

Hyper-V Plugin

Bacula Systems Documentation

Contents

- 1 Hyper-V
- 2 Hyper-V WMI plugin

Contents

Important: Remember to read the Best Practices chapter common for all of our hypervisor plugins.

Bacula Enterprise offers two ways to backup your Hyper-V virtual machines:

1 Hyper-V

Important: Remember to read the Best Practices chapter common for all of our hypervisor plugins.

• Hyper-V Plugins to Cover All Backup Needs

1.1 Hyper-V Plugins to Cover All Backup Needs

Microsoft has created various technologies for backing up Hyper-V virtual machines. Thus, multiple Bacula Plugins have been designed to maximize the benefits of each solution.

Hyper-V is equipped with a VSS writer on all compatible versions of Windows Server. This VSS writer enables developers to utilize the existing VSS infrastructure for backing up virtual machines to Bacula using the Bacula Enterprise VSS Plugins. This technology is supported by the original **Bacula Hyper-V plugin**. Although it doesn't allow incremental and differential backups and other more granular VM-based options, it can still cover any Hyper-V version. Therefore, it is highly recommended for small standalone Hyper-V servers (single node, no Failover Cluster) and older Hyper-V versions that do not offer Virtual Disk Service or Hyper-V WMI API.

The Virtual Disk Service (VDS) is a service provided by Microsoft Windows that handles query and configuration tasks upon request from end users, scripts, and applications. This service is compatible with Windows Server 2003, Windows Vista, and newer versions. The **Hyper-V Winapi Plugin** utilizes this technology to backup and restore virtual machines. It supports incremental and differential backups, making it the recommended solution for more intricate Hyper-V servers, such as Failover Clusters with multiple nodes, where local disk space is a critical resource. Depending on the relocation of virtual machines within the Cluster, it may be necessary to migrate the backed-up VMs across specific nodes.

Starting in Windows 8 and Windows Server 2012, Hyper-V supports backup via the Hyper-V WMI API. This feature enables individual Guest VMs to be backed up separately and incrementally, offering a more scalable solution compared to using VSS in the host. The Bacula Enterprise **Hyper-V WMI Plugin** uses this technology for backup and restore to/from Bacula. It backups/restores VM in the recommended Microsoft format. By utilizing the Microsoft snapshot format from/to disk, it is essential to have sufficient disk space available for the process to proceed smoothly. In

scenarios where disk space may be limited due to busy configurations, the Hyper-V Winapi Plugin can be utilized as an alternative solution.

Backups created using the **Hyper-V WMI Plugin**, **Hyper-V Winapi Plugin** and **Hyper-V Plugin** are not compatible with each other.

Overview

This white paper presents how to use the Microsoft Hyper-V Server plugin when backing up with **Bacula Enterprise** version 8.2. These solutions are not applicable to prior versions. This document is intended to be used by **Bacula Enterprise** administrators.

Bacula Windows Hyper-V Plugin

Bacula Systems provides a single plugin for Bacula Enterprise named vss-fd.dll that permits you to backup a number of different components on Windows machines. One of those components is Microsoft Hyper-V Server, which is the subject of this white paper.

Backing up and restoring Hyper-V virtual machine is supported with Full level backups. It is not possible to do Incremental or Differential backups because Microsoft does not support that backup level for the Hyper-V Server product. Use of the Global Endpoint Deduplication plugin and the **bothsides** FileSet option permits to minimize the data transfer and the storage.

Installation and Configuration

To activate the Hyper-V component you have to put the following into the Include section of the File Set which will be used to back up the Hyper-V Server:

Plugin = "vss:/@HYPERV/"

This will back up all Hyper-V Virtual Machine. The plugin directive must be specified exactly as shown above. A Job may have one or more of the **vss** plugin components specified.

You must ensure that the vss-fd.dll plugin is in the plugins directory on the FD doing the backup (done by default with the installer), and that the Plugin Directory directive line is present and enabled in the FD's configuration file bacula-fd.conf.

An example of the FD configuration file is shown in the screenshot below:

| 📗 bacula-fd.conf - Notepad | | |
|--|---|--------|
| File Edit Format View Help | | |
| FileDaemon { Name = wsb-sql08-fd FDport = 9102 WorkingDirectory = " Pid Directory = "C:\ Plugin Directory = " Maximum Concurrent D | # this is me # where we listen for the d C:\\Program Files\\Bacula\\working" \\Program Files\\Bacula\\working" C:\\Program Files\\Bacula\\plugins" Dobs = 10 | irectc |
| , | | - |
| • | | |

Fig. 1: File Daemon Configuration Excerpt with "Plugin Directory" Line

The status output of a client with the VSS plugin enabled:

```
*status client=wsb-sql08-fd
Connecting to Client wsb-sql08-fd at wsb-sql08:9102
wsb-sql08-fd Version: 8.2.0 (02 Feb 2015) VSS Linux Cross-compile Win64
Daemon started 20-Apr-12 13:14. Jobs: run=15 running=0.
Microsoft Windows Server 2008 R2 Standard Edition Service Pack 1 (build 7601), 64-bit
Heap: heap=0 smbytes=1,061,455 ...
Sizes: boffset_t=8 size_t=8 debug=0 ...
Plugin: vss-fd.dll
```

Backup

If everything is set up correctly as above then the backup will include the Hyper-V server data. The Hyper-V server data files backed up will appear in a **bconsole** or **bat** restore like:

/@HYPERV/ ... etc

A complete example of a FileSet and Job resource for Hyper-V Server data is shown below. As for all VSS-enabled components, it is the administrator's responsibility to make sure that the required VSS snapshots are created by explicitly mentioning at least one file or directory for each drive where data that is handled by the plugin is stored. In the example, we use the file c:/backmeup to ensure this.

```
FileSet {
```

```
Name = HYPERV
  Include {
    Options {
      Signature = SHA1
      Dedup = bothsides
    }
    File = C:/backmeup
    Plugin = "vss:/@HYPERV/"
  }
}
Job {
  Name = HYPERV08
  Accurate = Yes
  File Set = HYPERV
  Client = wsb-hyp08-fd
  Job Defs = DefaultJob
  Level = Full
}
```

Note in the example above that C:/backmeup is explicitly included, which is required to ensure that **Bacula** creates the required VSS snapshot of that Windows drive letter. If Hyper-V Server data is also stored on other partitions, you need to create similar File =-lines for these drives, too.

Note: Starting with Bacula Enterprise version 12.6, the explicit include of a dummy file (see File = C:/backmeup

in the fileset example above) is not mandatory anymore

```
File Set {
  Name = HYPERV-TestVM
  Include {
    Options {
      Signature = SHA1
    }
  File = C:/backmeup
  # backup only TestVM on the server
  Plugin = "vss:/@HYPERV/ cinclude=\"Host Component\" cinclude=*/TestVM cexclude=*"
  }
}
```

Hyper-V uses one of two mechanisms to back up each VM. The default backup mechanism is called the "Saved State" or "Offline" method, where the VM is put into a saved state during the processing of the PrepareForSnapshot event, snapshots are taken of the appropriate volumes, and the VM is returned to the previous state during the processing of the PostSnapshot event.

