



Symantec NetBackup **Blueprints**

Blueprint for Microsoft Hyper-V

Symantec Backup and Recovery Technical Services



Notice



This NetBackup Blueprint presentation includes example diagrams that contain objects that represent applications and platforms from other companies such as Microsoft and VMware. These diagrams may or may not match or resemble actual implementations found in end user environments. Any likeness or similarity to actual end user environments is completely by coincidence.

The goal of the diagrams included in this blueprint presentation is not to recommend specific ways in which to implement applications and platforms from other companies such as Microsoft and VMware; the purpose of these diagrams is to illustrate NetBackup best practices only.

For guidelines and best practices on installing and configuring applications and platforms from other companies, please refer to best practice documentation and other resources provided by those companies.

These **Blueprints** are designed to show customer challenges and how NetBackup solves those.

- Each Blueprint consists of:
 - **Pain Points:** Explain the current challenges a customer faces.
 - **Whiteboards & Example Diagrams:** Describe the implementation of NetBackup solution.
 - **Best Practices:** Present NetBackup best practices to avoid common pitfalls
- Use these **Blueprints** to present the NetBackup best practice implementation example



Pain Points

- Downtime is expensive
- Requirement for High Availability
- Application Performance Impact
 - Backing up a client via a backup agent installed in the VM congests networks and can impact performance
- Limited Recovery Options
- Native backup tools are insufficient



NetBackup Advantages

- Performs full backups and file-level incremental backups of the virtual machine.
- Can restore the full virtual machine or selected files.
- Can restore selected files from a full virtual machine backup
- Can restore to the original virtual machine, to other locations on the Hyper-V server, or to a different Hyper-V server.
- Simplifies disaster recovery.
- Supports Windows Server 2012R2 and VHDX with the release of 7.6.0.2 .



Whiteboards

Symantec NetBackup Blueprints

Term	Description
.avhd file	Snapshot file that Windows Server 2008 Hyper-V creates, for point-in-time recovery of the virtual machine.
.vhd, .vhdx file	A file in a Windows 2008 Hyper-V installation that contains the virtualized contents of a hard disk. A .vhd or .vhdx file can contain an entire virtual operating system and its programs.
Common .vhd files	Refers to a virtual disk (.vhd file) that contains the files that multiple virtual machines require.
CSV	A cluster-shared volume in a failover cluster
Differencing disk	A differencing disk is in a child relationship to the parent disk
Virtual machine configuration files: .xml, .bin, .vsv	<p>.bin: This captures the memory state for the guest OS on the parent Hyper-v server. Hence this will be visible only when the machine is running or is put into saved state.</p> <p>.vsv: This captures the virtual machine saved state once the vm is put into such state. If the vm is turned off/shutdown then this file should not be there.</p> <p>.xml: This captures the entire configuration of the vm along with the vm guid, ip address, hostname, etc</p>

- For Hyper-V servers, Symantec recommends Windows Server 2008 SP2, Windows Server 2008 R2 SP1, or Windows Server 2012.
- For Hyper-V servers on Windows 2008, apply the following hofixes:
<http://technet.microsoft.com/en-us/library/dd430893.aspx>
- Verify that the communication among NetBackup master, media servers and Hyper-V server.
- Add the name of the NetBackup master server to the server list on the NetBackup client and (optional) alternate client.

- If the Hyper-V server is Windows 2008 R1 and shadow storage for a volume is not configured on the same volume, Windows hot fix **KB959962** must be installed to perform an online backup of the virtual machine.
- Windows shadow storage is required whenever the Windows Volume Shadow Copy Service (VSS) creates point-in-time snapshots.
- The NetBackup master server must include the NetBackup Enterprise Client license.

Although a NetBackup client is required on the Hyper-V server, it is not required in the virtual machine except in the following cases:

- To back up and restore the individual virtual drives that are inside the virtual machine.
- To back up the physical disks that the virtual machine accesses in a pass through configuration.
- To back up disks in a pass through configuration by means of a VSS hardware snapshot provider, an alternate client configuration is required.
- To back up databases or applications using NetBackup agents.
- To restore individual files directly to the VM without the use of a shared directory.
- Alternate restore methods ,such as restoring file to a CIFS share and accessing the share from the VM.

- The VSS snapshot provider must support transportable snapshots with the Hyper-V writer.
- The VSS provider should be installed on both the primary client (the Hyper-V server) and the alternate client.
- The primary client (Hyper-V server) and alternate client must run the same operating system (Windows 2008), volume manager, and file system.
- For each of these I/O system components, the alternate client must be at the same version as the primary client, or at a higher version.
- The primary client and alternate client must run the same version of NetBackup.

