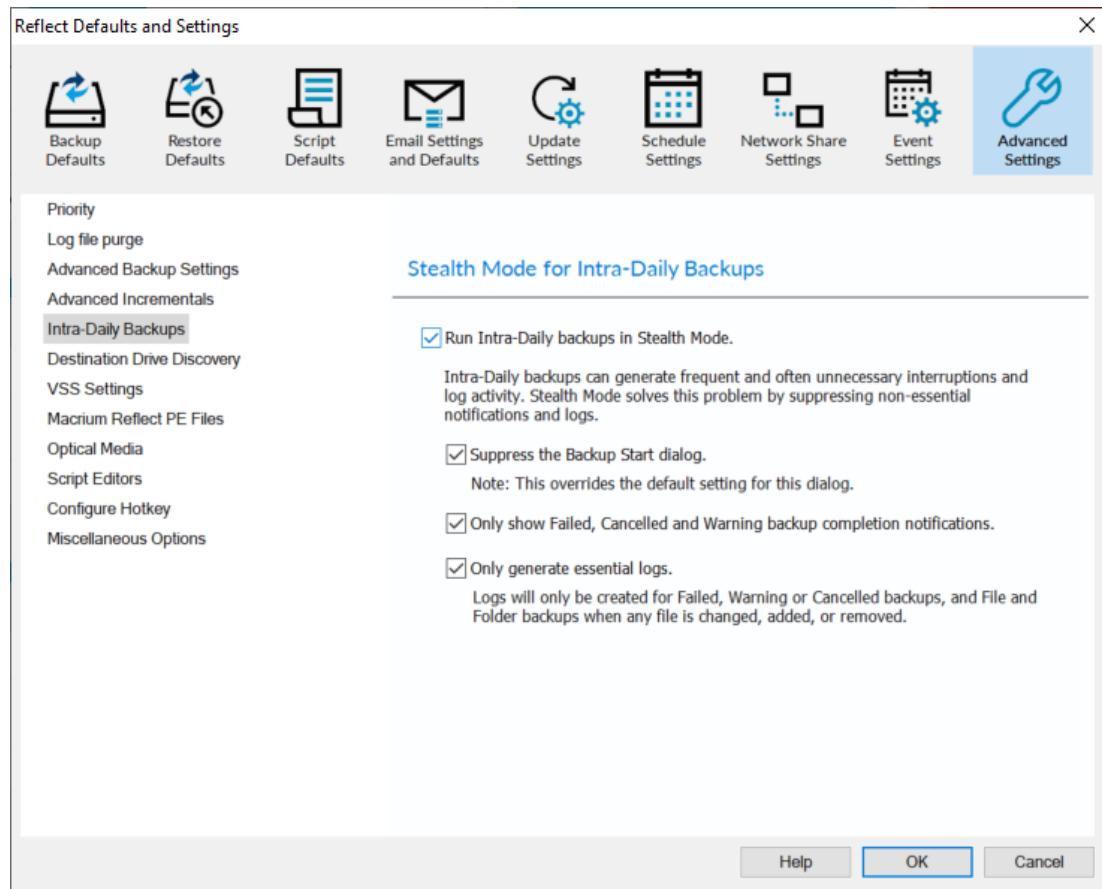
Enabling **Delta indexes** will reduce incremental file size and can increase the speed of merging Incremental backups during Synthetic Full and Incremental consolidation.

Additionally, all previous files in the backup set, up to the previous Diff or Full, are required to continue to append to the set.

For more information on Macrium **Changed Block Tracker** please see here [Macrium Changed Block Tracker](#)

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Stealth Mode for Intra-Daily Backups

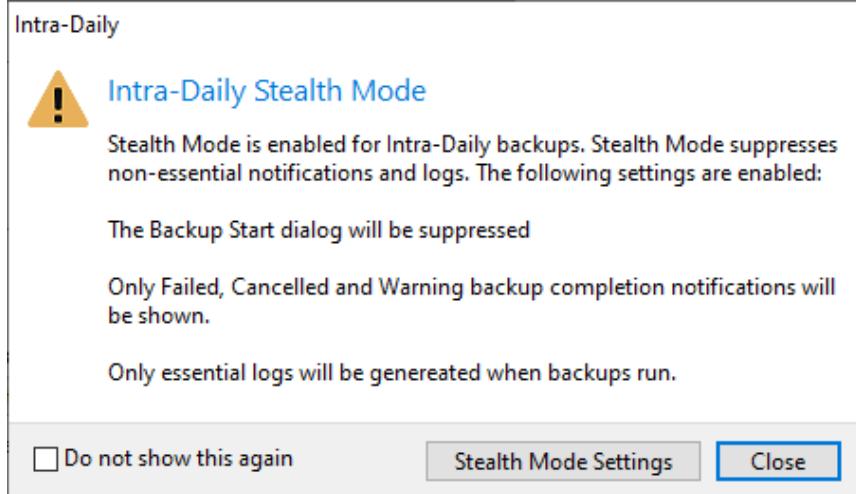


Intra-daily backups can generate frequent and often unnecessary interruptions and log activity. Stealth Mode solves this problem by suppressing non-essential notifications and logs:

Suppress the Backup Start dialog.	Never show the Backup Start dialog that is shown when a scheduled backup is triggered. Note: This overrides the default setting for the dialog.
Only show Failed, Cancelled and Warning completion notifications.	Taskbar popups and notifications will not be shown for successful backups.
Only generate essential logs.	Logs will only be generated for Failed, Warning or Cancelled backups, and File and Folder backups when any file is changed, added or removed.

Intra-Daily Stealth mode is enabled by default, and if an Intra-daily schedule is selected then the following dialog is shown:

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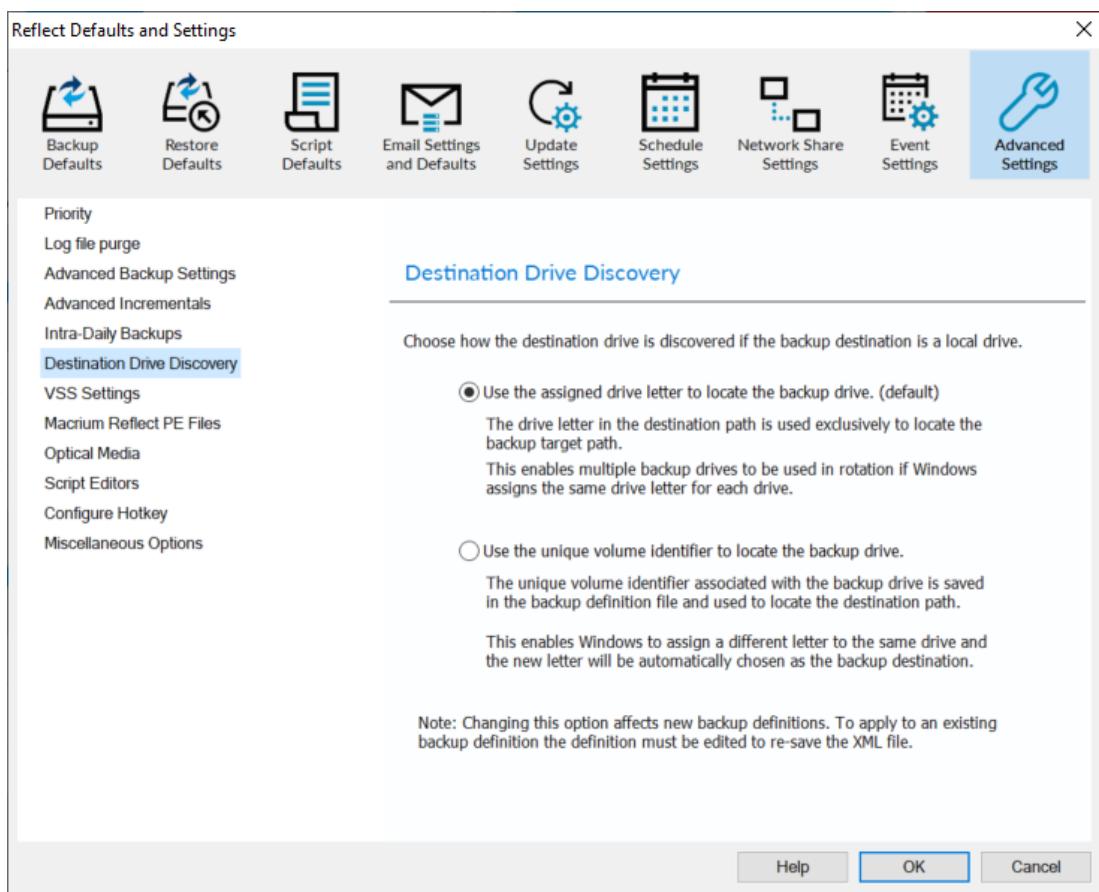


Click 'Stealth Mode Settings' to open the defaults dialog to change or confirm.

Select 'Do not show this again' to stop this message being shown in the future.

You can re-enable by taking 'Other Tasks' > Edit Defaults' > 'Advanced' > 'Miscellaneous'.

Destination Drive Discovery

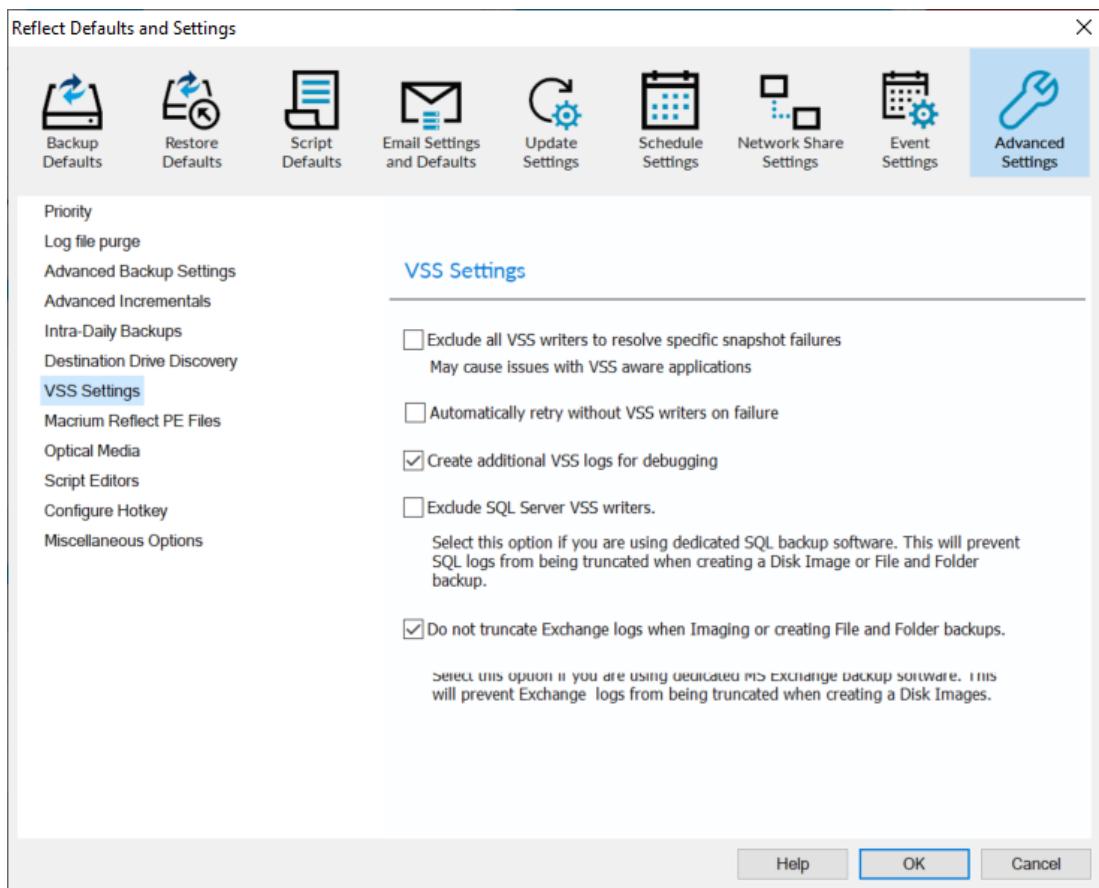


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Option	Description
Use assigned drive letter (default)	<p>The drive letter in the destination path is used exclusively to locate the backup target path. The destination path is saved in the format '<DRIVE LETTER>:\Folder'</p> <p>This enables multiple backup drives to be used in rotation if Windows assigns the same drive letter for each drive.</p>
Use volume GUID path	<p>The unique volume identifier associated with the backup drive is saved in the backup definition file and used to locate the destination path. The destination path is saved in the format '\\?\Volume{GUID}\Folder'</p> <p>This enables Windows to assign a different letter to the same drive and the new letter will be automatically chosen as the backup destination.</p>

Note: If 'Use volume GUID path' is selected you must edit/re-save existing backup definitions to reflect the change in the XML file.