The other backup mechanism is called the "Child VM Snapshot" or "Online" method, which uses VSS inside the child VM to participate in the backup. For the "Child VM Snapshot" method to be supported, all of the following conditions must be met:

- Backup (volume snapshot) Integration Service is installed and running in the child VM. The service name is "Hyper-V Volume Shadow Copy Requestor".
- The child VM must be in the running state.
- The Snapshot File Location for the VM is set to be the same volume in the host operating system as the VHD files for the VM.
- All volumes in the child VM are basic disks and there are no dynamic disks.
- All disks in the child VM must use a file system that supports snapshots (for example, NTFS).

To know if your VMs are "Offline" or "Online", it is possible to use the following windows command on Windows 2012 R2:

```
C:/> echo list writers > t.txt
C:/> diskshadow /s t.txt | find "Caption: O"
- Caption: Offline/2012
- Caption: Offline/windows
- Caption: Online/centos
```

On Windows 2012 and 2008

C:/> echo list writers > t.txt
C:/> diskshadow /s t.txt | find /i "Caption: Backup Using"

- For Offline backups: Backup Using Saved State/VMname1
- For Online backups: Backup Using Child Partition Snapshot/VMname2

Restore

Restoring the VMs is done entirely by the host operating system; the VSS writers in the child VMs are not involved.

- During the processing of the PreRestore event, the Hyper-V VSS writer turns off and deletes any VMs that are about to be restored.
- After all VSS writers have processed the PreRestore event, the files are restored.
- For each VM that was restored, the Hyper-V VSS writer registers the VM with the Hyper-V management service. If the VM is restored to a nondefault location, a symbolic link is created in the default location linking to that location.
- For each VHD that was restored, the location is compared with the one specified for that VM. If the location is different, then the configuration is updated with the proper location.
- The network configuration is updated. If the virtual switches that the VM was connected to when it was backed up still exit, new ports are created and connected to the VM.

When restoring a "Offline" VM, the VM will not be re-created by Microsoft Hyper-V vss driver. It is possible to run "New-VM" powershell command to re-create the VM.

New-VM -VMName centos -VHDPath C:/VM/centos.vhdx -MemoryStartupBytes 512MB -SwitchName_

without_vss

With Bacula Enteprise 8.2, it is possible to restore VSS files directly on disk without using the VSS restore framework. In the restore menu, it is possible to configure Plugin Options menu and set the without_vss option to "true".

| Run Restore job | |
|-----------------|--|
| JobName: | RestoreFiles |
| Bootstrap: | /opt/bacula/working/trusty-amd64-dir.restore.9.bsr |
| Where: | c:/tmp |
| Replace: | Always |
| FileSet: | Full Set |
| Backup Client: | hyperv |
| Restore Client: | hyperv |
| Storage: | dedup |
| When: | 2015-03-03 06:50:22 |
| Catalog: | MyCatalog |
| Priority: | 10 |
| Plugin Options: | *None* < Plugin Options menu |

Example

We assume that a correct backup of Hyper-V data exists and you start the restore with option 5 of the bconsole **restore** command, mark the complete tree of data backed up by the Hyper-V component of the VSS plugin, then finally do lsmark @HYPERV to show all the files selected to be restored:

\$ mark *
31 files marked.
\$ lsmark
*@HYPERV/

(continues on next page)

```
*Microsoft Hyper-V VSS Writer/
  *Host Component/
    *:component_info_5215da3c
    *c:/
      *programdata/
        *microsoft/
          *windows/
            *hyper-v/
              *initialstore.xml
              *resource types/
                *06ff76fa-2d58-4baf-9f8d-455773824f37.xml
                *118c3be5-0d31-4804-85f0-5c6074abea8f.xml
                *146c56a0-3546-469b-9737-fcbcf82428f4.xml
                *dacdcf3f-6f67-4eb8-a4d0-5d93b48a2468.xml
                *f6293891-f32f-4930-b2db-1a8961d9cb75.xml
  *Offline/
    *ubuntu/
      *:component_info_5215da3c
      *c:/
        *programdata/
          *microsoft/
            *windows/
              *hyper-v/
                *virtual machines/
                  *690f5094-ff23-411e-92c0-639fc7ebc598/
                    *690f5094-ff23-411e-92c0-639fc7ebc598.bin
                    *690f5094-ff23-411e-92c0-639fc7ebc598.vsv
                  *690f5094-ff23-411e-92c0-639fc7ebc598.xml
        *vm/
          *ubuntu.vhdx
```

```
$ lsmark
*@HYPERV/
```

```
*Microsoft Hyper-V VSS Writer/
  *Host Component/
    *:component_info_5216cf46
    *c:/
      *programdata/
        *microsoft/
          *windows/
            *hyper-v/
              *initialstore.xml
              *resource types/
                *06ff76fa-2d58-4baf-9f8d-455773824f37.xml
                *118c3be5-0d31-4804-85f0-5c6074abea8f.xml
  *Online/
    *centos/
      *:component_info_5216cf46
      *c:/
        *programdata/
          *microsoft/
            *windows/
```

(continues on next page)

```
*hyper-v/
 *snapshots/
 *acc145fb-9566-402d-9434-04f1e325a75f-backupsnapshot.xml
 *virtual machines/
 *acc145fb-9566-402d-9434-04f1e325a75f.xml
*vm/
 *centos-childvhd.avhdx
 *centos.vhdx
```

File Level Restore

To restore a set of files from a Hyper-V VM backup without re-importing the entire VM, it is possible to restore VHD files in a directory using the without_vss plugin restore option (See sec *without_vss*) and mount them in the system with the Powershell command Mount-VHD (or the Server Manager console (see Fig *Attach/Mount Option in Server Manager* below). Once mounted, the VHD image is accessible like other physical disks on the system.

Mount-VHD -Path c:\testvhdx.vhdx -ReadOnly

More information about the Mount-VHD command can be found here:

https://technet.microsoft.com/en-us/library/hh848551.aspx

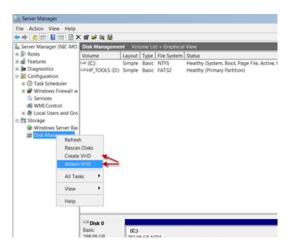


Fig. 2: Attach/Mount Option in Server Manager

We advise to restore VHD files on a different system to avoid operational problems during the restore. If the without_vss option is not properly set, the original VM would be deleted by Hyper-V automatically during the restore.

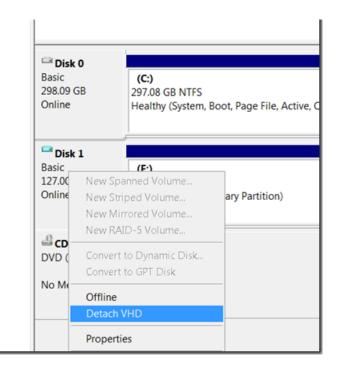


Fig. 3: Detach/Unmount Option in Server Manager

Cluster Shared Volumes

Starting with Bacula Enterprise 12.6, Cluster Shared Volumes File System (CSVFS) backup is supported, so VMs located on CSVFS volumes are backuped transparently. However, mixing CSVFS and NTFS in the same backup is not supported due to a Microsoft limitation. Noticeably, Host Component are located on C:/ which is typically a NTFS volume.

