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#1 MSP BACKUP



WHITEPAPER

Full System Backup and Recovery



Introduction

This whitepaper provides an overview of ways to back up your Windows computer. It addresses both desktops and servers. We will focus on methods of system backup, on various recovery destinations, and on application-aware backup and recovery.

Image-Based Backup and Recovery

System image backup is a process that allows the backup and recovery of the whole computer including the state and the structure of its drives and operating system.

System image backup works as follows:

- Backup software creates a block-level copy of the disk.
- If the disk contains several partitions, each partition is then saved as a single file, an image.
- The software adds a copy of a boot sector and disk configuration data to images.

System image backup is a general term used by Microsoft. Some backup vendors including MSP360 and users call the technology image-based backup.

Image-Based Backup Is Helpful in Cases of



Hardware / software
failure



Disaster recovery



Malware attack



Hardware migration

Image backup technology can be helpful in cases of hardware or software failure, disaster recovery, or any malware attack. Speaking of less disastrous situations, you may need system image backup if you would like to switch to different hardware keeping the same system settings and configuration.

The greatest advantage of system image backup is a faster recovery of entire systems. The faster you restore your data, the sooner you can get back to business operations and communication with customers.

System Image Recovery Options

There are three options to recover a system from an image backup. You can recover only selected files, selected partitions excluding the operating system, or recover the full system if you don't have the operating system installed.



File-Level Restore

The recovery of individual files and folders from the system image is called file-level or granular restore. It often saves the day when you need to recover only one file without downloading the whole image from the failed machine.



Recovery to the Drive

Sometimes you boot your machine and one or several partitions are missing or do not work. There are two possible reasons for that: HDD/SSD failure and file system failure. In these situations, you can recover only the needed partitions from system image without recreating their structure, or reinstalling the OS.



Recovery with ISO File

ISO file is basically an archive with the .iso, .img or .ima file extension. Nowadays, it's an industry standard and files with mentioned extensions are used to distribute large programs. The idea behind ISO image file is that you can store and recreate, when needed, an exact digital copy of a disc or a selected partition.

ISO files typically contain everything you need to run and install a given program. When you need to recover the whole system, you need some sort of operating system in your ISO file so that the recovery can be started. That is why ISO-images contain not only copies of partitions, configuration, and a boot sector, but also a Windows PE (PE stands for Preinstalled Environment). This makes images bootable - you don't need any installed OS on the machine to boot it and recover your data.

The given structure for bootable ISO file is true for MSP360 Backup and may not be used by other backup vendors.



Bare-Metal Recovery

A computer without an operating system installed is called a bare-metal machine. Bootable ISO images help to recover the system to these machines fast and without additional configuration. This approach saves time in many cases of sudden hardware changes including:

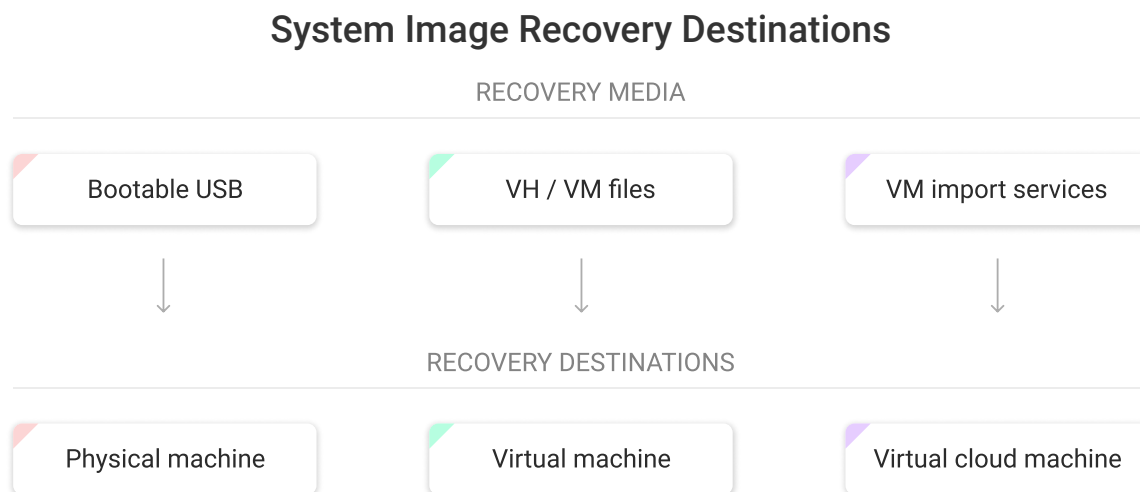
- Upgrade
- Maintenance
- Disaster recovery