VSS Settings

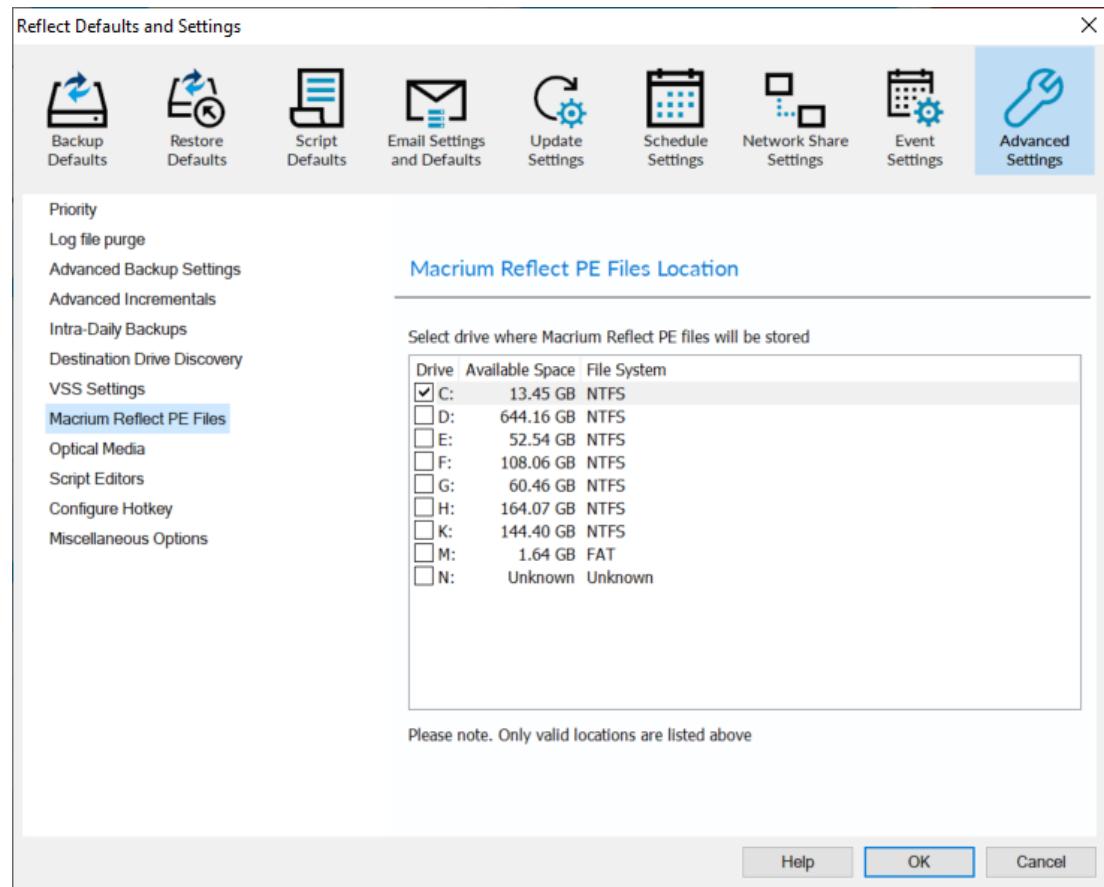


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Option	Description
Option	Description
Exclude all VSS writers to resolve specific snapshot failures.	This option will disable VSS writers. Due to Windows system configuration issues, VSS writers are the cause of some backup failures. This may cause issues with other VSS aware applications.
Automatically retry without VSS writers on failure	Reflect will try to create a backup of your system without using VSS; this option is useful when experiencing VSS related errors.
Create additional VSS logs for debugging.	Each backup will create additional VSS logs that can be used in order to troubleshoot VSS related issues when creating backups.
Exclude SQL Server writers.	Select this option if you are using dedicated SQL backup software. This will prevent SQL logs from being truncated when creating a Disk Image or File and folder backup.
Do not truncate Exchange logs when imaging or creating file and folder backups.	Select this option if you are using dedicated MS Exchange backup software. This will prevent Exchange logs from being truncated when creating a Disk Images.

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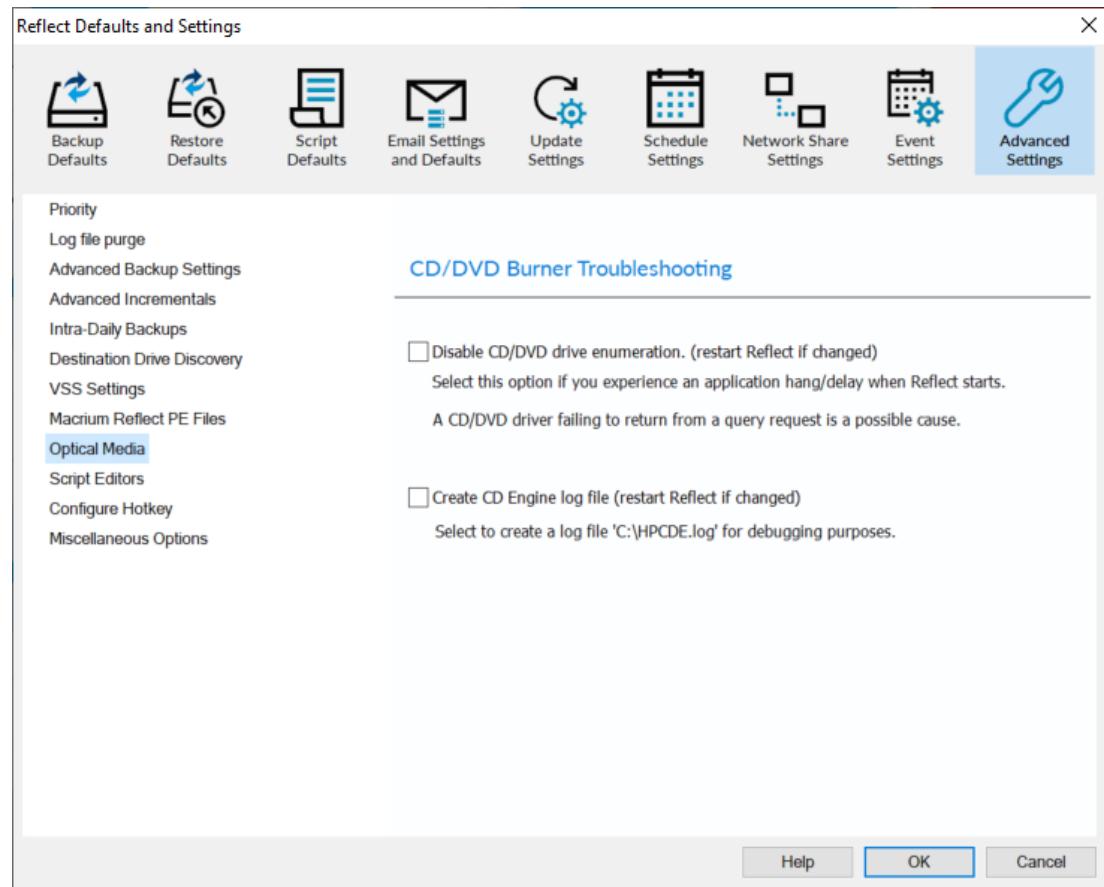
Macrium Reflect PE File Location



By default, the files to create, and boot, your rescue media are saved to directory 'c:\boot\macrium'. Select a different local drive if your 'C' drive is compromised by storing approximately 1GB of storage space here.

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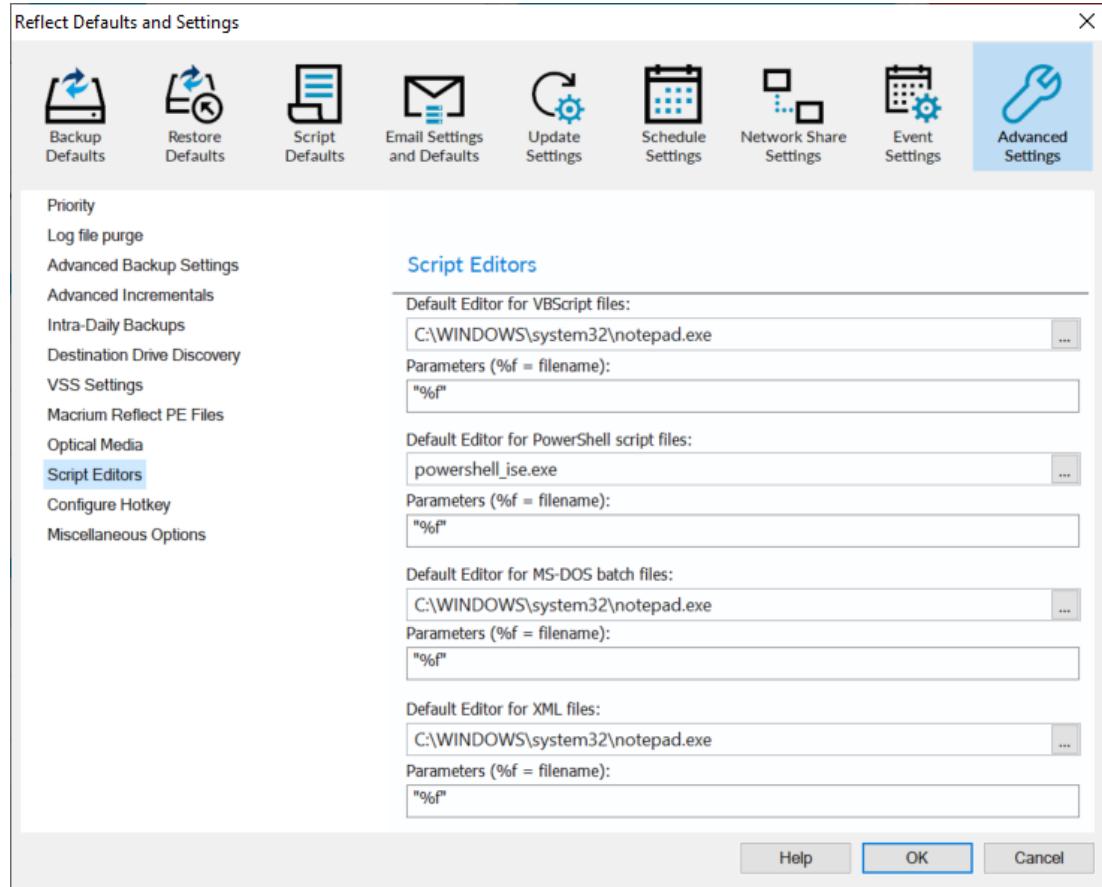
CD/DVD Burner Troubleshooting



Disable CD/DVD drive enumeration	CD/DVD burners that fail to return from a query request may cause an application hang. Select this option as a troubleshooting step if Macrium Reflect hangs on startup.
Create a CD Engine log file	Turning this option creates a log file that can be used for troubleshooting CD/DVD burner connection activity. Log file: 'C:\HPCDE.log'