- Make sure to backup this kind of system with 2 different jobs:
- One job backups the default selection without the Host Component:

```
File Set {
Name = HYPERV-CSVFS-1
 Include {
 Options {
    Signature = SHA1
 }
 # backup all defaults but Host Component
Plugin = "vss:/@HYPERV/ cexclude=\"Host Component\""
}
}
Job {
Name = HYPERV09-CSVFS-NO-HOSTCOMPONENT
Accurate = Yes
File Set = HYPERV-CSVFS-1
Client = wsb-hyp09-fd
Job Defs = DefaultJob
Level = Full
}
```

• Another job backups specifically the Host Component:

```
File Set {
Name = HYPERV-CSVFS-2
 Include {
 Options {
    Signature = SHA1
 }
 # backup only Host Component
Plugin = "vss:/@HYPERV/ cinclude=\"Host Component\" cexclude=*"
}
}
Job {
Name = HYPERV09-CSVFS-HOSTCOMPONENT
Accurate = Yes
File Set = HYPERV-CSVFS-2
Client = wsb-hyp09-fd
Job Defs = DefaultJob
Level = Full
}
```

Single Item Restore

(see separate article about Hyper-V Single Item Restore that you can download on the top of the page of that article)

Plugin Notes

Windows VSS Plugin Items to Note

- One file from each drive needed by the plugins must be explicitly listed in File Set used. This is to ensure that the main **Bacula** code does a snapshot of all the required drives. At a later time, we will find a way to accomplish this automatically.
- When doing a backup that is to be used for Bare Metal Recovery, do not use the VSS plugin.

General Plugin Items to Note

- The estimate command does not handle plugins. When estimating a job that uses plugins, an error message regarding the plugin will be displayed. However, backup jobs will use the plugin.
- The File Set Include Option CheckFileChanges = Yes does not work with plugin-generated data. Thus, you must not use that Option in the Include section of the FileSet where you specify using the Hyper-V plugin.
- When an Offline virtual machine is currently backed up, it is not possible to start it (Hyper-V limitation).
- The Bacula replace flag is not respected by the Hyper-V plugin. Virtual machines will be always overwritten during restore.
- Microsoft Hyper-V vss interface doesn't support Differential and Incremental backup. Use of the Global Endpoint Deduplication plugin and the bothsides FileSet option permits to minimize the data transfer and the storage.

• When trying to restore Incremental or Differential jobs, Hyper-V VSS writer will print errors on PostRestore and PreRestore events. The virtual disk image (VHDX) should be restored despite these errors.

Best Practices

While it is technically possible to backup multiple VMs in one Bacula hypervisor plugin backup job (VMware, Hyper-V, RHV, Proxmox, etc), this is not necessarily the best way to perform VM backups. It is strongly recommended that one backup Job is created for each VM being backed up for the following reasons:

- By default, if one of your VMs fails to backup in a "multi-VM" backup job, the main Bacula job will terminate "Backup OK with warnings." The JobStatus for jobs that terminate "Backup OK" and "Backup OK with warnings" are not differentiated in the catalog. They are both 'T', so this means that you will have to carefully monitor your backup job logs in case some VM backups fail and pay attention to the JobErrors field in the job summaries.
- To address this issue, there is a plugin option called "abort_on_error" in each of the Bacula hypervisor plugins, which causes Bacula to immediately fail the job as soon as an error is detected while backing up a VM. However, if you use this option, and the backup of VM number 11 in a list of 50 VMs fails, then the whole job will be failed, and VMs 12-50 will not be backed up during that job's run.
- A 1:1 configuration (one VM backed up per job) means that the "abort_on_error" option will make more sense to enable in each job so you will immediately know when a VM fails to backup since the Bacula job will terminate with a "Backup failed" message and 'f' in the catalog for the job.
- With a 1:1 VM/Job configuration, re-running a specific VM backup job is simple to do after the cause of the failure is investigated and fixed.
- In the example about the 50 VMs, without a 1:1 configuration, there is no way to re-run a backup of just the one VM that failed to backup.
- Additionally, with a 1:1 VM/Job configuration, job metrics will have more meaning because each VM will be one job, and you will know to expect a specific number of jobs each night with each job representing one VM.
- With a multi-VM per job configuration, each VM will be backed up "serially", one at a time, disk by disk, VM by VM. A 1:1 configuration will allow several VM backups to be run concurrently which will reduce the overall time to perform the VM backups. Of course, you will need to pay close attention to SD and ESXi storage and networking resources, and adjust the number of concurrent jobs accordingly.
- For some hypervisors (VMware, Proxmox, etc) Bacula provides automation scripts (eg: scan_datacenter.pl for VMware). These scripts are designed so that they will create 1:1 VM/Job configurations. If you plan to make use of these automation scripts, it is a good idea to already be thinking this way, and having your hypervisor plugin backup configurations in a 1:1 configuration from the beginning.

VSS services enable Bacula Enterprise to do snapshot backup of your Hyper-V virtual machines.

Single Item Restore is supported, but differential and incremental level backup cannot be done using this method.

2 Hyper-V WMI plugin

Important: Remember to read the Best Practices chapter common for all of our hypervisor plugins.

• Hyper-V Plugins to Cover All Backup Needs

2.1 Hyper-V Plugins to Cover All Backup Needs

Microsoft has created various technologies for backing up Hyper-V virtual machines. Thus, multiple Bacula Plugins have been designed to maximize the benefits of each solution.

Hyper-V is equipped with a VSS writer on all compatible versions of Windows Server. This VSS writer enables developers to utilize the existing VSS infrastructure for backing up virtual machines to Bacula using the Bacula Enterprise VSS Plugins. This technology is supported by the original **Bacula Hyper-V plugin**. Although it doesn't allow incremental and differential backups and other more granular VM-based options, it can still cover any Hyper-V version. Therefore, it is highly recommended for small standalone Hyper-V servers (single node, no Failover Cluster) and older Hyper-V versions that do not offer Virtual Disk Service or Hyper-V WMI API.

The Virtual Disk Service (VDS) is a service provided by Microsoft Windows that handles query and configuration tasks upon request from end users, scripts, and applications. This service is compatible with Windows Server 2003, Windows Vista, and newer versions. The **Hyper-V Winapi Plugin** utilizes this technology to backup and restore virtual machines. It supports incremental and differential backups, making it the recommended solution for more intricate Hyper-V servers, such as Failover Clusters with multiple nodes, where local disk space is a critical resource. Depending on the relocation of virtual machines within the Cluster, it may be necessary to migrate the backed-up VMs across specific nodes.

Starting in Windows 8 and Windows Server 2012, Hyper-V supports backup via the Hyper-V WMI API. This feature enables individual Guest VMs to be backed up separately and incrementally, offering a more scalable solution compared to using VSS in the host. The Bacula Enterprise **Hyper-V WMI Plugin** uses this technology for backup and restore to/from Bacula. It backups/restores VM in the recommended Microsoft format. By utilizing the Microsoft snapshot format from/to disk, it is essential to have sufficient disk space available for the process to proceed smoothly. In scenarios where disk space may be limited due to busy configurations, the Hyper-V Winapi Plugin can be utilized as an alternative solution.