- To use a hardware array snapshot, make sure that the hardware array's VSS provider supports the snapshots that involve the Hyper-V writer.
- For the virtual machines that have a FAT or FAT32 file system, NetBackup supports only Hyper-V offline backup. (This is due to a Microsoft limitation)
- NetBackup for Hyper-V does not support :
 - The NetBackup Instant Recovery feature.
 - Backup of encrypted .vhd or .vhdx files. (This is due to a Microsoft limitation.)
 - Virtual machine display names that contain Chinese characters.
 - File-level recovery from a Hyper-V backup when the file originates from a Resilient File System (ReFS) volume.

- Windows Hyper-V provides no mechanism for quiescing file system activity on Linux virtual machines.
- Linux files that are inconsistent at the time of the backup can be recovered from the NetBackup.lost+found directory.
- Unmounted LVM2 volumes must start with /dev
- Files or directories with path names longer than 1023 characters cannot be individually backed up or restored.
- For Linux virtual machines, only the ext2, ext3, and ext4 file systems are supported for individual file restore.
- The "/" (root) partition must be formatted with ext2, ext3, or ext4 so that NetBackup can present mount points in the Backup, Archive, and Restore interface.

- If you are running antivirus on Hyper-V VMs, Symantec recommends Symantec Endpoint Protection 11.0 Maintenance Release 4 (build 11.0.4000) or later.
- Cross-platform restore of individual files is not supported.
- To restore files to a shared location on the virtual machine, virtual machines must be in the same domain as the NetBackup client and master and media server.
- To restore an individual file that is larger than approximately 2 GB, restore the file to a host that has a NetBackup client.
- Files that use NTFS-file system features cannot retain those features if you attempt to restore the files to a FAT or FAT32 file system .
- To restore single file and folder directly to a virtual machine we need a NetBackup client inside the vm.

Note the following about restoring a virtual machine in a cluster:

- Virtual machines are always restored to a state of non-high availability.
 - To return the virtual machine to high availability, refer to following [http://technet.microsoft.com/en-in/library/cc732181\(en-us,WS.10\).aspx](http://technet.microsoft.com/en-in/library/cc732181(en-us,WS.10).aspx)
- If the existing virtual machine has a status of high availability and the restore overwrites the virtual machine, note the following:
 - The existing virtual machine's cluster resources are removed during the restore.
 - The virtual machine's cluster group is not removed during restore. Removal of the cluster group must be done manually.

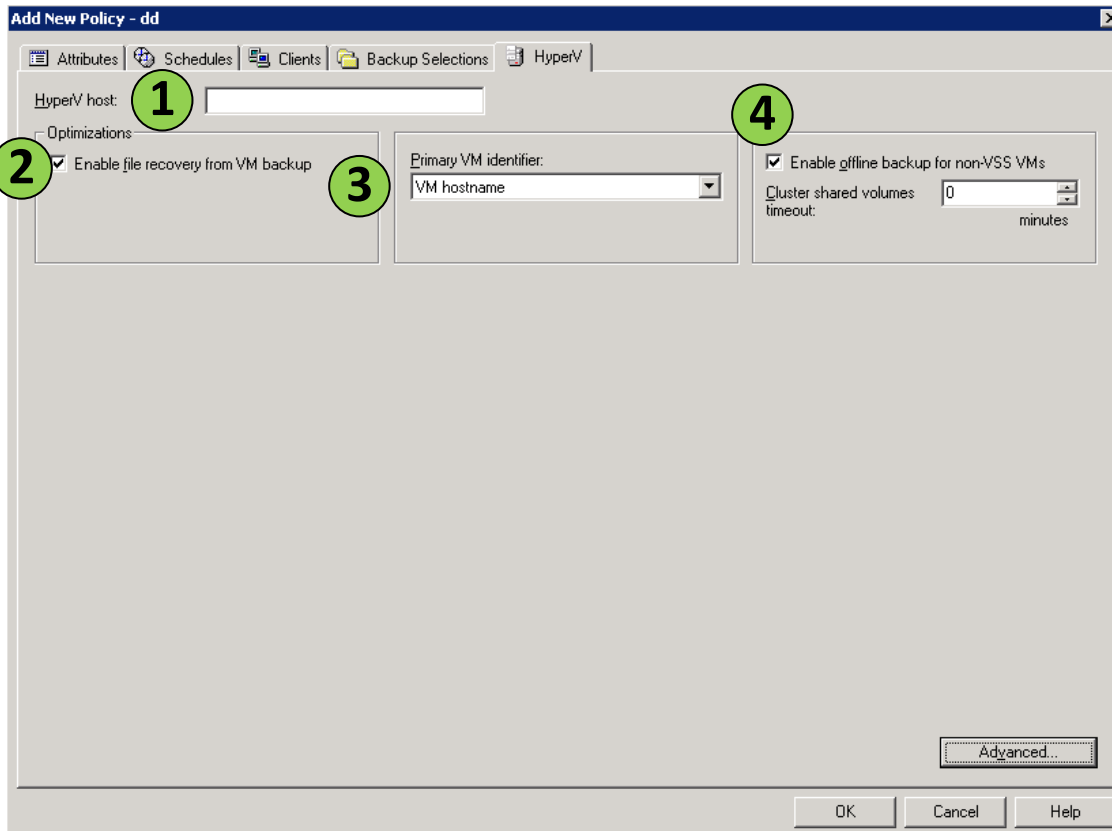
- During the backup, the cluster-shared volume (CSV) enters the online state ("Backup in progress, Redirected access"). The cluster node that performs the backup becomes the owner of the CSV.
- Multiple nodes cannot back up a CSV simultaneously. When a node backs up a virtual machine on a CSV, the attempt by another node to back up the same virtual machine fails. (This has changed in Windows server 2012)
- You can use the *Cluster shared volumes timeout* option in the policy to adjust how long NetBackup waits for another backup of the same CSV to complete.
- A single node containing two virtual machines can back up both virtual machines simultaneously, even if they use the same CSV. As long as both virtual machines reside on the same node, simultaneous backups are allowed.