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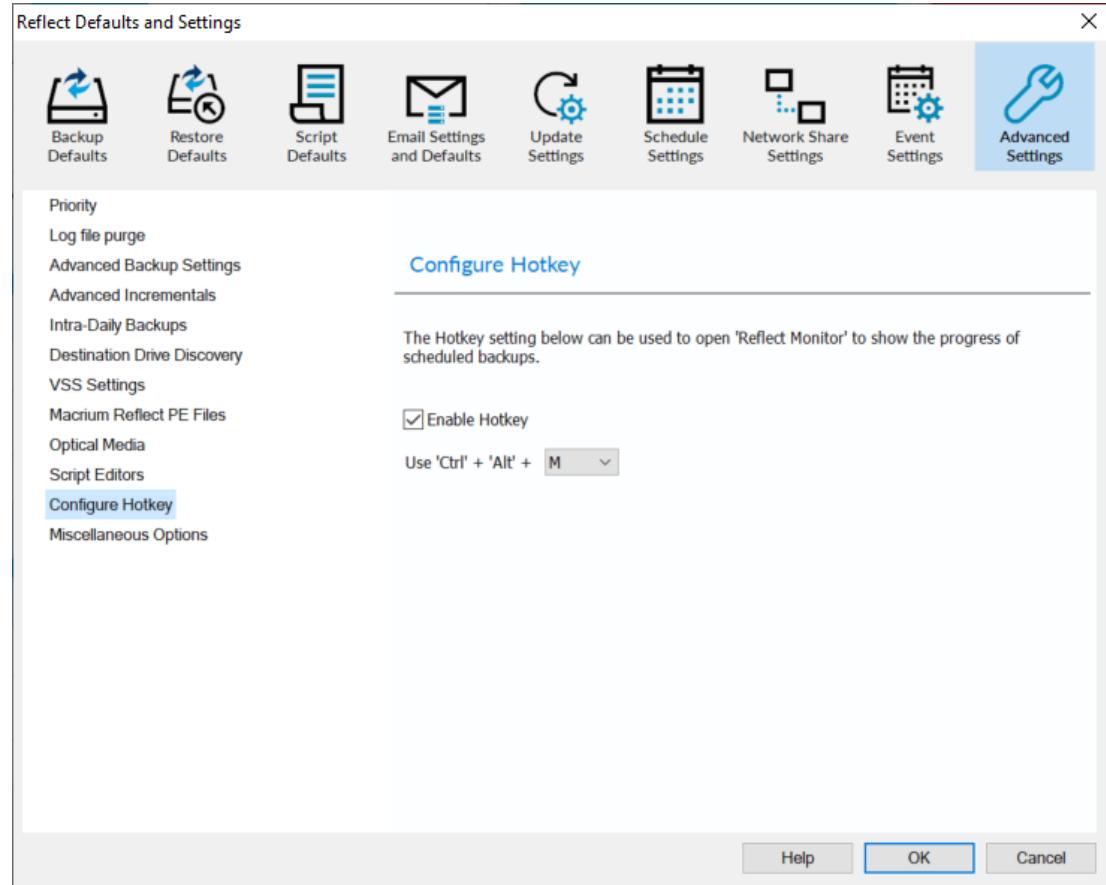
Script Editors



Set the program to use as an editor when editing your VBScript, PowerShell, MS-DOS batch, and xml files.

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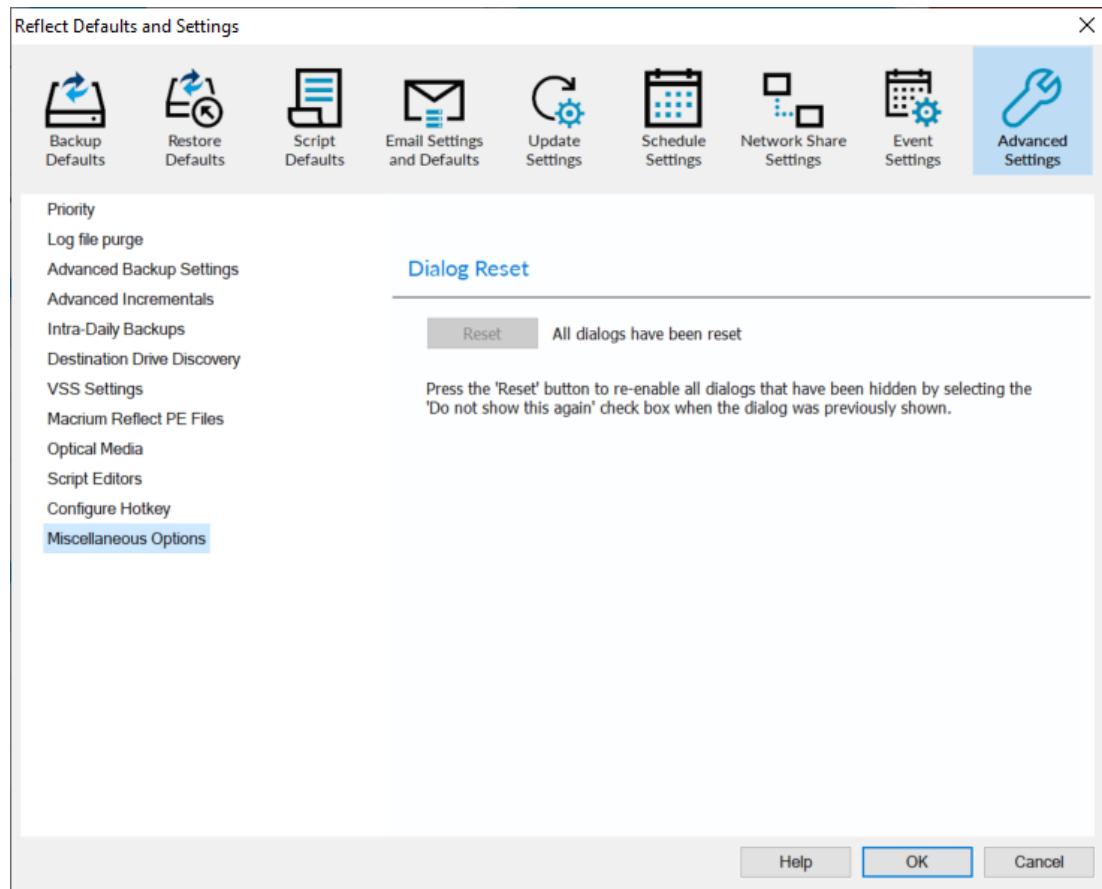
Configure Hotkey



ReflectMonitor is a standalone application that is used to monitor the progress, and cancel, background backups. ReflectMonitor can be easily accessed using a Hotkey sequence. You can enable and configure the Hotkey here.

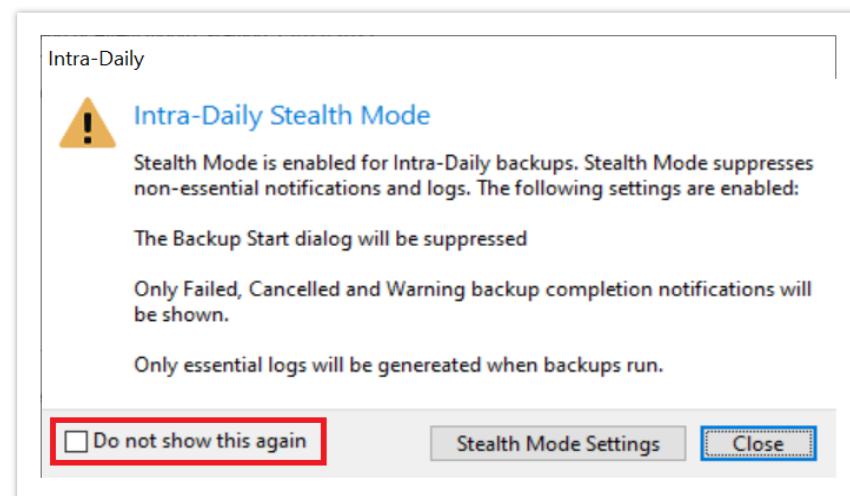
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Miscellaneous Options



Click the 'Reset' button to re-enable all dialogs hidden by selecting the 'Do not show this again' check box.

There are several dialogs in Reflect, an example below:



PXE Deployment

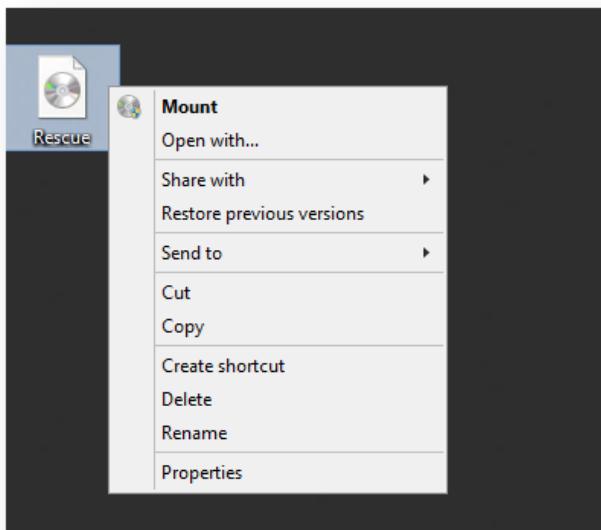
This article will take you through PXE deployment of the Rescue Media.



In order to use this technology you will need to have purchased the Macrium Reflect Technicians Deployment License.
If you wish to obtain this license please [click here](#) for further details.

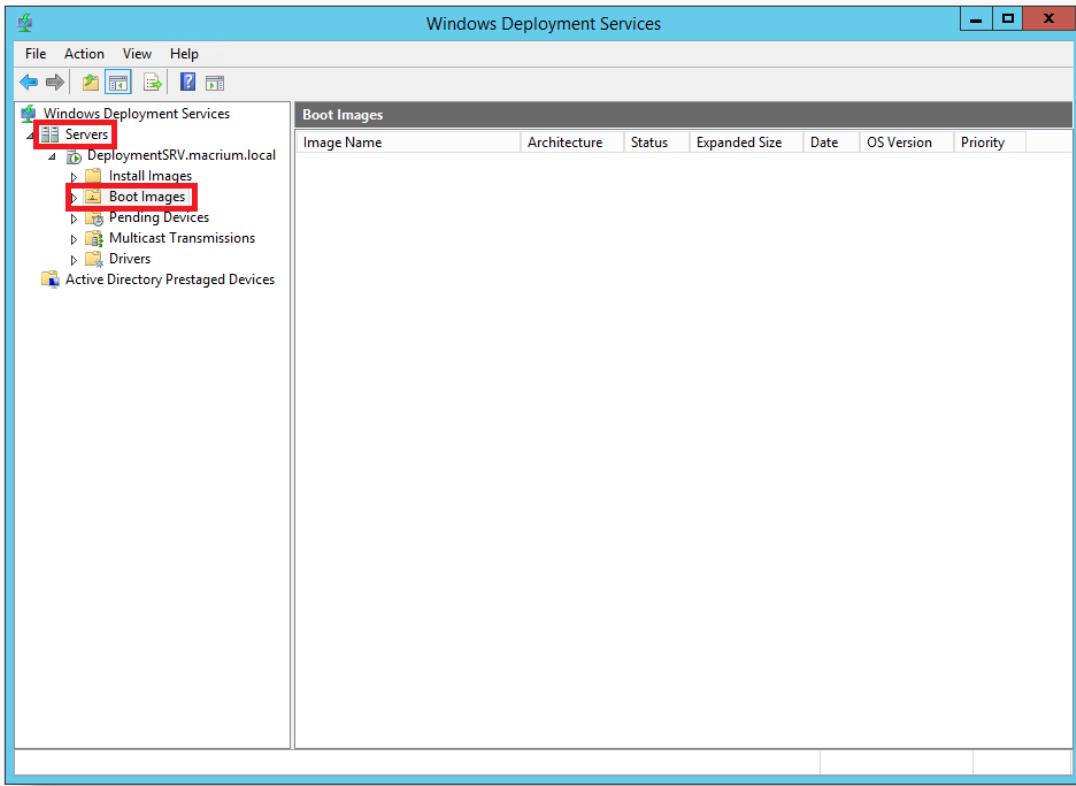
Before you begin: You will need to have set up a Windows Deployment Services Server and created a rescue media ISO image file. See [Creating rescue media](#).