Backups created using the **Hyper-V WMI Plugin**, **Hyper-V Winapi Plugin** and **Hyper-V Plugin** are not compatible with each other.

Features summary

- Quiescing VSS-based applications can be achieved through VSS-based guest snapshots.
- Microsoft's RCT technology enables Full, Differential, and Incremental image-level backups for virtual machines.
- Complete virtual machine images can be restored effortlessly.

Important notes

- Backups made with the Hyper-V WMI plugin cannot be used with Virtual Full jobs. It is not recommended to mix these backup methods as it may result in difficulties when restoring jobs from Virtual Full backups.
- Single Item Restore is not supported.
- Linux virtual machines cannot be backed up live at Application Consistency level.
- The **Hyper-V WMI Plugin** requires Hyper-V Virtual Machines version 6.2 or above to manage Differential and Incremental backups.

Supported platforms

This documentation presents solutions for **Bacula Enterprise** 16.0.0 and higher, and is not applicable to prior versions of Bacula.

This plugin supports Windows 8, Windows Server 2012 and later.

Installation

The Bacula File Daemon and the **Hyper-V WMI Plugin** need to be installed on the Hyper-V host server. The **Hyper-V WMI Plugin** Windows installer is the same as the **Hyper-V Winapi Plugin** installer.

You can choose to install one or the other from the Plugin tree.

| 🌐 Bacula Systems(R) Enterprise | Hyper-V Plugin | _ | | × |
|--|--|------------------|-------------|--------|
| | oose Components noose which features of Bacula ugin you want to install. | Systems(R) 64 b | it Hyper-V | |
| Check the components you war install. Click Next to continue. | it to install and uncheck the com | iponents you dor | n't want to |) |
| Select the type of install: | Custom | | | \sim |
| Or, select the optional components you wish to install: | Plugin | | | |
| Space required: 634.0 KB | Position Position your mouse over a co description, | omponent to see | its | |
| Nullsoft Install System v3.06.1-1 – | < Back | Next > | Cano | cel |

It will deploy required components within the Bacula File Daemon plugins directory.

To configure the Bacula File Daemon, refer to the general Bacula installation documentation.

| → * ↑ _ > TI | nis PC → Local | I Disk (C:) → Program Files → Bacula | > plugins | ~ Ū | Search plugins | م |
|------------------|----------------|--------------------------------------|------------------|--------------------|----------------|---|
| _ | ^ | Name | Date modified | Туре | Size | |
| A Quick access | | 🙀 hyperv | 10/15/2023 11:40 | Windows PowerS | 40 KB | |
| Desktop | * | hyperv-wmi-fd.dll | 10/15/2023 11:40 | Application extens | 869 KB | |
| Downloads | * | | | | | |
| 🔮 Documents | * | | | | | |
| Pictures | * | | | | | |
| | | | | | | |
| - plugins | | | | | | |
| System32 | | | | | | |
| 📙 tmp | | | | | | |
| This PC | | | | | | |
| 3D Objects | | | | | | |
| Desktop | | | | | | |
| Documents | | | | | | |
| Downloads | | | | | | |
| Music | | | | | | |
| Pictures | | | | | | |
| 🔮 tmp on stretch | | | | | | |
| Videos | | | | | | |
| Local Disk (C:) | | | | | | |

On the server side, the *Hyper-V PowerShell Module* needs to be enabled. On Windows Server or Hyper-V server 2012, 2016 and 2019, use Server Manager to install it. It should be located under Remote Server Administration Tools -> Role Administration Tools -> Hyper-V Management Tools and check Hyper-V Module for Windows PowerShell.

Verify the correct installation of the FD and the **Hyper-V WMI Plugin** by running status client from beconsole or from BWeb.

```
*status client=w2019-hv01-fd
Connecting to Client w2019-hv01-fd at 172.22.22.50:9102
w2019-hv01-fd Version: 12.8.0 (06 April 2021) VSS Linux Cross-compile Win64
Daemon started 19-Jun-21 16:31. Jobs: run=23 running=2.
Microsoft Windows 2012 Standard Edition (build 9200), 64-bit
Priv 0x73f
Memory: WorkingSetSize: 34,168,832 QuotaPagedPoolUsage: 183,768 QuotaNonPagedPoolUsage:
→17,368 PagefileUsage:
43,687,936
APIs=OPT, ATP, LPV, CFA, CFW,
WUL, WMKD, GFAA, GFAW, GFAEA, GFAEW, SFAA, SFAW, BR, BW, SPSP,
WC2MB, MB2WC, FFFA, FFFW, FNFA, FNFW, SCDA, SCDW,
GCDA, GCDW, GVPNW, GVNFVMPW, LZO, EFS
Heap: heap=34,168,832 smbytes=39,489,074 max_bytes=69,259,353 bufs=395 max_bufs=396
Sizes: boffset_t=8 size_t=8 debug=10 trace=1 mode=0,2010 bwlimit=0kB/s
Crypto: fips=no crypto=OpenSSL
APIs: !GPFS
Plugin: alldrives-fd.dll(1.2) hyperv-wmi-fd.dll(0.1) winbmr-fd.dll(3.1.0)
```

Verify that hyperv-wmi-fd.dll is in the "Plugin" line (last line in the above example output).

| 🔁 Add Roles and Features Wizard | | - 🗆 X |
|---|--|---|
| Select features Before You Begin | Select one or more features to install on the selected server. | DESTINATION SERVER hvcl01-hv.supportlab.baculasystems.com |
| Installation Type | Features | Description |
| Server Selection Server Roles Features Confirmation Results | Multipath I/O Multipath I/O Multipath I/O Multipoint Connector Network Load Balancing Network Virtualization Peer Name Resolution Protocol Quality Windows Audio Video Experience RAS Connection Manager Administration Kit (CMAK) Remote Assistance Remote Differential Compression Remote Server Administration Tools (5 of 43 installed) Feature Administration Tools (2 of 17 installed) Role Administration Tools (3 of 26 installed) AD DS and AD LDS Tools (1 of 4 installed) Hyper-V Management Tools (Installed) Hyper-V Module for Windows PowerShell (Installed) Hyper-V Module for Windows PowerShell (Installed) Active Directory Certificate Services Tools Active Directory Certificate Services Tools | Hyper-V Module for Windows PowerShell includes Windows PowerShell cmdlets for managing Hyper-V. |
| | < Previou | s Next > Install Cancel |

In the case of a Failover Cluster configuration, the Bacula file deamon and the **Hyper-V WMI plugin** need to be installed on only one node.

Important considerations regarding credentials settings

Important: In order to access and backup the Hyper-V server, the delegation of the User credentials must be enabled and the Bacula file daemon must be logged as an authorized user within the Hyper-V server.

Enable delegation of user credentials on the Hyper-V server

• Run gpedit.msc (normally in C:\Windows\System32) on the Hyper-V server and look at the

following policy: Computer Configuration -> Administrative Templates -> System -> Credentials Delegation -> Allow Delegating Fresh Credentials.

• Verify that it is enabled and configured with the WSMAN SPN appropriate for the target computer.

For example, for a target computer name "myserver.domain.com", the SPN can be one of the following: WS-MAN//myserver.domain.com or WSMAN//*.domain.com. Introduce it in the "Add servers to the list" "Show" dialog box.