- A backup of the full virtual machine can be restored only to a Windows Server 2008 and later with the Hyper-V role enabled.
- You cannot restore a full virtual machine from a NetBackup client that does not have Administrator privileges.
- For the virtual machines that are configured in a volume GUID with a differencing disk in another volume GUID, redirected restores are not supported.
- When you restore the virtual machine to a Hyper-V server that has a virtual machine of the same GUID, you must select the Overwrite virtual machine option. Otherwise, the restore fails.
- If you restore a virtual machine without the overwrite virtual machine option, note:
 - You must remove the current virtual machine and its .vhd or .vhdx files from the destination server before you start the restore.



Example Diagrams

Example Diagram: Microsoft Hyper-V Backup Options on the Hyper-V tab



1 In the Hyper-V host field, enter the name of the Hyper-V server.

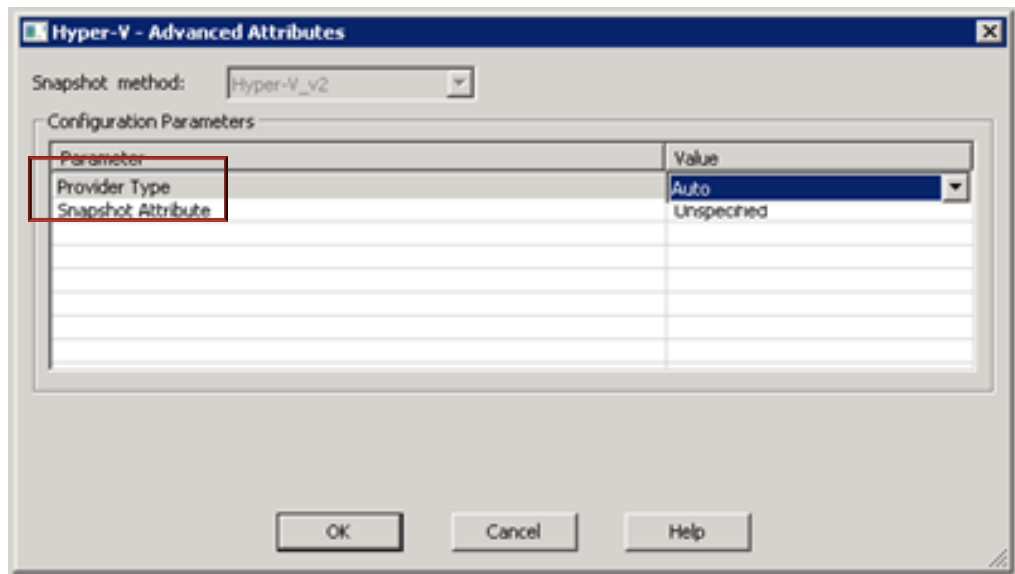
2 This option allows the restore of individual files from the backup.