1. Mount the **Rescue Media Image** that was created earlier.



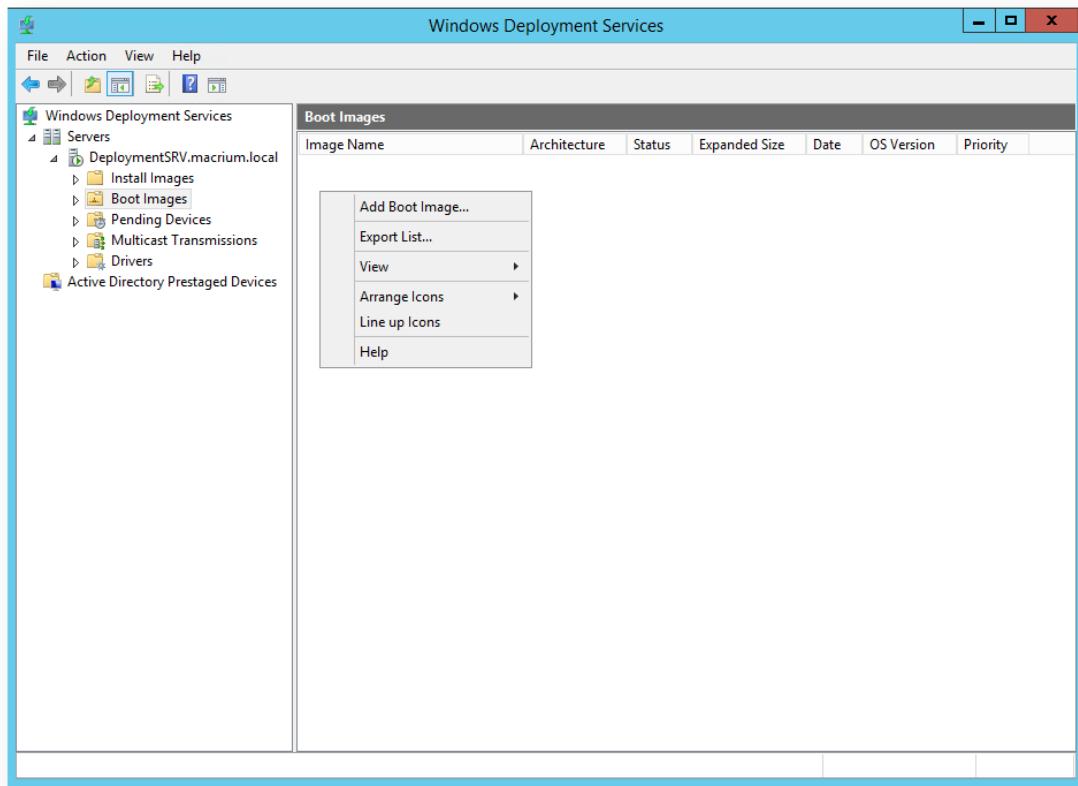
2. Open Windows Deployment Services and select 'Servers > Boot Images'

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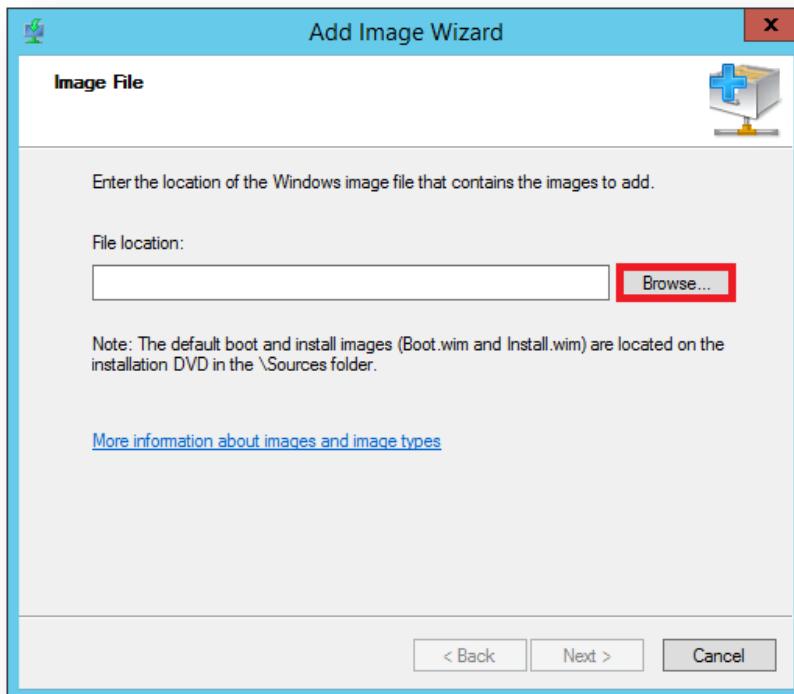


3. Right click the right pane and click 'Add Boot Image...'

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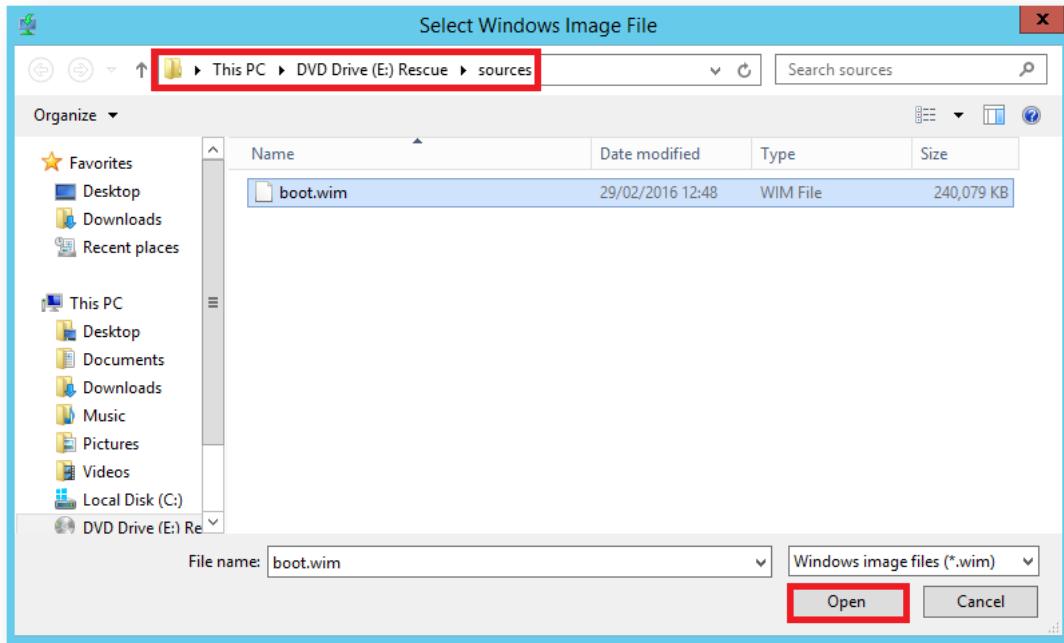


4. In the **Wizard** you can **browse** for a location of the **bootable WIM**.

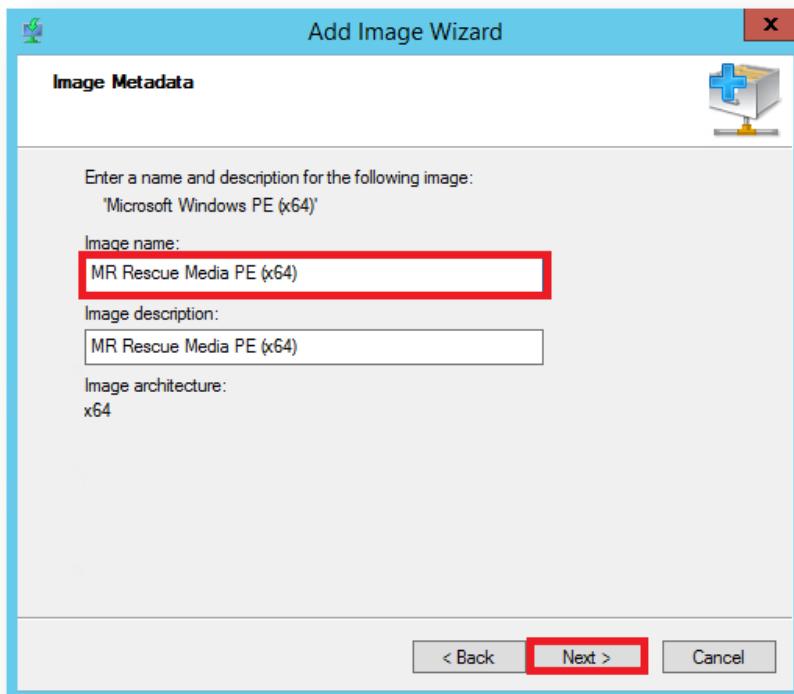


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5. Locate 'boot.wim' in the 'sources' folder of the mounted Rescue Media Image and click 'Open' then 'Next'.

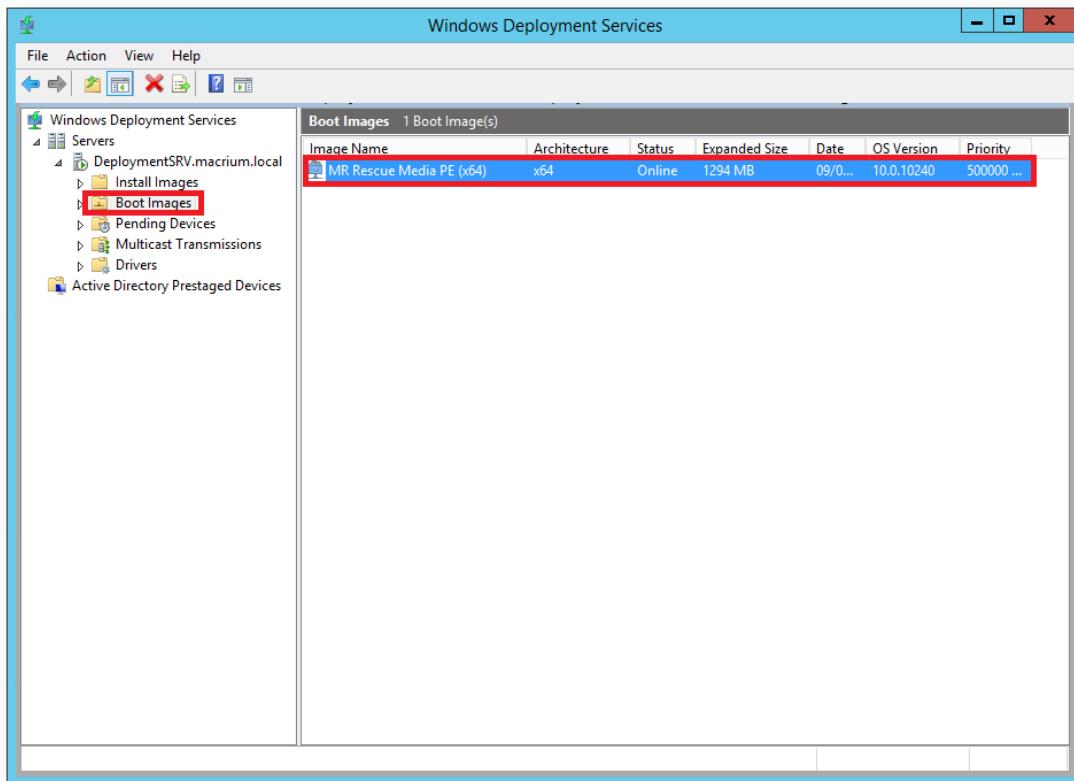


6. Name your boot image and click 'Next' twice.



7. Once finished you will see the the bootable image in the 'Boot Images' section of Windows Deployment Services console.