• Alternatively run a powershell console on the Hyper-V server (normally in C:\Windows\Systeme32\WindowsPowerShellv1.0powershell.exe) and enter the following commands:

```
Enable-WSManCredSSP -Role Server -Force
Enable-WSManCredSSP -Role "Client" -DelegateComputer myserver.domain.com -Force
```

| Local Group Policy Editor | | | | - 0 |
|------------------------------------|--|---|------------------|---------|
| le Action View Help | | | | |
| • 🔿 🔁 📷 🔒 🔽 🖬 🛛 🝸 | | | | |
| Local Computer Policy | Credentials Delegation | | | |
| 👰 Computer Configuration | Allow delegating fresh credentials | Setting | State | Comment |
| > 🧮 Software Settings | Allow delegating resil credentials | | | |
| > Windows Settings | Edit policy setting | Allow delegating default credentials with NTLM-only server | - | No |
| Administrative Templates | | Allow delegating default credentials | Not configured | No |
| > 📫 Control Panel | Requirements: | Encryption Oracle Remediation | Not configured | No |
| > 🧰 Network | At least Windows Vista | Allow delegating fresh credentials | Not configured | No |
| Printers | Description: | Allow delegating fresh credentials with NTLM-only server a | Not configured | No |
| Server | This policy setting applies to | Remote host allows delegation of non-exportable credentials | Not configured | No |
| > 📔 Start Menu and Taskbar | applications using the Cred SSP | Allow delegating saved credentials | Not configured | No |
| ✓ 🚞 System | component (for example: Remote | Allow delegating saved credentials with NTLM-only server a | Not configured | No |
| Access-Denied Assistance | Desktop Connection). | Deny delegating default credentials | Not configured | No |
| > 📫 App-V | This policy setting applies when | Deny delegating fresh credentials | Not configured | No |
| Audit Process Creation | server authentication was | Deny delegating saved credentials | Not configured | No |
| Credentials Delegation | achieved via a trusted X509 | Restrict delegation of credentials to remote servers | Not configured | No |
| Device Guard | certificate or Kerberos. | . Institut delegation of electricity to remote service | liter configured | |
| Device Health Attestation Service | | | | |
| > Device Installation | If you enable this policy setting, you can specify the servers to | | | |
| 🚞 Disk NV Cache | which the user's fresh credentials | | | |
| 🧾 Disk Quotas | can be delegated (fresh | | | |
| 📫 Display | credentials are those that you are | | | |
| > iii Distributed COM | prompted for when executing the | | | |
| Driver Installation | application). | | | |
| 🧮 Early Launch Antimalware | If you do not configure (by | | | |
| Enhanced Storage Access | default) this policy setting, after | | | |
| File Classification Infrastructure | proper mutual authentication, | | | |
| 📔 File Share Shadow Copy Provider | delegation of fresh credentials is | ~ | | |
| > 📔 Filesystem | permitted to Remote Desktop | < | | |
| Folder Redirection | V Extended Standard | | | |

Impersonation of Hyper-V WMI Plugin

The impersonation of the Hyper-V WMI Plugin can be achieved in different ways.

• Specify the user name and password locally on the hyper-v node. This is the **recommended method**. In a bacula-hyperv.pwd file, located by the bacula-fd.conf config file (typically C:\Program Files\Bacula).

bacula-hyperv.pwd contains the user name followed by the user password, separated by a colon.

name@domain.com:mypassword

or

DOMAIN\name:mypassword

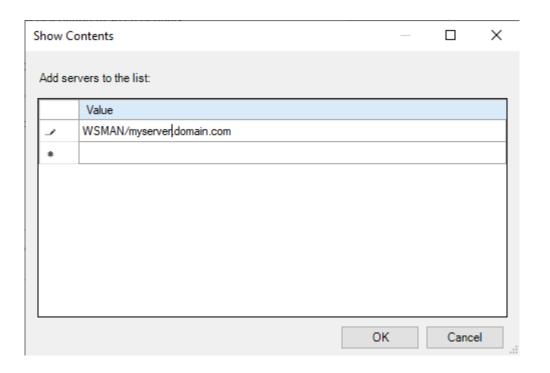
- Impersonate the **Hyper-V WMI Plugin** by passing user and password, as plugin options See Job configuration user_name and user_password options.
- Manually change the Bacula file daemon default login account:

Access the Hyper-V server using administrative credentials. Go to the Windows Start menu, enter "Services", and press Enter to display a list of all installed services. Locate the Bacula File Backup Service, right-click on it, and then select Properties. Navigate to the Log On tab, where the settings should appear as follows:

Toggle the selection from "Local System account" to "This account". Enter the credentials of a Hyper-V administrator (either read only or read-write). Click OK.

Click on the Bacula File Backup Service entry once more with the right mouse button, then select "Restart" to ensure that the changes take effect.

| 🕵 Allow delegating f | fresh credentials | — 🗆 X |
|------------------------------------|-------------------|---|
| 🔚 Allow delegating | fresh credentials | Previous Setting Next Setting |
| Not Configured | Comment: | ^ |
| Enabled | | |
| Disabled | | × |
| | Supported on: | At least Windows Vista |
| | | × |
| Options: | | Help: |
| Add servers to the list | | Doove This policy setting applies to applications using the Cred SSP component (for example: Remote Desktop Connection). This policy setting applies when server authentication was achieved via a trusted X509 certificate or Kerberos. If you enable this policy setting, you can specify the servers to which the user's fresh credentials can be delegated (fresh credentials are those that you are prompted for when executing the application). If you do not configure (by default) this policy setting, after proper mutual authentication, delegation of fresh credentials is permitted to Remote Desktop Session Host running on any machine (TERMSRV/*). If you disable this policy setting, delegation of fresh credentials is not permitted to any machine. Note: The "Allow delegating fresh credentials" policy setting can be set to one or more Service Principal Names (SPNs). The SPN |
| | | OK Cancel Apply |