System Image Recovery Destinations

The system image recovery process is different for different types of IT-architecture. There are three common destinations for a recovery:

- Physical machine
- Virtual machine
- Virtual cloud machine



Physical Machine

In case of a bare-metal restore, you need to recover with a bootable USB, a device containing the ISO-image.

Virtual Machine

Virtual machines are booted similarly to physical ones - from an archive file which contains the image of the drive. The extension of this archive is defined by the VM-environment you are going to use for recovery. Two of the most popular VM-environments (Hyper-V and VMware) have extensions formats starting with VH and VM (VHD, VMD, etc).

To recover your system as a virtual machine, you should first convert the ISO file to the needed format. In MSP360 Backup, this operation is automated.

Cloud Virtual Machine

All large cloud service providers including AWS, Microsoft Azure and Google Cloud, allow to spin up virtual servers within their infrastructure. They each offer a service for the task:

- Amazon EC2
- Microsoft Azure VM
- Google Cloud Compute



You can build a cloud virtual machine from scratch or use an image of a server. The procedure is similar to server recovery to a virtual machine. All mentioned providers allow to import virtual machine images, but they each have different naming, feature set, user-interface, and requirements.

System State Backup and Recovery

System state backup is a copy of crucial OS components that are necessary for the successful operation of the system. If your system fails to start or function properly, you can recover the latest system state backup.

Windows system state backup contains the following:

- Windows System Registry
- Performance Counter Configuration information
- Component Services Class registration database
- Boot and system files, including those protected by Windows File Protection (WFP)
- The configuration of system-dependent Microsoft applications, such as Certificate Services, Active Directory, IIS etc.

**System state backup is small in size and can be completed quite quickly.
You can perform it using native Windows backup tools.**

System state backup can help you solve such issues as:

- configuration-dependent system faults (for example, BSOD errors)
- crucial file or system registry corruption of any kind

To perform a complete system image backup, you'll also need to make a copy of the system state as it contains files that cannot be copied 'manually', but are required to restore the state of the system.

	System State Backup	System Image Backup
Allows system configuration and crucial system file(s) restoration	Yes	Yes
Enables roll back from the improper system configuration	Yes	Yes
Allows recovery of the server in any case of disaster	No	Yes
Suitable for server OS cloning or relocation	No	Yes
Allows restoration of certain user files, granularly	No	Yes
Suitable for fast "snapshot" backup	Yes	No
Suitable for regular backup of the heavy-loaded server	Yes	No



Application-Aware Backup

Windows Servers are built to provide services for users and other servers. They are the basis for most IT infrastructures. Popular Windows Server applications include (but are certainly not limited to) the following:

- Database servers - Microsoft SQL, MySQL, etc.
- Email servers - Microsoft Exchange
- Users catalog and management - Microsoft Active Directory
- Web services - IIS, Apache, etc.
- File servers



All server applications have unique backup and recovery specifics that vary depending on the server configuration and the nature of the infrastructure of which it is a part. For example, servers may be integrated into clusters or have different connections to external services, which create unique backup and recovery requirements. For this reason, you should be extremely cautious when planning recovery procedures for a server.