3 This setting specifies the type of name by which NetBackup recognizes vms when it selects them for backup.

4 This option determines whether or not NetBackup is allowed to perform an offline backup of a virtual machine.

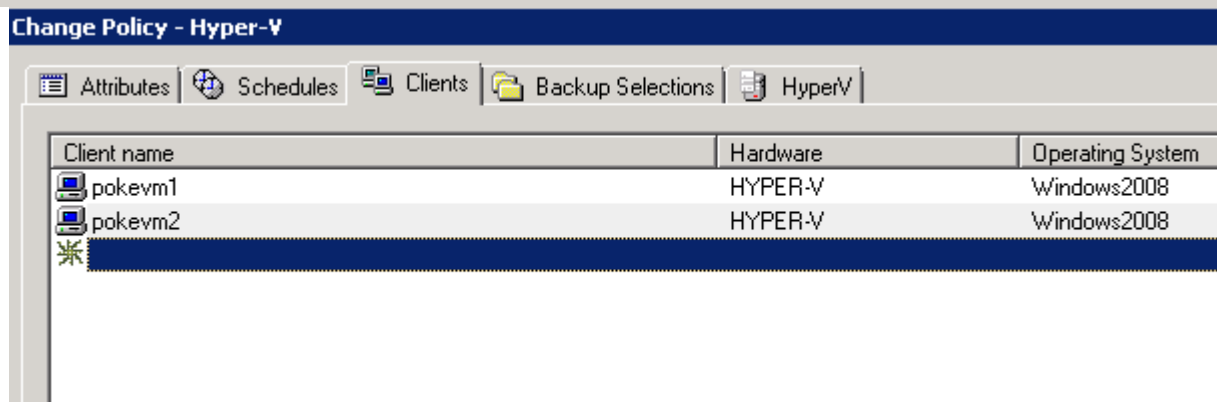
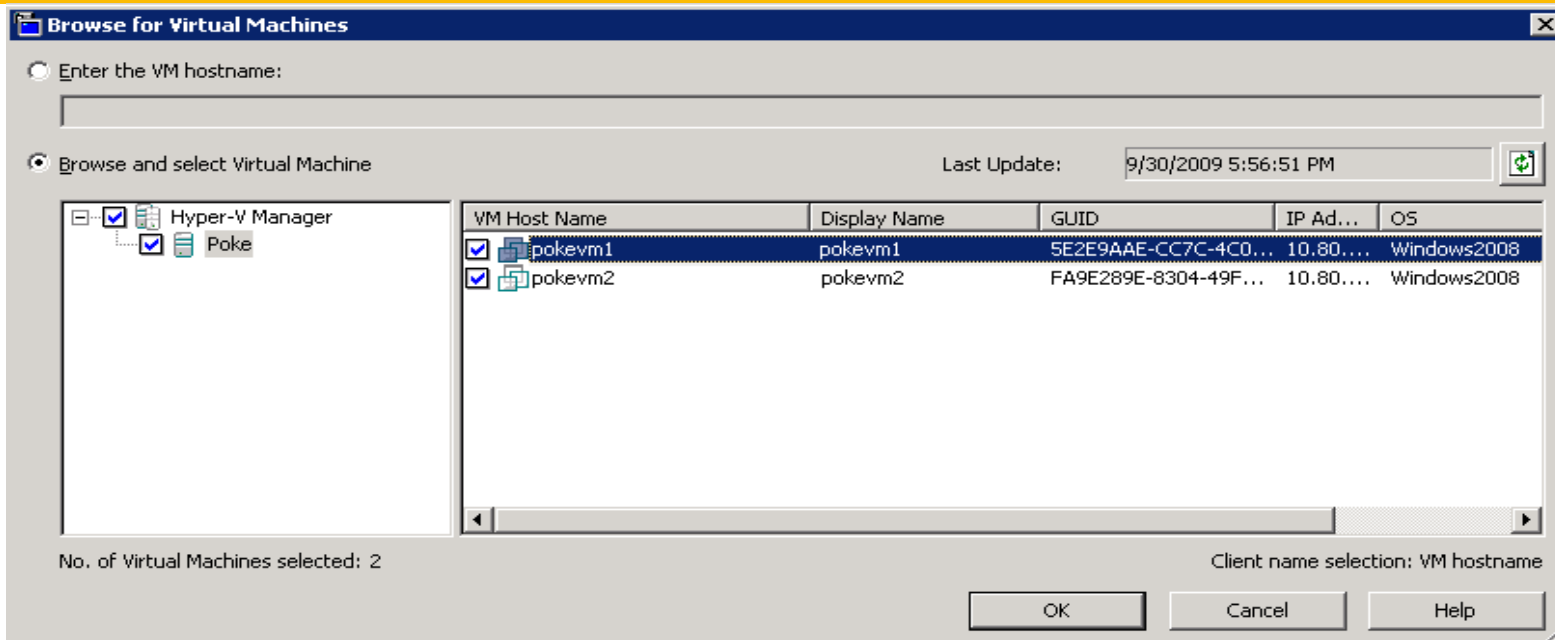
Example Diagram: Microsoft Hyper-V Backup Options on the Hyper-V tab

This dialog box appears when you click **Advanced** tab in the earlier Window



- The **ProviderType** configuration parameter determines the type of VSS snapshot provider that creates the snapshot.
- The **Snapshot Attribute** configuration parameter determines the type of VSS snapshot that is created