| 🛃 📕 ╤ Bacula Ie Home Share | e View | | | | | | |
|---------------------------------|--|--------------------|--------------------|-----------|-----|---------------|---|
| → × ↑ 📴 > TI | his PC → Local Disk (C:) → Program Files | > Bacula | | | ٽ ~ | Search Bacula | ۶ |
| _ | Name | Date modified | Туре | Size | | | |
| 🖈 Quick access | platforms | 5/27/2022 4:37 PM | File folder | | | | |
| 📃 Desktop 🛛 🖈 | plugins | 11/14/2022 5:23 PM | File folder | | | | |
| 🖊 Downloads 🛛 🖈 | working | 11/15/2022 11:35 | File folder | | | | |
| 🗄 Documents 🛛 🖈 | la bacula.dll | 11/15/2022 10:57 | Application extens | 10,612 KB | | | |
| 📰 Pictures 🛛 🖈 | | 6/15/2022 12:40 PM | CONF File | 2 KB | | | |
| 📲 Volume1 🛛 🖈 | bacula-fd eve | 11/15/2022 10:57 | Application | 6.440 KB | | | |
| Bacula | bacula-hyperv.pwd | 11/14/2022 2:53 PM | PWD File | 1 KB | | | |
| plugins | bacula-tray-monitor.conf | 5/27/2022 4:37 PM | CONF File | 1 KB | | | |
| | bacula-tray-monitor.exe | 11/15/2022 10:57 | Application | 2,268 KB | | | |
| System32 | bconsole.conf | 5/27/2022 4:37 PM | CONF File | 1 KB | | | |
| working | bconsole.exe | 11/15/2022 10:57 | Application | 1,064 KB | | | |
| This PC | 📧 bsleep.exe | 11/15/2022 10:57 | Application | 577 KB | | | |
| 3D Objects | bsmtp.exe | 11/15/2022 10:57 | Application | 652 KB | | | |
| - | cdp-client.exe | 11/15/2022 10:57 | Application | 1,319 KB | | | |
| Desktop | expr64.exe | 11/15/2022 10:57 | Application | 792 KB | | | |
| Documents | install.log | 11/15/2022 11:06 | Text Document | 5 KB | | | |
| 👆 Downloads | libcrypto-1_1-x64.dll | 11/15/2022 10:57 | Application extens | 3,419 KB | | | |
| Music | libgcc_s_seh-1.dll | 11/15/2022 10:57 | Application extens | 1,237 KB | | | |
| Pictures | libssl-1_1-x64.dll | 11/15/2022 10:57 | Application extens | 945 KB | | | |
| Videos | ibstdc++-6.dll | 11/15/2022 10:57 | Application extens | 18,988 KB | | | |
| Local Disk (C:) | libwinpthread-1.dll | 11/15/2022 10:57 | Application extens | 579 KB | | | |
| | LICENSE | 11/15/2022 10:57 | File | 0 KB | | | |
| Network | openssl.cnf | 11/15/2022 10:57 | CNF File | 11 KB | | | |
| | 📧 openssl.exe | 11/15/2022 10:57 | Application | 1,226 KB | | | |
| | Qt5Core.dll | 11/15/2022 10:57 | Application extens | 6,159 KB | | | |
| | 🗟 Qt5Gui.dll | 11/15/2022 10:57 | Application extens | 5,859 KB | | | |
| | Qt5Network.dll | 11/15/2022 10:57 | Application extens | 1,644 KB | | | |
| | Qt5Widgets.dll | 11/15/2022 10:57 | Application extens | 5,549 KB | | | |

| Name | | | Description | Status | Startup Type | Log On As |
|--|--------------------|--------------|----------------------|---------|--------------|-----------------|
| ActiveX Installer (AxInstSV) | | | Provides Us | | Disabled | Local System |
| 🔍 AllJoyn Router Service | Pacula Filo Packum | Service D | roperties (Local Con | anutar) | × | Local Service |
| 🔍 App Readiness | васија гле васкир | Service P | roperties (Local Con | nputer) | ^ | Local System |
| AppFabric Caching Service | General Log On | Recovery | Dependencies | | | SUPPORTLAB\ad |
| Application Host Helper Service | | | | | | Local System |
| Application Identity | Log on as: | | | | | Local Service |
| Application Information | Local System a | account | | | | Local System |
| 🔍 Application Layer Gateway Service | Allow service | ce to intera | ct with desktop | | | Local Service |
| 🥋 Application Management | ○ This account: | | | | | Local System |
| AppX Deployment Service (AppXSVC | O This account: | | | t | Browse | Local System |
| 🥋 ASP.NET State Service | Password: | | | | | Network Service |
| 🎑 Auto Time Zone Updater | | | | | | Local Service |
| AVCTP service | Confirm passw | ord: | | | | Local Service |
| 🗟 Background Intelligent Transfer Serv | | | | | | Local System |
| 🖏 Background Tasks Infrastructure Sen | | | | | | Local System |
| 🧠 Bacula File Backup Service | | | | | | ad-admin@suppo |
| 🍓 Base Filtering Engine | | | | | | Local Service |
| 🖏 Bluetooth Audio Gateway Service | | | | | | Local Service |
| 🎑 Bluetooth Support Service | | | | | | Local Service |
| 🥋 Capability Access Manager Service | | | | | | Local System |
| CaptureService_253e80 | | | | | | Local System |
| CaptureService_a3092 | | | | | | Local System |
| Certificate Propagation | | | | | | Local System |
| 🎇 Claims to Windows Token Service | | | | | | Local System |
| Client License Service (ClipSVC) | | | OK | Cancel | Apply | Local System |
| Clipboard User Service_253e80 | | | | | | Local System |
| 🆏 Clipboard User Service_a3092 | | | This user se | | Manual | Local System |
| 🍓 CNG Key Isolation | | | The CNG ke | Running | Manual (Trig | Local System |
| 🧠 COM+ Event System | | | Supports Sy | Running | Automatic | Local Service |
| 🧠 COM+ System Application | | | Manages th | | Manual | Local System |
| Connected Devices Platform Service | . 252.00 | | This service | Running | Automatic (D | Local Service |

🛛 📊 🕨 🔳 II IÞ

Services (Local) ~ Log On As a File Backup Service Name Description Status Startup Type ActiveX Installer (AxInstSV) Provides Us... Disabled Local Syster he service 🎑 AllJoyn Router Service Local Servic Bacula File Backup Service Properties (Local Computer) \times t the service App Readiness Local Syster AppFabric Caching Service SUPPORTLA General Log On Recovery Dependencies ption: Application Host Helper Service Local Syster les file backup and restore Log on as: Application Identity Local Servic es. Bacula -- the network Application Information O Local System account Local Syster p solution. Application Layer Gateway Service Allow service to interact with desktop Local Servic Application Management Local Syster This account: ad-admin@supportlab.baculasy: Browse... AppX Deployment Service (AppXSVC Local Syster ASP.NET State Service Network Se Password: Auto Time Zone Updater Local Servic Confirm password: AVCTP service Local Servic 🧠 Background Intelligent Transfer Serv Local Syster 🖏 Background Tasks Infrastructure Serv Local Syster 🝓 Bacula File Backup Service ad-admin@ Base Filtering Engine Local Servic 🖏 Bluetooth Audio Gateway Service Local Servic Reluetooth Support Service Local Servic 🖏 Capability Access Manager Service Local Syster CaptureService_253e80 Local Syster CaptureService_a3092 Local Syster Certificate Propagation Local Syster Local Syster Claims to Windows Token Service Client License Service (ClipSVC) Local Syster OK Cancel Apply Clipboard User Service_253e80 Local Syster Clipboard User Service_a3092 Manual Local Syster This user se... CNG Key Isolation The CNG ke... Running Manual (Trig... Local Syster ALCON F 1.0

Job Configuration

Once the Bacula File Daemon and the **Hyper-V WMI plugin** are correctly installed and configured, setting a backup job up is as simple as adding the job and the fileset within the Bacula Director configuration file.

Important: The Enable VSS parameter must be set to no in the FileSet (see examples below).