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You will now be able to boot PCs on your network with the Macrium Reflect Rescue Media.

Standalone backup set consolidation

It can be useful to independently consolidate multiple files in a backup set into a single Full or to consolidate a group of Incremental backups. This helps to conserve disk space and can be used when archiving your backups to optimize the number of backups being copied.

Independent consolidations can be run without creating a backup or launching Macrium Reflect by running a small utility **Macrium Image Consolidation** located in the Macrium Reflect install folder.

This is usually '`C:\Program Files\Macrium\Reflect\consolidate.exe`'.

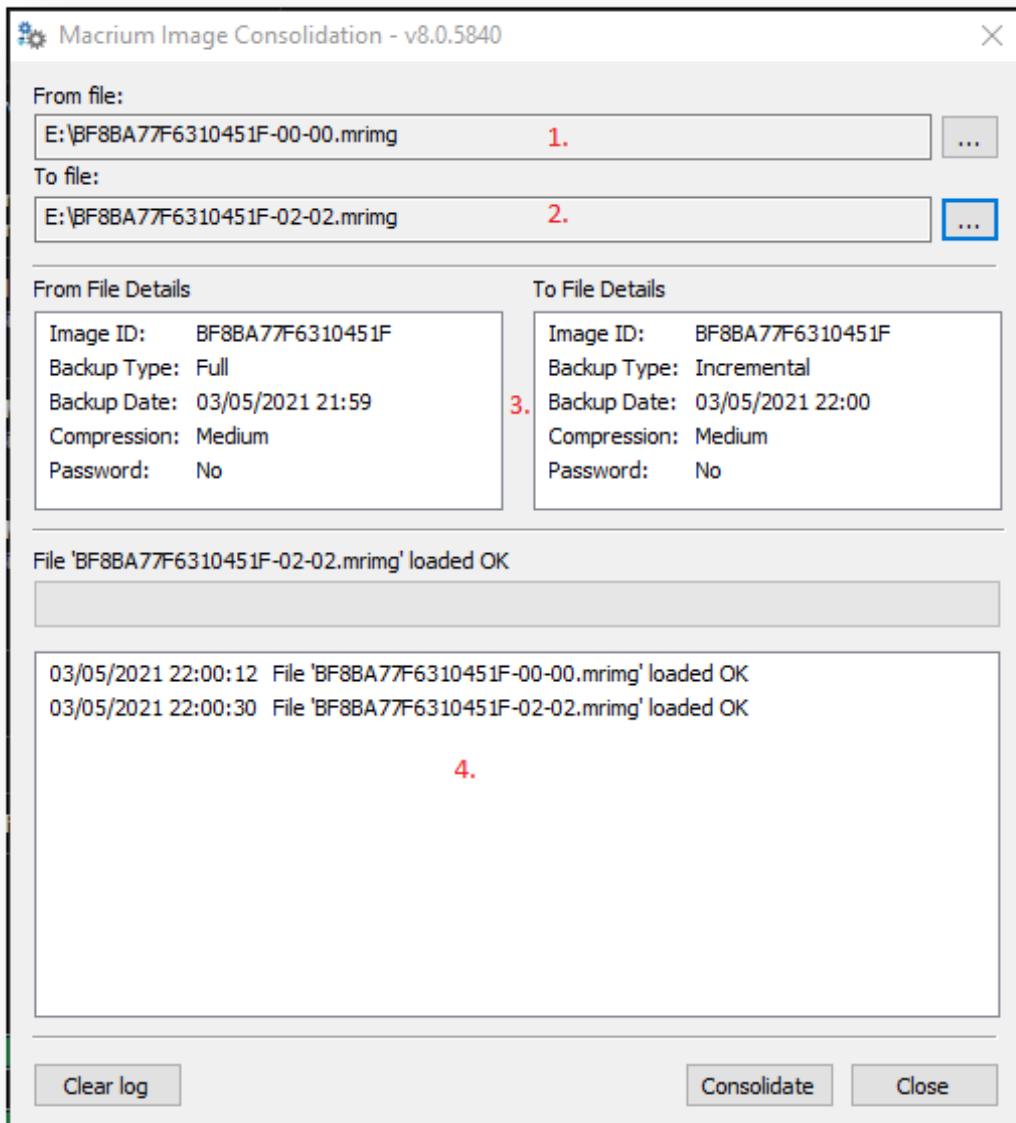
Using Macrium Image Consolidation

To Launch Macrium Image Consolidation **double click 'consolidate.exe'** in Windows Explorer.



'`consolidate.exe`' is a standalone executable that does not require installing.

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Area	Description				
1	<p>Enter the 'From' backup file for the consolidation process, or click '...' to browse. This is usually the Full backup, ending in '00-00.mrimg', but can be an Incremental file.</p> <p>Valid Macrium backup file types are:</p> <table border="1"><tr><td>Image files:</td><td>.mrimg</td></tr><tr><td>File and Folder backup files:</td><td>.mrbak</td></tr></table>	Image files:	.mrimg	File and Folder backup files:	.mrbak
Image files:	.mrimg				
File and Folder backup files:	.mrbak				

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Area	Description
	Exchange backup files: .mrex
2.	Enter the 'To' file for the consolidation process, or click '...' to browse. This must be in the same backup set as 1. and must have been created after the backup in 1. Click 'Consolidate' to begin the consolidation process.
3.	Basic information about the backup files.
4.	The output Window. This is populated after clicking 'Consolidate' and contains detailed information about the consolidation process.



Note: Selecting a '**Full**' image for the '**From**' backup file will create a consolidated '**Synthetic Full**' image.

Restrictions when choosing the 'From' and 'To' backup files.

- Each file must be from the same backup set. See [How backup sets are created and maintained](#) for more information on sets.

Error output:

From and To files are from a different backup set.

- The 'To' file must have been created after the from file.

Error output:

From file is more recent than the To file

- The backup set cannot contain any Differential backups.

Error output:

The backup set contains Differential backups

Converting a Physical machine to Virtual Machine



Links have been added to each applicable step to explain the step in greater detail.

1. Using Macrium Reflect [take an image of your physical machine](#).
2. Once you have an image, [create a Rescue Media ISO image](#).
3. Create a Virtual Machine using your preferred hypervisor (Hyper-V, VMware, Virtual box...), assigning to it a vCPU, Memory and a Virtual Hard Disk.
4. Boot the VM using the created Rescue Media ISO image.
5. From the booted Rescue Media [restore your image](#) on to the Virtual Hard Disk attached to your VM.
6. Without exiting the Rescue Media, run the [ReDeploy](#) option.
7. Detach the ISO from your VM and reboot it.

Logging file changes for Incremental and Differential Images

Your Windows operating system and installed applications can create many changes 'under the hood' without you knowing about it. This can cause Incremental or Differential images to be substantially larger than expected. This article describes a feature in Macrium Reflect to log files that have been changed in each Incremental or Differential image.



Note: In Macrium Reflect v7, this functionality is only available if Changed Block tracker (CBT) is disabled. Take '[Other Tasks](#)' > '[Edit Defaults](#)' > '[Advanced](#)' > '[Advanced Incrementals](#)' and **un-check 'Enable Changed Block Tracker'**

What are Incremental and Differential Images?

Incremental images will only backup data blocks that have changed since the last image or, in the case of Differential, full image in the backup set. Images are created at File System cluster level and each block is MD5 hashed and compared. Blocks with the same hash signature aren't included in the Differential or Incremental image file. A data block is usually 16 clusters in length.

See also: [How backup sets are created and maintained](#)

How to show changed files

If the following registry entry is set, Reflect will perform a reverse 'look-up' to identify the file for each cluster that is backed up.

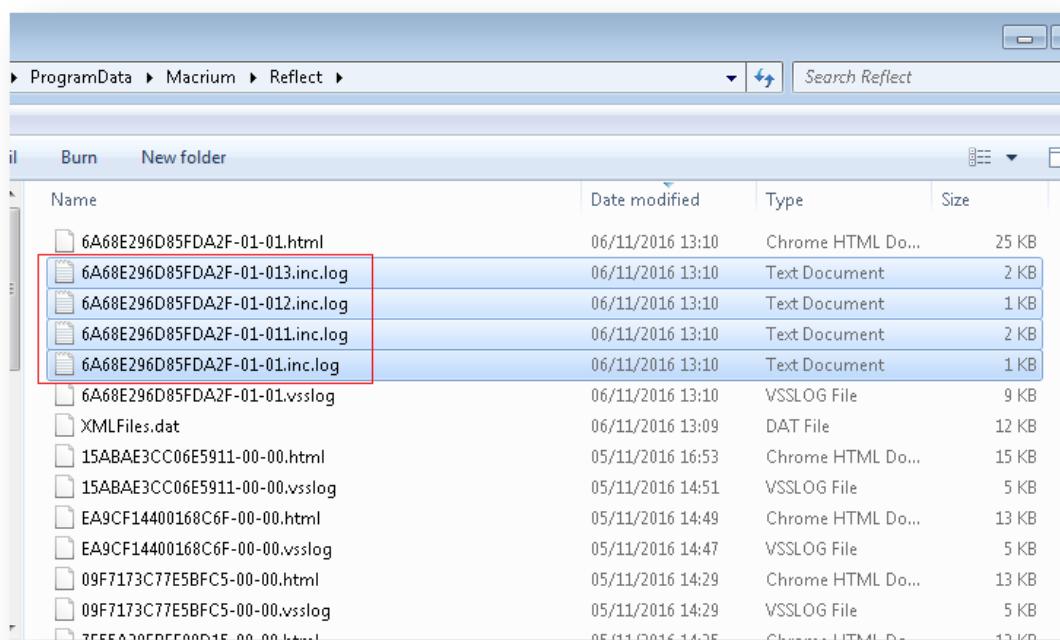
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This may increase the time taken to backup and **should only be used for diagnosis**.

Key:	HKEY_LOCAL_MACHINE\SOFTWARE\Macrium\Reflect\Settings
Name:	LogIncrementalChanges
Type:	DWORD
Value:	1

Once the registry entry is set, **perform another Differential or Incremental Image** and, once complete, **delete the registry entry created above**. Then use Windows Explorer to **navigate to: 'C:\ProgramData\Macrium\Reflect'** in Windows Explorer and **sort by Modified Date**:



In addition to the normal '.html' and '.vsslog' files you will also see files with '.inc.log' at the end. There will be one for each NTFS partition in the Differential or Incremental.

The first file, **{IMAGEID}-XX-YY.inc.log**, is the log for the first NTFS partition, the next file is , **{IMAGEID}-XX-YY1.inc.log** and,

in the above example, **{IMAGEID}-XX-YY3.inc.log** is the last last NTFS partition in the image.