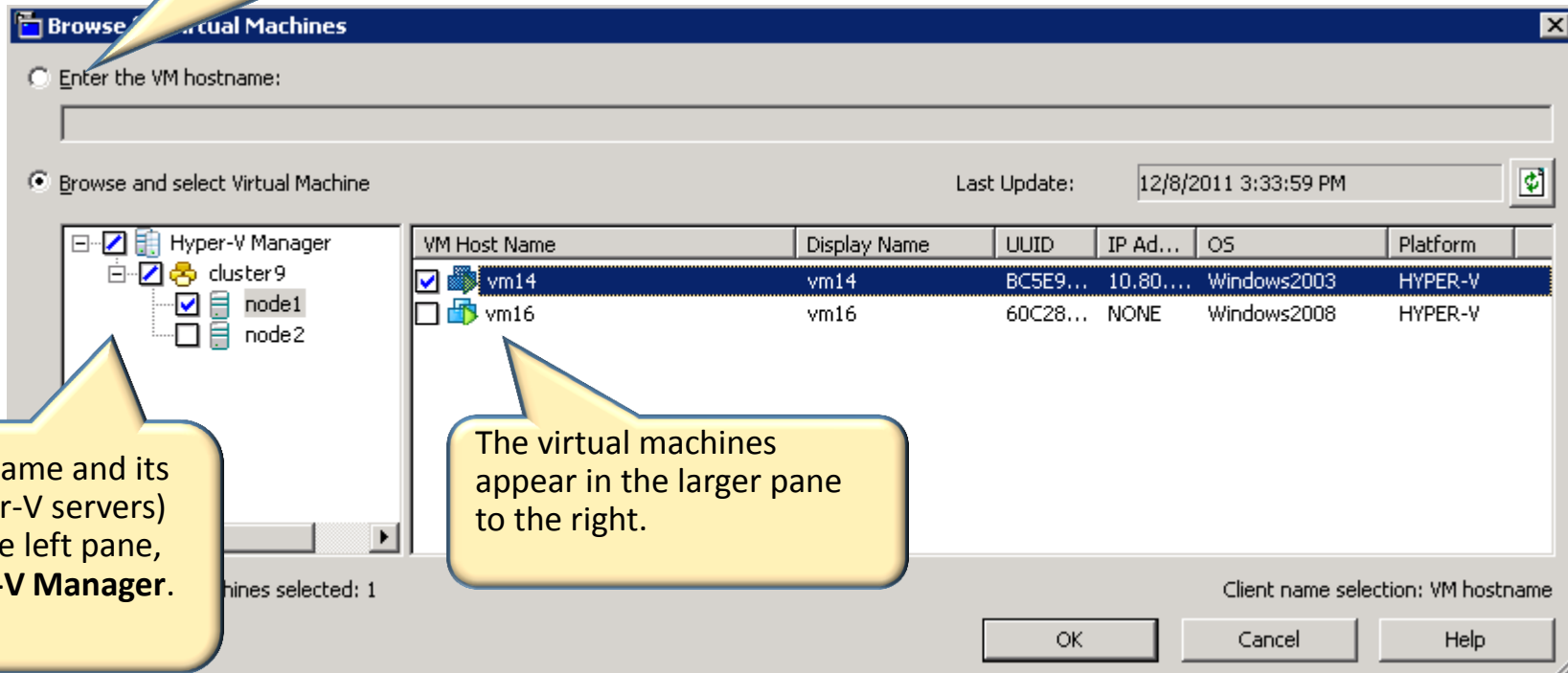
Example Diagram: Microsoft Hyper-V Client Selection



Example Diagram: Microsoft Hyper-V

Creating a policy for VM in CSV

You can enter the host name, display name, or GUID of the virtual machine to backup, or click **Browse and select Virtual Machine**.



The cluster name and its nodes (Hyper-V servers) appear in the left pane, under **Hyper-V Manager**.

The virtual machines appear in the larger pane to the right.