The following plugin options are supported:

| Name | Sta- | De- | Description |
|-----------|------------------|---------|--|
| | tus | fault | |
| include | Op- | In- | a Unix shell-style wildcards pattern for including VMs by name |
| | tional | clude | |
| | | all | |
| | | (*) | |
| exclude | Op- | Ex- | a Unix shell-style wildcards pattern for excluding VMs by name |
| | tional | clude | |
| | | none | |
| tmp_dir | Op- | Bacul | a locapes the Bacula working repository folder. Make sure there's enought space on this |
| | tional | | location to create VM's shapshots and exports. Default is a Bacula-repo folder in the |
| | | | VHD location. |
| pre_back | ıp <u>O</u> peti | oiNone | action on the VMs before backup takes place. Can be None, Stop, Save None is noop |
| | tional | | Stop stops the VM before backup (useful when VM doesn't support VSS or kernel freeze |
| | | | to maintain consistent backups) Save saves the VM before stoping it. |
| post_back | cuppact | idmone | action on the VMs after backup is completed. Can be None, Restart, ForceRestart None |
| | tional | | is noop Restart restarts the VM if it was stopped or saved pre-backup ForceRestart |
| | | | restarts the VM unconditionnaly. |
| consis- | Op- | Ap- | overwrites the consistency level. Can be Application Consistent of Crash Consistent. |
| tency_lev | eltional | pli- | Application is the recommanded value but some VMs might not support it. |
| | | ca- | |
| | | tion | |
| al- | Op- | Dis- | when enabled, allows retry with pre_backup_action set to Save and |
| low_pre_ | | | post_backup_action set to Restart, if crash consistency retry backup has failed. |
| local- | Op- | Dis- | when anabled, restricts all operations to the local node (for Failover Cluster configuration). |
| host_only | | | |
| abort_on_ | ectpr | Dis- | abort immediately the job if a serious error is found (b.e when no VM matches the |
| | tional | | include patterns). By default, a Job error is raised, but the job continues. |
| dis- | Op- | Dis- | when enabled, VMs migration is disabled during backup to avoid collision between |
| able_vm_ | ntignat | icabled | backup an migration (for Failover Cluster configuration). Doesn't take any value. To |
| | | | disable, remove keyword. |
| user_nam | e Op- | None | the user name that will run the backup/restore operation. This is not the recommanded |
| | tional | | method. The user name can be specified locally on the hyper-v node in a bacula-hv. |
| | | | usr file located in the fd plugins folder. |
| user_pass | wOpd | None | the user password that will run the backup/restore operation. This is not the recom- |
| | tional | | manded method. The user password can be specified locally on the hyper-v node in a |
| | | | bacula-hv.pwd file located in the fd plugins folder. |

Examples

Example 1: backup all vms using Bacula's default working directory

```
Job {
 Name = "Hyper-V-BackupAll"
 Type = Backup
 Client= w2019-hv01-fd
 FileSet="Simplest-Hyper-V-FileSet"
 Storage = File
 Messages = Standard
 Pool = Default
}
FileSet {
 Name = "Simplest-Hyper-V-FileSet"
  Enable VSS = no
  Include {
   Options {
      signature=MD5
   }
   Plugin = "hyperv-wmi:"
 }
}
```

Example 2: backup only «Linux- » prefixed vms using Bacula's default working directory

```
Job {
  Name = "Hyper-V-BackupOnlyLinux"
  Type = Backup
  Client= w2019-hv01-fd
  FileSet="Linux-Hyper-V-FileSet"
  Storage = File
  Messages = Standard
  Pool = Default
}
FileSet {
  Name = "Linux-Hyper-V-FileSet"
  Enable VSS = no
  Include {
    Options {
      signature=MD5
    }
    Plugin = "hyperv-wmi: include=\"Linux-*\""
  }
}
```

Example 3: backup any VM having «Windows» in its name, using a custom working directory

```
Job {
  Name = "Hyper-V-BackupOnlyWindowsOnF"
  Type = Backup
  Client= w2019-hv01-fd
  FileSet="WindowsOnF-Hyper-V-FileSet"
  Storage = File
 Messages = Standard
  Pool = Default
}
FileSet {
  Name = "WindowsOnF-Hyper-VFileSet"
  Enable VSS = no
  Include {
   Options {
      signature=MD5
    }
    Plugin = "hyperv-wmi: include=\"*Windows*\" tmp_dir=\"F:/backup\""
  }
}
```

Backup

The files backed up by the Hyper-V server will be visible in a beconsole or with the prefix /@HYPERV-WMI/.

Typically, a VM backup data is organized as follows:

```
/@HYPERV-WMI/1ecd8f42-ccca-462a-ab0f-b7644ea77b9b/1ECD8F42-CCCA-462A-AB0F-B7644EA77B9B.

→ Vmcx
/@HYPERV-WMI/1ecd8f42-ccca-462a-ab0f-b7644ea77b9b/1ECD8F42-CCCA-462A-AB0F-B7644EA77B9B.

→ Vmgs
/@HYPERV-WMI/1ecd8f42-ccca-462a-ab0f-b7644ea77b9b/1ECD8F42-CCCA-462A-AB0F-B7644EA77B9B.

→ VMRS
/@HYPERV-WMI/1ecd8f42-ccca-462a-ab0f-b7644ea77b9b/backup-config.xml
/@HYPERV-WMI/1ecd8f42-ccca-462a-ab0f-b7644ea77b9b/test1_1C6A2D1E-9CEF-4F08-A14E-

→ E463F909C94D.avhdx
/@HYPERV-WMI/1ecd8f42-ccca-462a-ab0f-b7644ea77b9b/test1.vhdx
/@HYPERV-WMI/1ecd8f42-ccca-462a-ab0f-b7644ea77b9b/test1.vhdx
/@HYPERV-WMI/1ecd8f42-ccca-462a-ab0f-b7644ea77b9b/test1.vhdx
/@HYPERV-WMI/1ecd8f42-ccca-462a-ab0f-b7644ea77b9b/test1.vhdx
```

Where:

- 1ecd8f42-ccca-462a-ab0f-b7644ea77b9b is the VM UID of the "test1"
- the .vmcx file stores the Vm's machine settings
- the .vmgs file stores the Vm's guest state
- the .vmrs file stores the Vm's running state
- the backup-config.xml contains information on the vm at the backup time
- the vhdx file stores the Vm's Virtual Hard Drive data
- the avhdx file stores the differential data of the Vm's Virtual Hard Drive

• 1ecd8f42-ccca-462a-ab0f-b7644ea77b9b-test1 is a convenience file reminding us that the VM name is test1 and its ID 1ecd8f42-ccca-462a-ab0f-b7644ea77b9b

Incremental-Differential backups: the **Hyper-V WMI Plugin** will automatically follow the backup level strategy as scheduled in Bacula.

Consistency Level: A backup can fail when the option "Application Consistent" is required for a VM that doesn't support it.

- If an Application Consistent backup fails, the **Hyper-V WMI Plugin** will change automatically the Consistency Level to "Crash Consistent" and retry.
- If allow_pre_save if enabled and a "Crash Consistent" backup fails, the **Hyper-V WMI Plugin** will change the pre_backup_action to "Save" and post_backup_action to "Restart" and retry.
- If none of the above works, the backup fails with Error.

Restore

It is advisable to choose the entire fileset instead of cherry-picking backed up files, especially for one VM.