Example log output

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```
MFT Record - 32 - .\$Extend\$RmMetadata\$TxfLog\$TxfLog.blf
MFT Record - 34 - .
\$Extend\$RmMetadata\$TxfLog\$TxfLogContainer00000000000000000000000000000002
MFT Record - 38 - .\Windows\Prefetch\AgGlGlobalHistory.db
MFT Record - 39 - .\Windows\Prefetch\AgGlFaultHistory.db
MFT Record - 43 - .\Windows\Prefetch\AgRobust.db
MFT Record - 45 - .\Windows\Prefetch\AgGlFgAppHistory.db
MFT Record - 1236 - .\Windows\SoftwareDistribution\SelfUpdate\WuPackages.xml
MFT Record - 1333 - .\Program Files (x86)\TeamViewer\Version8\TeamViewer8_Logfile.log
MFT Record - 1353 - .\ProgramData\Microsoft\RAC\PublishedData\RacWmiDatabase.sdf
MFT Record - 1592 - .\Users\Dev\AppData\Local\Google\Chrome\User
Data\Default\Current Session
MFT Record - 1783 - .\Program Files\Microsoft SQL Server\MSSQL10.
SQLEXPRESS\MSSQL\Log\ERRORLOG
MFT Record - 13900 - .\Windows\System32\winevt\Logs\Microsoft-Windows-
PrintService%4Admin.evtx
MFT Record - 15637 - .\Windows\WindowsUpdate.log
MFT Record - 15741 - .\Windows\System32\winevt\Logs\Microsoft-Windows-Windows
Defender%4Operational.evtx
MFT Record - 15743 - .\Windows\System32\winevt\Logs\Microsoft-Windows-Windows
Defender%4WHC.evtx
MFT Record - 15755 - .\Users\Dev\AppData\Local\Google\Chrome\User
Data\Default\IndexedDB\http_localhost_2904.indexeddb.leveldb\LOG
MFT Record - 15868 - .\Windows\bootstat.dat
MFT Record - 21541 - .\Windows\security\database\secedit.sdb
MFT Record - 21544 - .\Windows\ServiceProfiles\LocalService\NTUSER.DAT
MFT Record - 21565 - .\Windows\ServiceProfiles\NetworkService\NTUSER.DAT
MFT Record - 22562 - .
\Windows\ServiceProfiles\NetworkService\AppData\Local\Temp\MpCmdRun.log
MFT Record - 22649 - .\Windows\System32\7B296FB0-376B-497e-B012-9C450E1B7327-5P-1.
C7483456-A289-439d-8115-601632D005A0
MFT Record - 22650 - .\Windows\System32\7B296FB0-376B-497e-B012-9C450E1B7327-5P-0.
C7483456-A289-439d-8115-601632D005A0
```

And so on.....

Each log file lists the MFT record and full path name to the file(s) that have changed.



There will be many MFT metadata files (prefixed by '\$') that are not visible to Windows Explorer or any other windows utilities, but these are always included (if changed) in Diff/Inc image files.



Please note that this doesn't mean that all clusters in the listed files have changed it means that the file clusters are scanned and differences have been detected.

Backup to the cloud with Azure File Shares

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Azure Files offers fully managed file shares in the cloud that are accessible via the industry standard Server Message Block (SMB) protocol.

Share access is fully secure using end to end AES encryption utilised in the SMB 3.0 protocol and **can be used directly for Macrium Reflect backup and restore and Site Manager repositories.**



Note: SMB 3.0 is available with **Windows 8.1 or later** and **Windows Server 2012 or later** operating systems. **Earlier versions of Windows cannot mount Azure shares.**

Port 445 (TCP outbound) must be open to allow communication with Azure file shares. If you have problems **please check that your ISP isn't blocking this port.**

How to setup an Azure File Share

It's easy and takes just 5 minutes! If you don't currently have an Azure account then it's easy to set one up. There's a Free tier and currently a free credit for full access when you first enrol. Please see here for more information: <https://azure.microsoft.com>

In the Azure Dashboard select '**All Services**' then scroll to and **select 'Storage Accounts'** in the 'Storage' group:

The screenshot shows the Microsoft Azure dashboard. On the left, there is a sidebar with a 'Create a resource' button and a 'FAVORITES' section containing 'Dashboard', 'All resources', 'Resource groups', 'App Services', 'Function Apps', and 'SQL databases'. Below these are 'All services' and 'Storage accounts'. The 'All services' button is highlighted with a red box. On the right, the main pane shows a list of services under 'All services' with a 'Filter' input and a 'By category' dropdown. The 'STORAGE (8)' section is expanded, showing 'Storage accounts' and 'Data Lake Store', both of which are also highlighted with red boxes. Other sections like 'WEB (12)' and 'APP SERVICES' are visible below.

Click the 'Add' button to reveal the share creation options.

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The screenshot shows the Azure Storage Accounts 'Create storage account' dialog. On the left, there's a list of existing storage accounts under 'Storage accounts' for the subscription 'paramountsoftwareukltd'. A red box highlights the '+ Add' button. The main right panel is titled 'Create storage account' and contains the following fields:

- Name:** macriumofficebackups (with a green checkmark)
- Deployment model:** Resource manager (selected) [Classic]
- Account kind:** Storage (classic)
- Location:** West Europe
- Replication:** Read-access geo-redundant storage (RA-GRS)
- Performance:** Standard (selected) [Premium]
- Subscription:** Visual Studio Professional
- Resource group:** Create new (selected) [Use existing] (radio buttons)
- Resource group name:** backups (with a green checkmark)
- Pin to dashboard:** checked (checkbox)

At the bottom are two buttons: 'Create' (highlighted with a red box) and 'Automation options'.

You must provide a **unique name**, across all Azure shares, for your share URL. I've used 'macriumofficebackups' for this example.

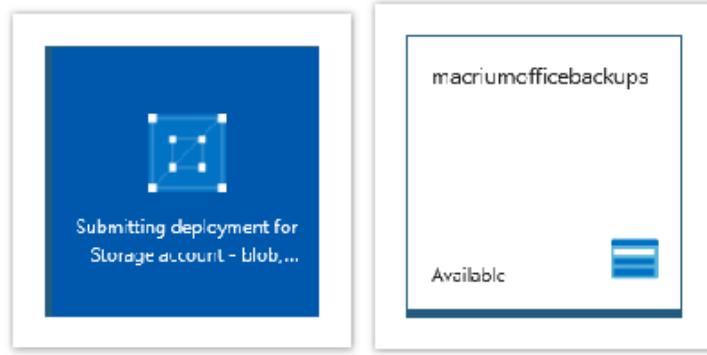
Select the '**Classic**' deployment model to keep things simple.

Create a **new** and appropriately named '**Resource Group**'. I've used 'backups'.

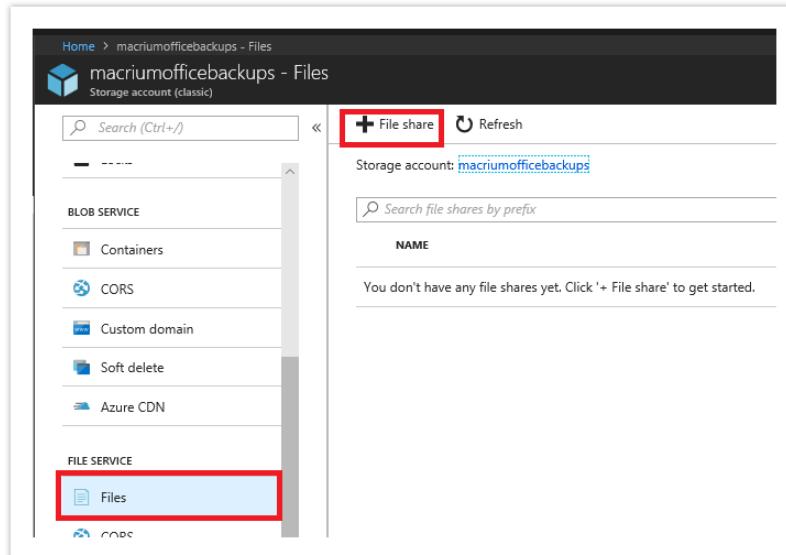
Select '**Pin to dashboard**' for easy access.

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Finally, click 'Create' and you'll see the following activity widget on the dashboard followed by a new storage tile after a few seconds:

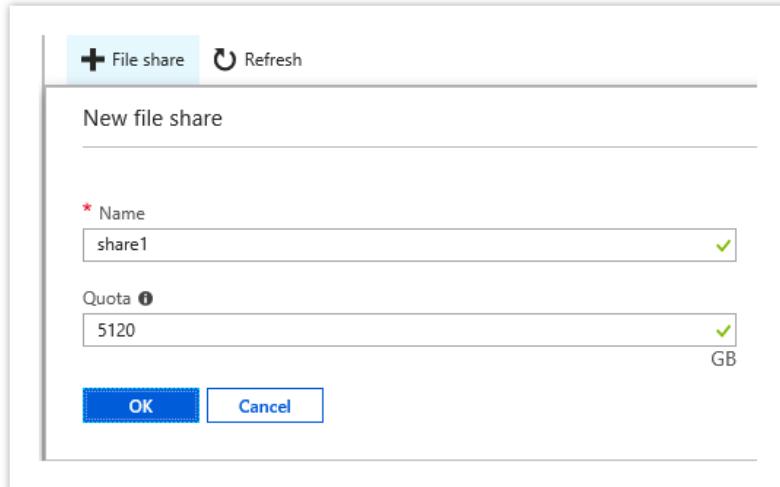


Click the new storage tile, select 'Files' in the storage account selections pane that opens, then click 'Add File Share'

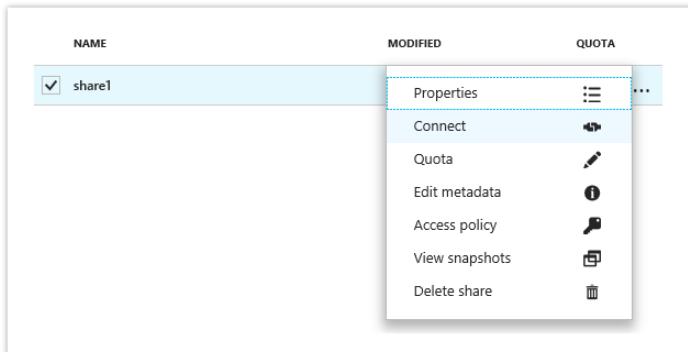


Give your share a **meaningful name** and **set the size**. The max is 5TB / 5120 GB:

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Click the '...' menu on the new share and select 'Connect'



You'll be presented with several scripts and command line options to connect to your new share from anywhere in the world

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Connect
share1

Connecting from Windows

Drive letter ▼

To connect to this file share from a Windows computer, run these PowerShell commands:

```
$acctKey = ConvertTo-SecureString -  
String "4FkHLDrmoaos2lYkwnLIR8Ls+6nVVATPlaMoCEWa1j6  
GfvnHMDfAaVmFDA4IQkCzxtn4YPObl2Lc+IfXWZPjQw==" -  
AsPlainText -Force  
$credential = New-Object
```

Alternatively, run this command if the key doesn't begin with a forward slash:

```
net use Z:  
\macriumofficebackups.file.core.windows.net\share1 /u:AZURE\  
macriumofficebackups  
4FkHLDrmoaos2lYkwnLIR8Ls+6nVVATPlaMoCEWa1j6GfvnHMDf  
AaVmFDA4IQkCzxtn4YPObl2Lc+IfXWZPjQw==
```

When connecting from a computer from outside Azure, remember to open outbound TCP port 445 in your local network. Some Internet service providers may block port 445. Check with your service provider for details.

[Learn more about Azure File Storage with Windows](#)

Connecting from Linux

To connect to this file share from a Linux computer, run this command:

```
sudo mount -t  
cifs //macriumofficebackups.file.core.windows.net/share1  
[mount point] -o  
vers=3.0,username=macriumofficebackups,password=4FkHLDrm  
aoos2lYkwnLIR8Ls+6nVVATPlaMoCEWa1j6GfvnHMDfAaVmFD  
A4IQkCzxtn4YPObl2Lc+IfXWZPjQw==,dir_mode=0777,file_mod  
e=0777,sec=ntlmssp
```

The Linux SMB3 client doesn't support share level encryption yet, so mounting a file share in Linux only works from virtual machines running in the same Azure region as the file share.

[Learn more about Azure File Storage with Linux](#)

We just need to **select and copy the share path, username and password text from 'net use' command**:

Your details will obviously be different, but for this example:

Share path:	\macriumofficebackups.file.core.windows.net\share1
User:	AZURE\macriumofficebackups
Password:	4FkHLDrmoaos2lYkwnLIR8Ls+6nVVATPlaMoCEWa1j6GfvnHMDfAaVmFDA4IQkCzxtn4YPObl2Lc+IfXWZPjQw==

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Creating the share is now complete and you have enough information to **connect to Azure for backup and restore from Macrium Reflect and for creating Site Manager repositories.**

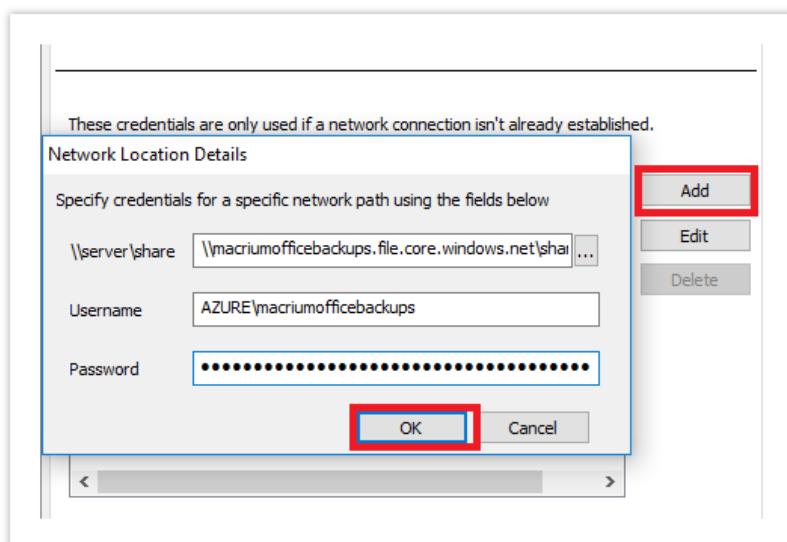
More details on other setup methods and options can be found here: <https://docs.microsoft.com/en-us/azure/storage/files/storage-how-to-create-file-share>

How to connect to the Azure Share in Macrium Reflect

Connecting is simple! Once you have the share details copied from the steps above you can begin backing up to the cloud in exactly the same way as you would any local network share.

Take the '**Other Tasks**' > '**Edit Defaults**' > '**Network**' menu option in Reflect.

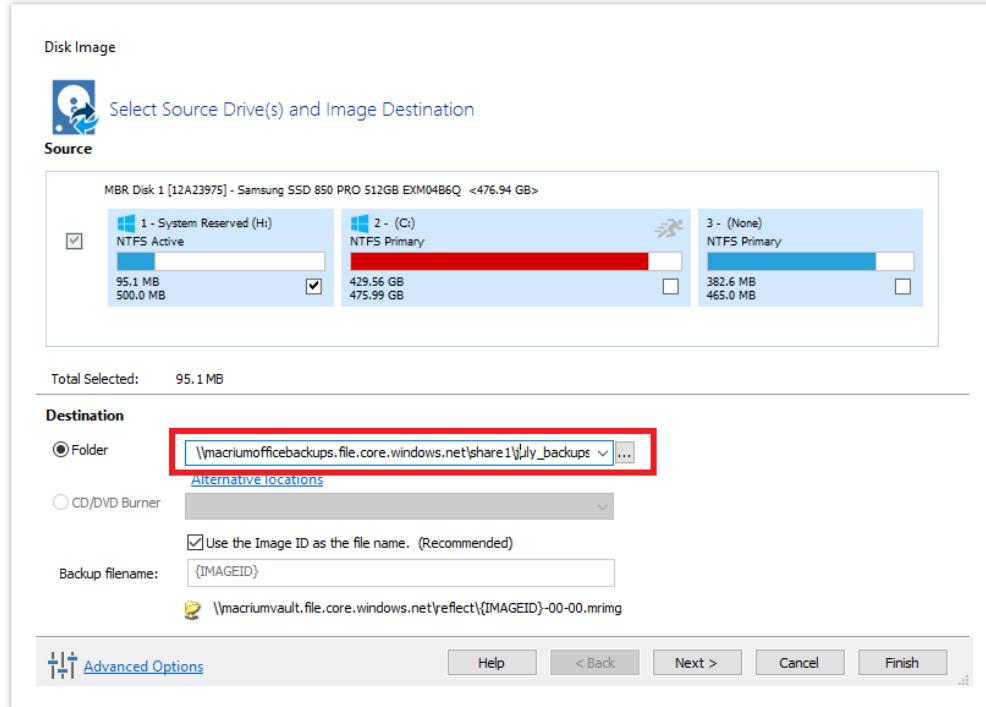
Click 'Add' and **enter the Azure share user name and password** then **click OK**.



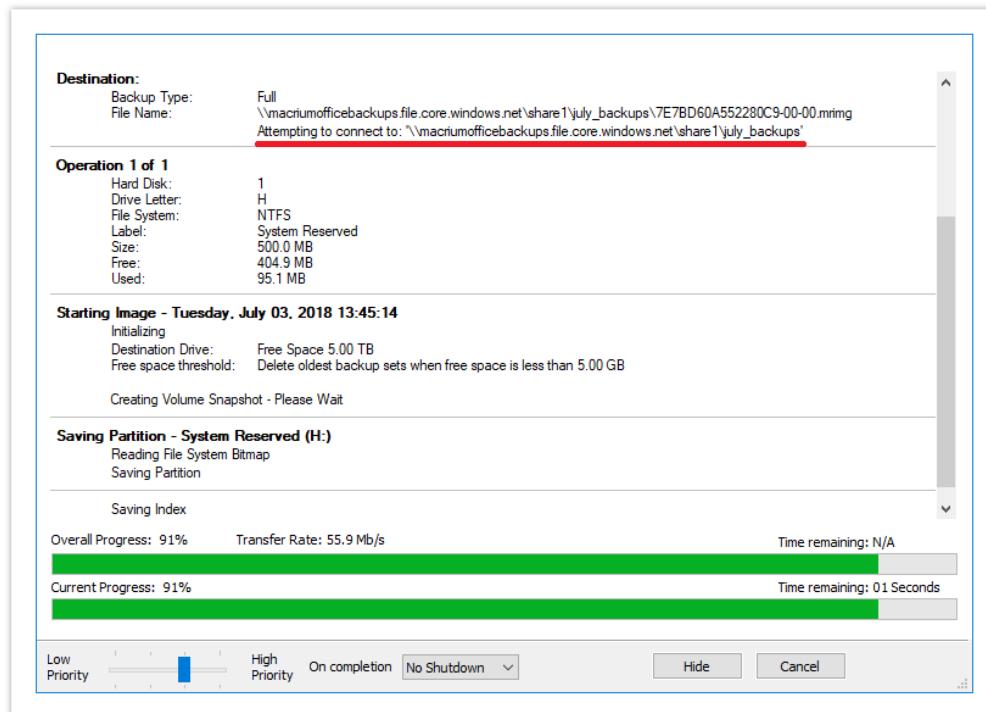
You can now **backup directly to the cloud by entering the Azure share path** plus any sub folder if you want to:

In this example we're imaging directly to: \\macriumofficebackups.file.core.windows.net\\share1\\july_backups

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Sucess!



Note: When your login credentials are saved in the Reflect defaults you can even perform an **unattended system restore** and the **rescue media will automatically connect to Azure for you**.

How to add an auto restore xml file to the rescue media

If you've purchased a Macrium Reflect Deployment Kit License then to assist with deploying images it may be desirable to automate the restore of a 'Golden' Image by adding the Macrium Reflect auto restore xml file directly to the Windows Image (WIM) file used by the rescue media or by a PXE deployment server.

Create your auto restore XML using your 'Golden' image by **simulating a restore and pressing 'Ctrl' + 'Shift' + 'S'** on the **final restore wizard page** as describe below:

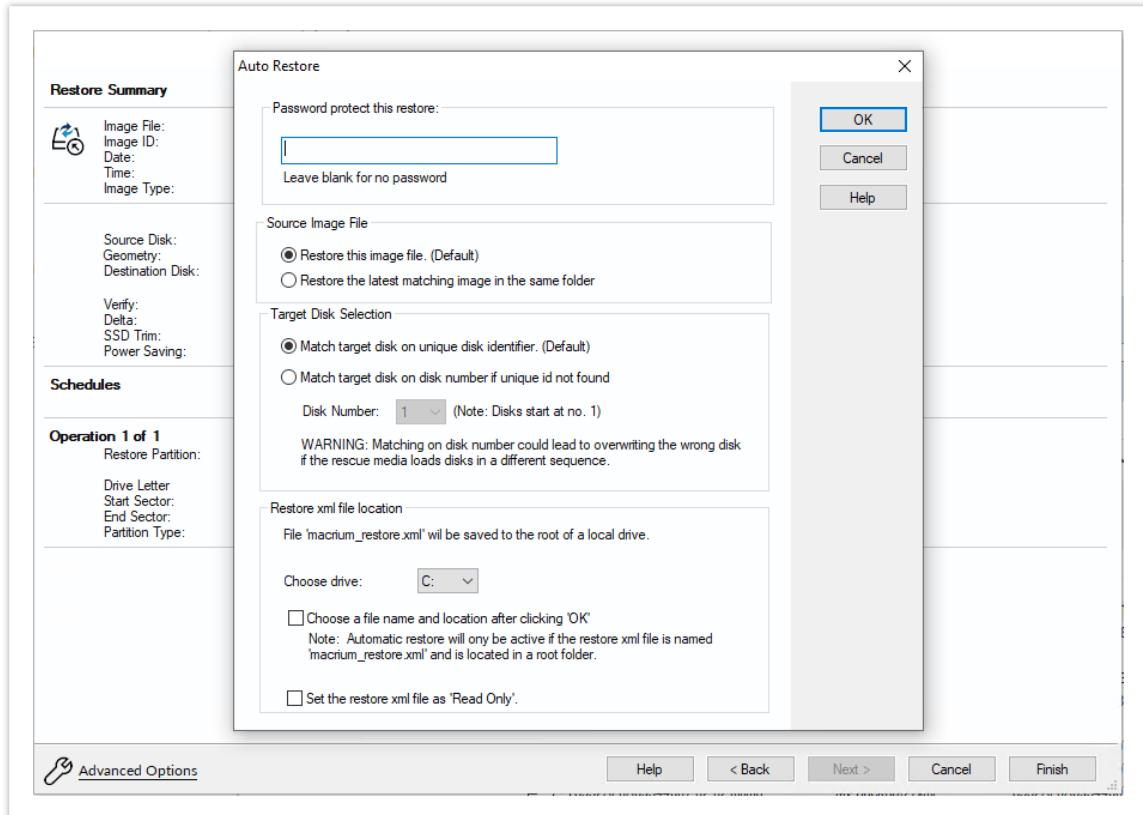


Note: The steps below to create the 'Golden' Image and 'macrium_restore.xml' can be run in Windows PE if required.

Ensure that the Image file is located on an accessible network share if you intend to deploy using PXE

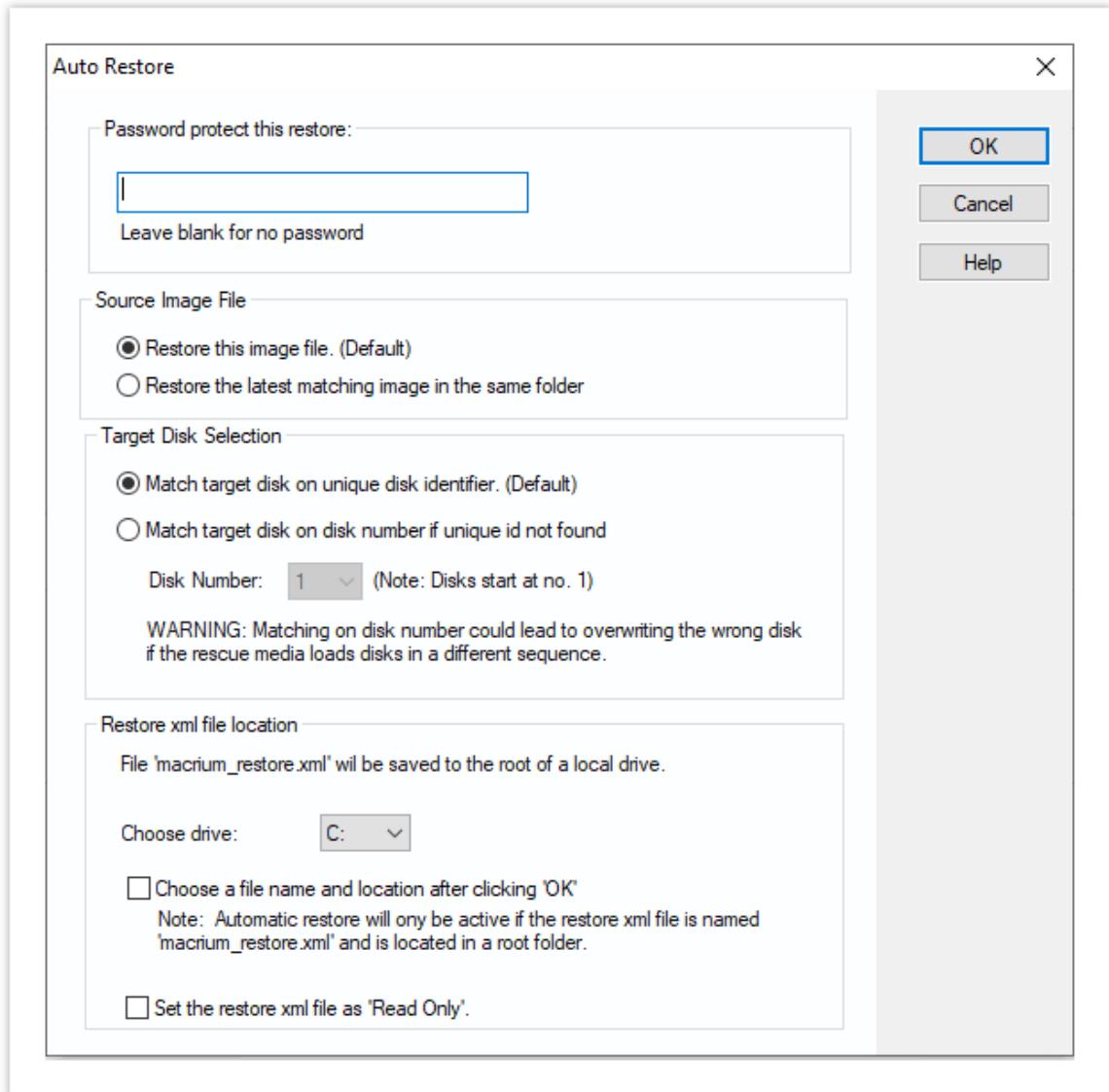
Click here to show the Auto Restore dialog...

To launch this dialog **press 'Ctrl + Shift + S'** together on the **last** page of the Restore wizard.



This dialog will prompt for options to automatically restore the selected image file at a later time using the Windows PE rescue media. When **OK** is clicked a restore definition XML file will be saved.

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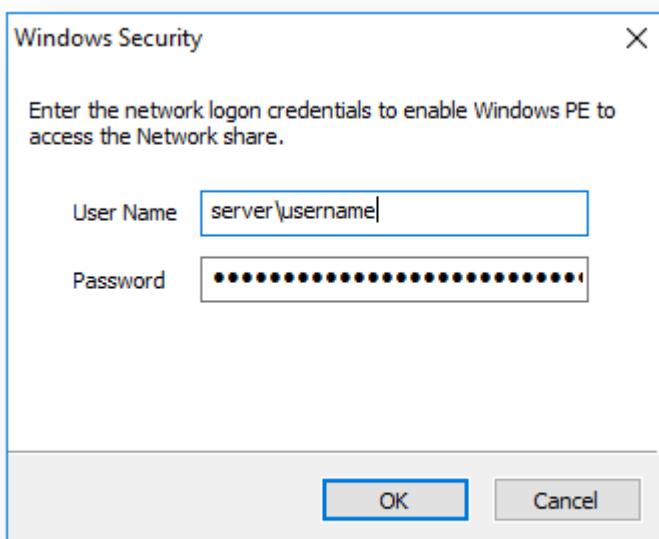


Option	Description
Password:	Enter a password to protect against accidental or unauthorised running of this restore.
Source Image File:	<p>Restore this image file: This is the default operation. The image file selected will be used as the restore source.</p> <p>Restore the latest matching image in the same folder: The image folder will be searched for any image files that contain the partitions being restored. The latest backup date is chosen as the restore source.</p>
Target Disk Selection:	Match target disk on unique identifier: This is the default operation. The unique disk id is used to ensure that the correct disk is restored to.

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Option	Description
	<p>Match target disk on disk number if unique id is not found: This option will not fail the restore if the target unique disk id cannot be found.</p> <p>The default number is the current number of the target disk but you can choose an alternative disk number if it's known that the number of the disk is different in the restore environment.</p> <p>Use with caution as Windows PE can enumerate disks in a different sequence and cause the wrong disk to be restored to, however, this won't be an issue if your system has only one local disk.</p>
Restore xml file location	<p>Choose drive: Select from a list of local drives to save the restore definition file. The file will be saved in the root folder of the chosen drive and will be named 'macrium_restore.xml'</p> <p>Choose a file name and location: If selected, a file 'save As' dialog will be shown when the 'OK' button on this dialog is clicked. This enables saving the restore definition file to any file name and to any folder.</p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"><p>Note: For auto restore to operate the restore definition must be named 'macrium_restore.xml' and be located on a root folder on a local drive. Saving to a different name and/or location enables you to prepare several restore definitions for later use.</p></div> <p>Set the restore xml file as 'Read Only': At the end of an auto restore the restore definition is automatically deleted. Setting the definition as 'Read Only' prevents deletion and enables re-running of the same restore each time Windows PE starts.</p>

If the image file is located on a network share then you'll be prompted to enter the authentication details:



How auto restore works

Local drives are scanned (from A to Z) for a restore definition '**macrium_restore.xml**' file in each drive root folder. Macrium Reflect will use the first restore definition found. This can be any local drive, including USB flash drives or optical media.

The restore definition contains instructions to locate the image file to restore from and the target disk to restore to.

It is imperative that the correct image file is restored to the intended disk. To ensure that there are no nasty surprises after restoring, Macrium Reflect uses unique disk identifiers and sector offsets to match the source and target of the restore.

Locating the source image file folder

The default behaviour is to read the image file specified in the **<file_name>** xml node. However, It's possible that Windows PE has assigned different drive letters to local drives, in this case the following procedure is followed.

- All local drives are scanned for a 'Marker' file that is created when the restore definition is saved. This Marker file has the following file name format: '**Macrium_restore_{GUID}.txt**', where the GUID (Globally Unique Identifier) is retrieved from the '**<search node>**' in the restore xml.