Example Diagram: Microsoft Hyper-V

Location of the restored virtual machine in a cluster

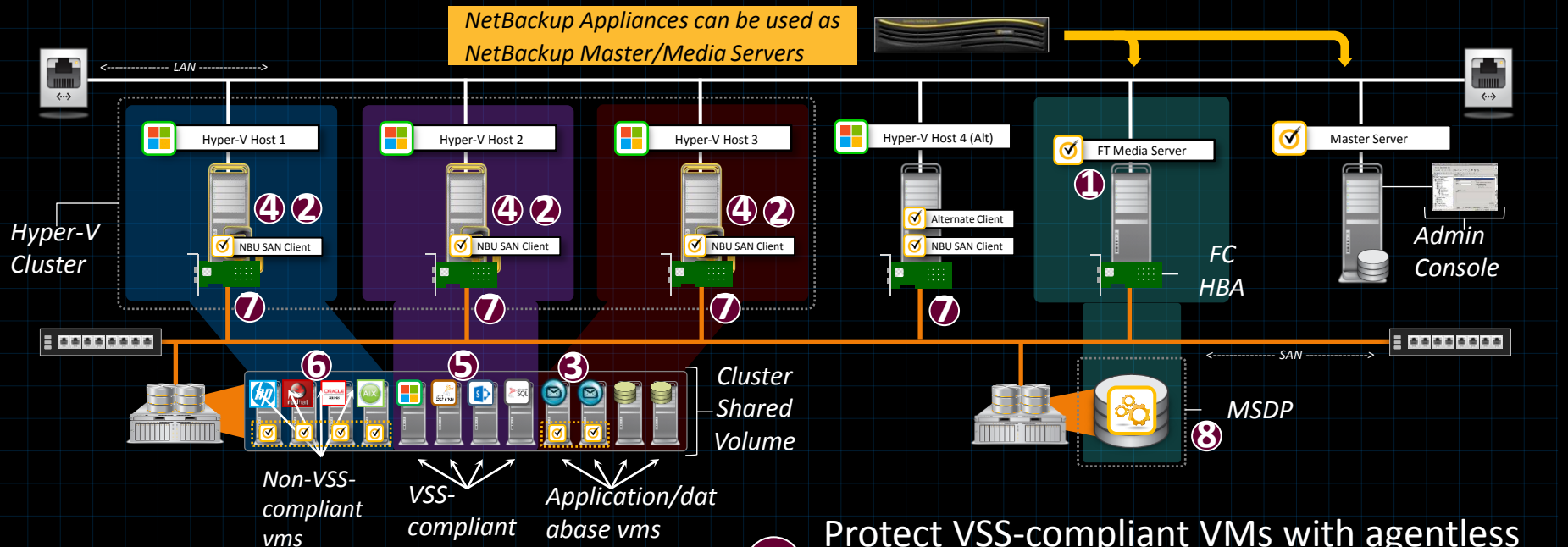


Is the virtual machine status HA at time of backup	Is the virtual machine status HA at time of restore?	Virtual machine is restored to this node (to non-HA state):
Yes	Yes	Restored to node that owns the virtual machine at the time of restore.
Yes	No	Restored to node on which the virtual machine resided at the time of backup.
Yes	Virtual machine does not exist.	Restored to node on which the virtual machine resided at the time of backup.
No	Yes	Restored to node on which the virtual machine resided at the time of backup. At the time of restore, if virtual machine resides on a different node from where it resided when backed up, the restore fails.
No	No	Restored to node on which the virtual machine resided at the time of backup.
No	Virtual machine does not exist.	Restored to node on which the virtual machine resided at the time of backup.



Best Practices

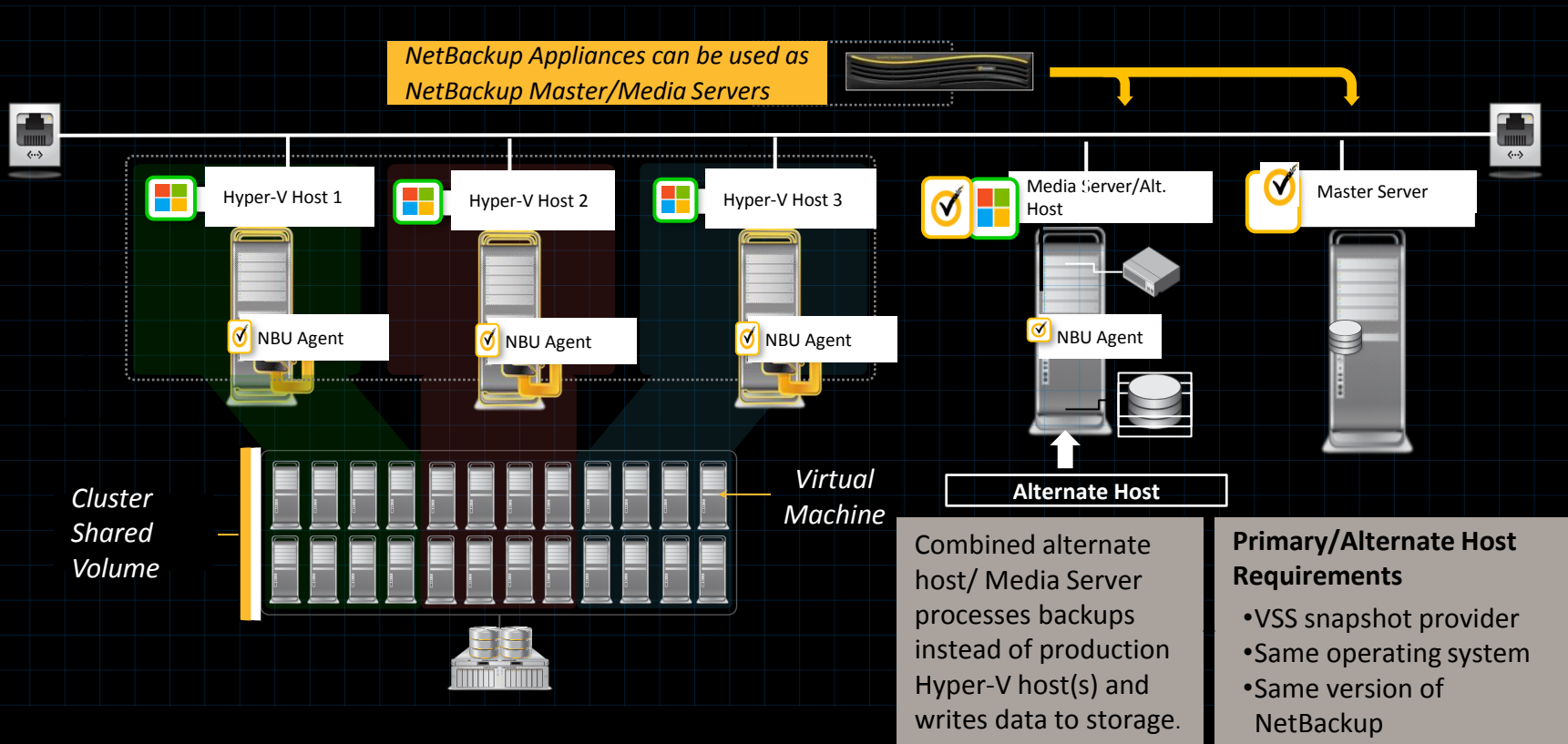
Example Diagram: Microsoft Hyper-V High-level best practices



