

Microsoft Hyper-V

This solution is cluster compatible. If your data is stored on a Hyperconverged server using Storage Spaces Direct, it will be able to back up VHD files from anywhere in the Hyperconverged cluster.

The set of virtual machines available for backup will only reflect the current Hyperconverged node, so it is recommended to install on all the host nodes in the cluster.

This Protected Item type backs up Microsoft Hyper-V virtual machines. The solution supports Hyper-V backups using three different modes:

1. Latest VM state (Changed Block Tracking),
2. Latest VM state (Standard),
3. All VM snapshots.

Backing up a Hyper-V virtual machine includes, but is not limited to:

- its configuration file
- all attached virtual drives
- the contents of memory (if the machine was running)
- the full tree of saved checkpoints

You can select individual virtual machines for backup or choose "All virtual machines".

Latest VM state (Changed Block Tracking)

The Latest VM state (Changed Block Tracking) option uses WMI/RCT as its underlying technology and is compatible with all versions of Hyper-V running on Windows Server 2016 or later and Windows 10 or later. The solution integrates with the Hyper-V WMI/RCT writer to perform a backup of Hyper-V virtual machines using WMI mode with RCT acceleration. This includes the latest snapshot data only.

Latest VM state (Standard)

The Latest VM state (Standard) option uses WMI/RCT as its underlying technology and is compatible with all versions of Hyper-V running on Windows Server 2016 or later and Windows 10 or later. The solution integrates with the Hyper-V WMI/RCT writer to perform a backup of Hyper-V virtual machines using WMI mode. This includes the latest snapshot data only.

All VM snapshots

The All VM snapshots option uses VSS as its underlying technology and is compatible with all versions of Hyper-V running on Windows Server, including Windows Server 2022 (the latest version at the time of writing). This backup type is only applicable when running on Windows Server. Hyper-V on Windows Desktop is not supported when using the All VM snapshots option.

The solution integrates with the Hyper-V VSS writer to perform a Hyper-V backup snapshot, including support for in-VM quiescence on supported guest operating systems. This includes all previous snapshots.

Consistency and guest additions

The following information applies to all products that perform Hyper-V backup.

When backing up a guest VM, it is important to get a consistent state of the VM. There are some different ways this happens.

If the guest OS has all necessary Hyper-V integration services installed, then the host can request for the guest VM to take a VSS snapshot. The snapshot is then exposed to Hyper-V on the host for it to backup. It shouldn't interrupt the guest OS. The VM backup is application consistent. This is known as a "Production checkpoint".

If the host OS is running Server 2012 R2 or newer, but there are no integration services inside the guest OS, then Hyper-V will take a checkpoint of the VM; the solution will back up the checkpoint; and then the checkpoint will be removed. This kind of checkpoint does not interrupt the guest OS. The VM backup is crash consistent. This is known as a "Standard checkpoint".

- You can also achieve this behaviour by disabling "Production checkpoints" in the Hyper-V settings for the VM.

If the host OS is older than Server 2012 R2, and there are no integration services inside the guest OS, then the VM will be paused; Windows will take a VSS snapshot of Hyper-V's files in paused state; the VM will be resumed and the solution will back up from the VSS snapshot. It would cause a short interruption to the guest OS. The VM backup is crash consistent.

- You can also achieve this behaviour by disabling checkpoints in the Hyper-V settings for the VM.

Production checkpoints are supported. If the guest VM is running a supported version of Windows, a production checkpoint will integrate with guest VSS services to create a VSS snapshot inside the guest operating system, offering best quiescence for VSS-aware services such as Microsoft SQL Server running inside the guest operating system. If production checkpoints are not available for the specified VM, the solution is able to make use of standard checkpoints or other methods to safely take a point-in-time checkpoint of the VM.

Replica VM

The following information applies to all products that perform Hyper-V backup.

If you are using Hyper-V replication, you can back up your virtual machines from either the primary or replica host.

A backup taken on the primary VM host is application-consistent (if possible), by quiescing a VSS snapshot inside the VM guest; or crash-consistent otherwise. A backup taken on the secondary VM host is only ever crash-consistent, because the replica VM is not running in order for guest integration services to take a VSS snapshot.

Current versions of Hyper-V do not allow backing up a VM that is currently replicating. If a VM is found to be currently replicating at the time of backup, The solution will retry the operation a few times. If you repeatedly see errors of the form The virtual machine '...' cannot start a backup operation because it is currently executing a conflicting operation. Try the backup again., and you are running backups from the replica VM host, you could consider

- scheduling the backup job to run at a time when it is more likely that the VM replication is up-to-date; or
- using Before / After commands in the solution to temporarily stop VM replication while the backup job is running.

For more information about backing up a replica VM, see <https://techcommunity.microsoft.com/t5/virtualization/backup-of-a-replica-vm/ba-p/382208>

Pass-through disks

The following information applies to all products that perform Hyper-V backup.

Hyper-V supports passthrough disks, to attach a physical disk from the host directly into the guest VM. This unmounts it from the host OS.

Hyper-V itself does not support backing up passthrough disks (nor does it support replicating them). A Hyper-V backup of the guest machines can be taken from the host, but does not include any data from passthrough disks.

You can work around this issue by either

- installing the solution inside the guest VM, and backing up the extra data at a file level (this will use an extra Device license); or
- changing your passthrough disks to be a real disk containing a large .vhd or .vhdx file. The "New Virtual Disk Wizard" in Hyper-V Manager has an option to convert an existing disk to a .vhd or .vhdx file.

For more information about backing up passthrough disks in Hyper-V, see <https://techcommunity.microsoft.com/t5/virtualization/working-around-the-pass-through-limitations-of-the-hyper-v-vss/ba-p/381537>

Restoring data from Hyper-V Checkpoints

If your selected virtual machine was using Hyper-V checkpoints, these are preserved by the backup job as-is within the Storage Vault.

When using the "Restore as Hyper-V virtual hard disk files" option to restore data, the vhdx (base checkpoint) and avhdx (differencing disks) are both present in the restore directory. You should use the "Import Virtual Machine" wizard in the Hyper-V Manager application to import the VM fully. Once the VM is fully imported, you can select the most recent checkpoint as the active checkpoint.

When using [the "Granular restore" option](#) to restore single files from within a Hyper-V vhdx file, only the base checkpoint (vhdx file) is processed. Any data from future checkpoints (avhdx files) is not supported by the "Granular restore" option. To recover individual files from a later checkpoint, you should first restore the vhdx/avhdx files in their entirety.

Importing a running VM into an incompatible hypervisor

When using the "Import Virtual Machine" wizard in the Hyper-V manager application, you can import the running state of a virtual machine. If you are restoring a VM to a different hypervisor that has a sufficiently different CPU, the VM may fail to resume on its previous running state (vmrs / RAM snapshot) because of an incompatible CPU.

To resolve this issue, either (A) use the 'Power off' option to shut down the imported VM, instead of the 'Shut down' option; or (B) re-import the VM from its saved disk files without including the RAM running state.