Restore parameters:

| Restore Option estore Client: | | | hvcl01-norbert | - |
|----------------------------------|----------------|-------------------------|---|-------------|
| /here: | | | C:/Volume1/restore/ | |
| eplace: | | | Never | ~ |
| comment: | | | | |
| ledia Needed | | | | |
| InChanger | Enabled | Volume | | |
| | oute the Media | " button to display the | e list of media that will be used during th | ne restore. |
| Click "Re-comp | | | | |

• Where: Can specify a path for VM restoration. If the content is not a path (does not contain slashes or backslashes), it's considered to be the new VM restore name.

| Restore Options | Advanced Options | Hyperv-wmi | | |
|--|------------------|-------------------|-------------------|--|
| hyperv-wmi: include New Virtual Machine | | ="C:/ClusterStora | e/Volume1/backup" | |
| Restore Path | | | | |
| Avoid Identical UUID | collision | | | |
| Node where the VM | is restored | | | |
| Name used to proce | ss restore | | | |
| Password used to pr | ocess restore | | | |
| | | | | |

- New Virtual Machine Name: Specify the restored VM new name
- Restore Path: Specify the location where Snapshot files are restored
- Avoid Identical UUID collision: Over restoration, the VM UID is regenerated. It avoids issue when the original VM is still existing on the Hyper-V host.
- Node where the VM is restored: Specify the name of the node where the VM is to be restored (clustered configuration). Note: the Restore Path need to be shared between the local host and the remote node, for this option to work (on a clustered storage b.e.)
- Name used to process restore: impersonation user name (see Impersonation of the Hyper-V WMI plugin)
- Password used to process restore: impersonation user password (see Impersonation of the Hyper-V WMI plugin)

VM Renaming:

If the 'New Virtual Machine Name' is specified, the restored VM(s) will be renamed using this value. However, if the 'Where' value is not a path, then the 'Where' value itself will be used for renaming the restored VMs. In case neither of these options are set, the restored VM(s) will retain their original name(s).

Restore Path:

If the 'Restore Path' is provided, it will be used as the restore path for all the drive-related backup files (vhdx, avhdx) and the VM-related backup files (vmcx, vmgs, vmrs). However, if the 'Restore Path' is empty and the 'Where' value is set with a path, then the 'Where' path will be used instead. To facilitate multiple restorations, the files will be restored in a specific folder named after the Bacula job name. If none of the above options are set, the default locations of the Hyper-V host will be used, and no specific folder named after the Bacula job name will be created. It is important to note that the restore files are not moved during the restoration process, so the Restore Path will be the location of the restored VM.

VMs duplication:

If the original VM still exists on the node, attempting to restore the same VM with the same unique identifier will be rejected. In such cases, the "Avoid Identical UUID collision" option can be used to assign a new unique identifier to the restored machine. If a restoration without the "Avoid Identical UUID collision" option fails, it will automatically be retried with this option enabled, and a warning will be issued.

Retries:

In the event of a VM restoration failure, the import process will be retried. If the "Avoid Identical UUID collision" option is turned off, it will be automatically enabled to prevent the most common cause of restoration errors: duplication of unique identifiers. Alternatively, an attempt will be made to rename the VM. By default, the rename will follow the pattern "<JobName>_<originalVMName>".

Examples:

- Defaults:
 - Where: Empty
 - New Virtual Machine Name: Empty
 - Restore Path: Empty
 - Avoid Identical UUID collision: Off
 - Node where the VM is restored: Empty

The restored VM(s) are (re)created in the local Hyper-V host default VMs and VirtualHardDrives locations with original names are Unique Identifiers.

- Quick Rename:
 - Where: newVMName
 - New Virtual Machine Name: Empty
 - Restore Path: Empty
 - Avoid Identical UUID collision: Off
 - Node where the VM is restored: Empty

The restored VM(s) are (re)created in the local Hyper-V host default VMs and VirtualHardDrives locations and renamed newVMName.

- Large Restore:
 - Where: Empty
 - New Virtual Machine Name: NewVMName
 - Restore Path: C:\LargeStorage\restore
 - Avoid Identical UUID collision: Off
 - Node where the VM is restored: Empty

The restored VM(s) are (re)created and renamed NewVMName. Virtual drive(s) and VM files are located into a folder named after the JovName in C:\LargeStorage\restore. Something like : C:\LargeStorage\restore\RestoreFiles.<date>_<time>.

Best Practices

While it is technically possible to backup multiple VMs in one Bacula hypervisor plugin backup job (VMware, Hyper-V, RHV, Proxmox, etc), this is not necessarily the best way to perform VM backups. It is strongly recommended that one backup Job is created for each VM being backed up for the following reasons:

- By default, if one of your VMs fails to backup in a "multi-VM" backup job, the main Bacula job will terminate "Backup OK with warnings." The JobStatus for jobs that terminate "Backup OK" and "Backup OK with warnings" are not differentiated in the catalog. They are both 'T', so this means that you will have to carefully monitor your backup job logs in case some VM backups fail and pay attention to the JobErrors field in the job summaries.
- To address this issue, there is a plugin option called "abort_on_error" in each of the Bacula hypervisor plugins, which causes Bacula to immediately fail the job as soon as an error is detected while backing up a VM. However, if you use this option, and the backup of VM number 11 in a list of 50 VMs fails, then the whole job will be failed, and VMs 12-50 will not be backed up during that job's run.
- A 1:1 configuration (one VM backed up per job) means that the "abort_on_error" option will make more sense to enable in each job so you will immediately know when a VM fails to backup since the Bacula job will terminate with a "Backup failed" message and 'f' in the catalog for the job.
- With a 1:1 VM/Job configuration, re-running a specific VM backup job is simple to do after the cause of the failure is investigated and fixed.
- In the example about the 50 VMs, without a 1:1 configuration, there is no way to re-run a backup of just the one VM that failed to backup.
- Additionally, with a 1:1 VM/Job configuration, job metrics will have more meaning because each VM will be one job, and you will know to expect a specific number of jobs each night with each job representing one VM.
- With a multi-VM per job configuration, each VM will be backed up "serially", one at a time, disk by disk, VM by VM. A 1:1 configuration will allow several VM backups to be run concurrently which will reduce the overall time to perform the VM backups. Of course, you will need to pay close attention to SD and ESXi storage and networking resources, and adjust the number of concurrent jobs accordingly.
- For some hypervisors (VMware, Proxmox, etc) Bacula provides automation scripts (eg: scan_datacenter.pl for VMware). These scripts are designed so that they will create 1:1 VM/Job configurations. If you plan to make use of these automation scripts, it is a good idea to already be thinking this way, and having your hypervisor plugin backup configurations in a 1:1 configuration from the beginning.

Failover Cluster

Backup operations are seamlessly executed in a Failover Cluster setup, regardless of the node responsible for hosting the VM(s) at the time of backup. As long as the user possesses the correct credentials on all nodes, the VMs within the cluster will undergo filtering via include/exclude criteria. The tmp_dir directory must be situated on the Cluster Shared Volume and be accessible to the user through an identical path on each node. By default, the tmp_dir is designated as a "Bacula-repo" folder within the VHD default directory, ensuring optimal performance as long as sufficient disk space is allocated for snapshots on the Shared Volume. It is important to note that transferring a VM from one node to another during a backup process is prohibited by Hyper-V.

The WMI provider allows you to perform differential and incremental backup for Microsoft Hyper-V. Single Item Restore is not possible using this method.