- 1** Install Media Server to Hyper-V host for best performance
- 2** Leverage SAN Client technology in Fiber Channel environments for best performance
- 3** Protect application vms using agent-based backups (legacy) when granular application recovery is required
- 4** Ensure NetBackup Agent is installed to all cluster nodes

- 5** Protect VSS-compliant VMs with agentless host-level backups
- 6** Protect non-VSS-compliant VMs with agent-based backups (legacy) to ensure consistent protection of critical data
- 7** Cluster nodes, Alternate Client Host, and Media Server must be SAN-connected (HBA) for SAN Client functionality
- 8** Leverage deduplication to optimized disk backup storage

Example Diagram: Microsoft Hyper-V Hyper-V Off-host Backups

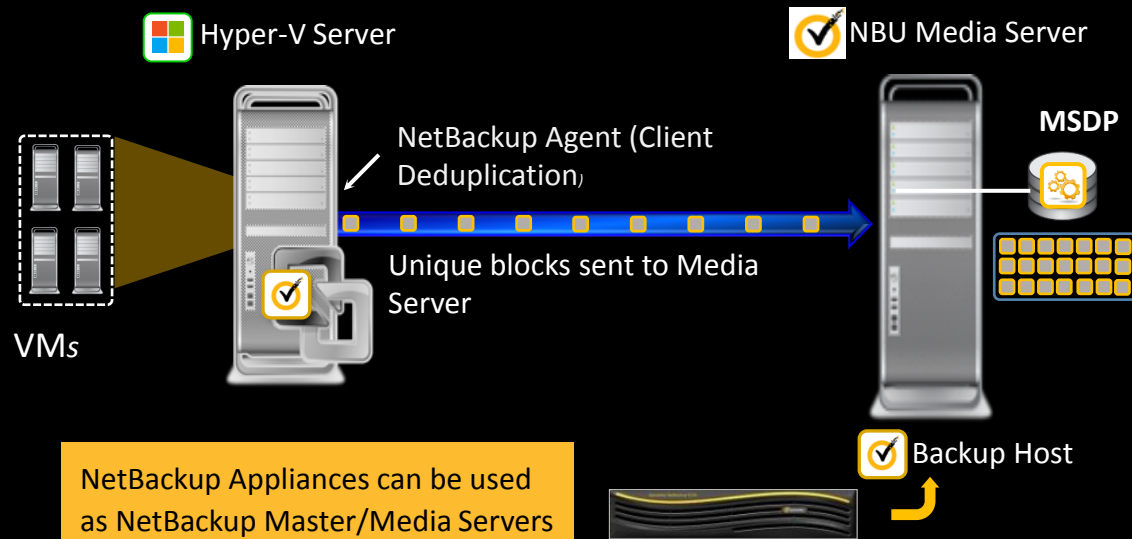


NetBackup 7.6 and Hyper-V Off-host Backups

- Useful when production Hyper-V hosts operate under heavy load
- Combined alternate host/Media Server can improve performance (local backup storage)

Example Diagram: Microsoft Hyper-V Deduplication of Hyper-V Virtual Machine Backups