In general, it is a good idea to start by planning how to recover services and how to rebuild connections between them and infrastructure they support. Only after formulating this recovery plan should you choose a backup method that is compatible with it.

Further reading

Check out our guides on [MS Exchange](#) and [MS SQL Server](#) backup and recovery.

Windows Server vs. Desktops: Backup and Recovery

All of the backup and recovery methods discussed above, except for system state backup, can be applied to both Windows server and Windows desktop operating systems. However, the time you spend to plan and execute backup and recovery for different types of systems can vary significantly.

For example, the failure of one server that provides a mission-critical service, such as Active Directory, will lead to a halt in the business processes that rely on computers. For the modern company that usually means almost all business processes.

In contrast, a machine with a desktop operating system does not typically run mission-critical services. One failed desktop won't lead to major business-continuity issues for a number of systems; it will usually only affect the individual user of that desktop.



When you need to recover the desktop, you can either recover files back to the machine from which they were lost, or re-create a new machine from a recovery image. If you have a domain in your infrastructure, you should check and re-add the user's data to the corporate network, if necessary. In most cases, that is all you need to remember when performing desktop recovery.

Full System Backup and Recovery with MSP360 Backup

MSP360 is a leading cross-platform cloud backup and disaster recovery solution. MSP360 Backup is integrated with major public cloud services, such as Amazon Web Services, Microsoft Azure, and Google Cloud Platform. MSP360 Backup comes with powerful, easy-to-use backup and disaster recovery capabilities, including file-level and image-based backups, disaster recovery to virtual machines in the cloud, data compression and military-grade encryption using customer-controlled keys. Customers can run MSP360 Backup on Windows, Mac and Linux operating systems.

MSP360 also provides a turnkey, white-label data protection service to thousands of VARs and MSPs to help them build their brand in the cloud backup market.

MSP360 Backup offers you fast and simple bare-metal restore process. It allows you to perform image-based backups to any cloud or local backup destination, [restoring image-based backups as VMware virtual machines or Azure virtual machines](#).

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File-level, System State and System Image

MSP360 Backup backup and recovery from:

- File-level backup
- System state backup: only the operating system and configuration
- System image backup: a full copy of the needed computer or server



Cloud and Local

MSP360 Backup allows you to store your system images on local storage or any of the major cloud storage providers, including Amazon S3 and Amazon Glacier, BackBlaze B2, Wasabi Hot Storage, Microsoft Azure, and others.



Bootable USB for Bare-Metal Restore

Easily [create a recovery USB drive](#) or [bootable ISO file](#) for an emergency recovery in case of a system or hardware crash. Install additional drivers for a hardware configuration that is different from the current machine.



Flexible Retention and Recovery

Why recover only the latest version? MSP360 Backup allows bare-metal restore to the point in time that you choose. Store as many versions as you need for as long as you need with flexible retention settings.



Compression and Encryption

MSP360 supports on-point compression and encryption. Compression allows you to save space (and thus money) on the storage of your choice and time when performing backup. With AES-256 encryption and encrypted upload channels, you can be sure that all your files are safe.

Request a demo or sign up for a free 15-day trial of MSP360 Managed Backup:
<https://www.msp360.com/managed-backup.aspx>

Free Sign Up

About MSP360

Established in 2011 by a group of experienced IT professionals, MSP360™ provides cloud-based backup and file management services to small and mid-sized businesses (SMBs). MSP360's offerings include powerful, easy-to-use backup management capabilities and military-grade encryption using customer-controlled keys.

Customers can choose to store their backup data with more than 20 online storage providers, including Amazon S3 and Amazon Glacier. MSP360 also collaborates with thousands of VARs and MSPs to provide them with turnkey, white-label data protection services. It has been an Amazon Web Services Advanced Technology Partner since 2012. MSP360 has also achieved Storage Competency Partner status in the AWS Partner Network. For more information, visit www.msp360.com. Follow us on Twitter at @MSP360.