```
<search guid="{0D6B46C4-A5ED-4578-A9C0-5539B0AB94A0}">Y</search>
<file_name>D:\backups\auto_restore\4E855CB463979BC9-01-01.mrimg</file_name>
```

If the marker file isn't found in the **path** specified in the **<file_name>** xml node then all local drives are searched for the marker file in the same sub folder. If the marker file is found then that folder will be searched for the image file to restore.

- If no Marker file is found or is not specified in the xml then all local drive are scanned (from A to Z) to locate any images in the folder specified by the '**<file_name>**' xml node that contain images to restore.



Note: If the image file is located on a network path then no searching is required. Network paths are unambiguous and absolute.

Locating the correct source image file

The default behaviour is to read the specified image file in the folder in the '**<image_file>**' xml node. However, if '**Restore the latest matching image in the same folder**' is selected in the Auto Restore dialog then the following procedure is followed:

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Source Image File

- Restore this image file. (Default)
- Restore the latest matching image in the same folder

xml attribute **find_recent="Y"** is added to the **<file_name>** xml node.

```
<file_name find_recent="Y">D:\backups\auto_restore\4E855CB463979BC9-01-01.mrimg</file_name>
```

All **matching** backup sets are loaded in the image file folder and the most recent backup date is selected and used for the restore. A **matching** backup set has the same disk and partitions specified in the restore definition file.

```
<restore_definition>
    <properties>
        <source_disk id="3A177438-02D6-4DB6-9FCC-184F81DEE52A">1</source_disk>
    </properties>
    <operation id="1">
        <type>copy</type>
        <copy>
            <source>
                <partition start_sector="2048" end_sector="616447">1</partition>
            </source>
        </copy>
    </operation>
</restore_definition>
```

A matching image file contains the same disk identifier and partition start and end sectors as well as partition number.

e.g. In this case **Disk identifier 3A177438-02D6-4DB6-9FCC-184F81DEE52A** and **partition number 1** with **start sector 2048** and **end sector 616447**

Locating the restore target disk

The default behaviour is to select the target disk by matching the unique disk identifier specified in the **<target_disk>** xml node. However, if '**Match target disk number if unique id not found**' is selected in the Auto Restore dialog then the following procedure is followed:

Target Disk Selection

- Match target disk on unique disk identifier. (Default)
- Match target disk on disk number if unique id not found

WARNING: Matching on disk number could lead to overwriting the wrong disk if the rescue media loads disks in a different sequence.

xml attribute **numberFallback="Y"** is added to the **<target_disk>** xml node.

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```
<target_disk id="3A177438-02D6-4DB6-9FCC-184F81DEE52A" numberFallback="Y">1</target_disk>
```

The restore target disk is matched on disk number if a disk cannot be matched using the unique identifier.



Please use this option with caution as Windows PE may load disks in a different sequence to regular Windows. This may cause the wrong disk to be restored to.

Next we need to mount the Windows Image (WIM) file and copy the 'macrium_restore.xml' file to the root of the image.

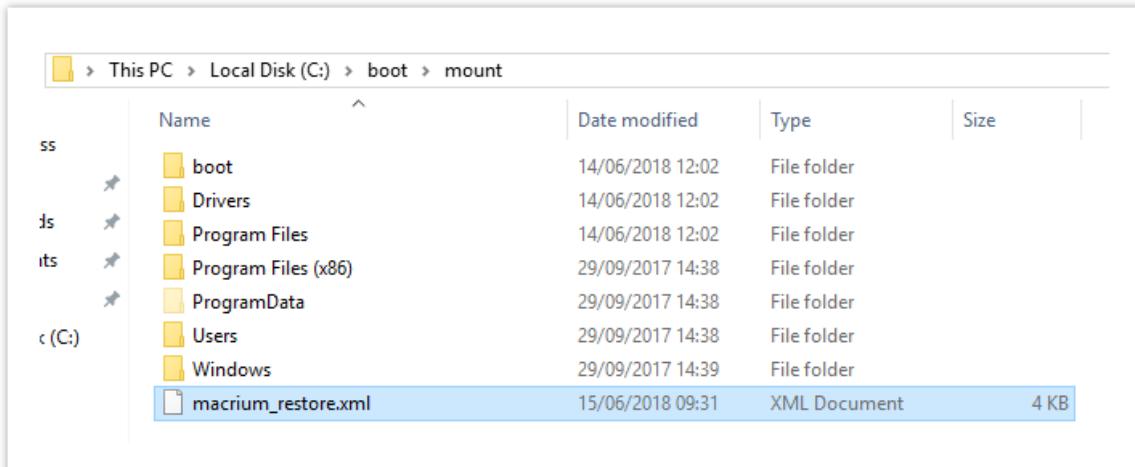
1. From within Windows (not PE), **create an empty folder** anywhere on your C: drive that will be used to mount the WIM file. In this example we'll use 'C:\Boot\Mount'.
2. Open a command prompt with elevated privileges and **type the following command**:

```
DISM /Mount-image /imagefile:C:\boot\macrium\WA10KFFiles\media\sources\boot.wim /index:1 /MountDir:"c:\boot\mount"
```



Note: The location of the WIM in this case is the default location for the Windows PE 10 WIM file. Please update as necessary in your own command.

3. **Open the mounted folder** in Windows Explorer and **copy the 'macrium_restore.xml' file** to the root.



Note: After copying the file close Windows Explorer so that there are no locks on the open folder.

4. **Type the following commands** in the command prompt:

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```
Dism /Unmount-image /MountDir:"c:\boot\mount" /Commit  
Dism /Cleanup-Wim
```

5. Once complete **the WIM file can be copied** to a deployment server or USB stick and used to initiate an automatic restore.
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