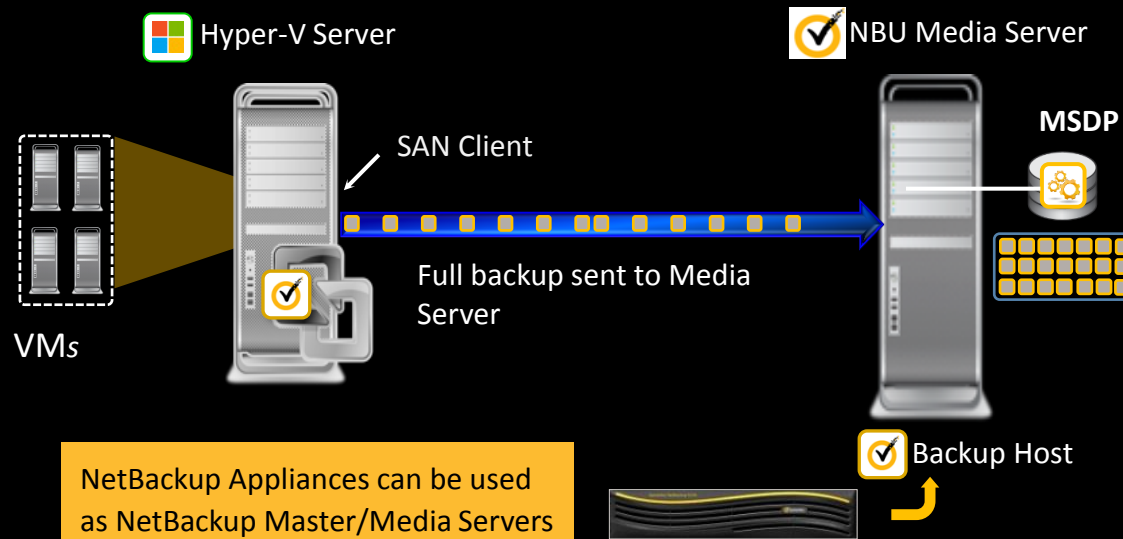
Better: Client Deduplication (Host-level) to MSDP



- Host-level VM snapshot backups captured via Agent on Hyper-V host
- Agent on Hyper-V host performs deduplication before transfer
- Only unique blocks transferred to Media Server
- Media Server stores blocks to MSDP

Example Diagram: Microsoft Hyper-V Deduplication of Hyper-V Virtual Machine Backups

Good: Server Deduplication (SAN Client) to MSDP



- Host-level VM snapshot backups captured via Agent on Hyper-V host
- SAN Client transfers full backup stream to Media Server over SAN
- Media Server performs deduplication
- Only unique blocks stored to MSDP

- Review Compatibility Lists Before Implementation
- Understand Key Limitations and Workarounds for Hyper-V
- Use the Correct Backup Method for Virtual Machines
 - *Understand agentless vs agent-based backup*
 - *Apply the right or “best” method for the virtual machines being protected*
- Leverage Deduplication for Backup Storage Optimization
- Install Hyper-V Integration Services to All VSS-Compliant Virtual Machines
 - *Required for proper utilization of snapshot and VSS processes*

- Failover Cluster and Cluster Shared Volume Configurations are supported.
- Install NetBackup Agent to All Cluster Nodes
- HA and Non-HA Virtual Machines Can Be Protected in a Single Policy
- Virtual Machines Always Restored Non-HA
 - *Can manually and easily changed back to HA after recovery*

- SAN Client Supported in Hyper-V Environments
- SAN Client, FT Media Server Must Be SAN-connected (HBA)
 - *SAN Client and FT Media Server must participate in SAN “fabric”*
- Only Server-side Deduplication Supported in SAN Client Configurations
 - *Client-side deduplication not supported by SAN client*
- SAN Client Cannot Also Be FT Media Server
- FT Media Server Cannot Also Be Master Server

- Install Media Server to Hyper-V Host
 - *Shortens data “journey”*
 - *Backup storage resources local to Hyper-V host*
- Leverage Alternate Clients for Highly Utilized Hyper-V Hosts
 - *Reduces/removes processing burden from production Hyper-V hosts*
- Use SAN Client Technology in SAN Environments
 - *Allows for use of SAN fabric for backup data transport*
 - *Can meaningfully improve backup performance*
 - *Reduces I/O burden from LAN infrastructure*

- NetBackup 7.6 and Hyper-V Limitations
 - Instant Recovery unsupported
 - Accelerator unsupported
 - Encrypted VHD or VHDX files unsupported
 - Virtual machines using VHDX files are unsupported for individual files restore
 - VHD files using FAT32 cannot be protected while online

- Hyper-V backup using Symantec NetBackup: Top articles, videos, and guides

<http://www.symantec.com/docs/HOWTO79574>

- Support for NetBackup 7.x in virtual environments

<http://www.symantec.com/docs/TECH127089>

- Troubleshooting NetBackup for Hyper-V

<http://www.symantec.com/docs/HOWTO70791>

- Symantec NetBackup for Hyper-V 7.6 Administrator's Guide

<http://www.symantec.com/docs/DOC6460>

Thank You!

Symantec Backup and Recovery Technical Services