

Best Practices

Best Practices for Installing and Configuring the Microsoft® Hyper-V™ Role on the Celeros SmartSAN™ Storage System for Windows 2008

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Best Practice Overview

Use the following table to find the applicable best practice. Do not attempt to use the best practice without reading the full explanation within the context of actual use.

Table 1-1 Best Practices

Key Words	Best Practice	Page
bind physical to virtual network	Create a virtual network and bind the physical network interface card (NIC) to the virtual NIC device. Then bind the heartbeat connection from the virtual network adapter to the corresponding physical network adapter.	14
cluster shared volumes	Enable cluster shared volumes (CSV) feature in Failover Cluster Management console. Add storage to CSV volumes. Create virtual machines on these CSV volumes.	20
cluster validation	Validate the server configuration that will participate in the cluster.	12
disk path error	Configure virtual machines not to use any DVD device or CD device because these devices cannot be shared.	15
failover cluster manager	Verify virtual machine's Live Migration process using Failover Cluster Manager.	22
failover, planned	Test the planned failover (quick migration) capabilities.	18
failover, unplanned	Test the unplanned failover capabilities.	19
hardware compatibility	Check the Windows Server Catalog for host server hardware compatibility.	8
live migration	Download the Hyper-V Live Migration white paper from Microsoft website.	19
logical drives, Exchange	When configuring storage for Exchange, create individual logical drives to separate database files and Hyper-V configuration files based on their workload and function.	10
logical drives, SQL Server	When configuring storage for SQL Server, create individual logical drives to separate database files and Hyper-V configuration files based on their workload and function.	9
network adapters	Configure the network to use the live migration feature of Hyper-V. Get the detailed list of networking configuration requirements for optimal performance and reliability.	20
PowerShell scripts	Write a PowerShell script to automate live migration process and migrates multiple virtual machines from one node to another node.	23

processor compatibility	Enable virtual machine's compatibility with different processor versions. Then Hyper-V normalizes the processor feature set and only exposes guest visible processor features that are available on all Hyper-V enabled processors of the same processor architecture.	21
RDP connection for VMs	Manage virtual machines using Remote Desktop connection.	24
release notes, Exchange 2007	Read the release notes for Exchange 2007.	16
release notes, Hyper-V	Read the release notes for the Hyper-V role.	11
release notes, SQL Server	Read the release notes for SQL Server 2008.	16
SCVMM R2	Migrate virtual machines using System Center Virtual Machine Manager R2 (SCVMM R2) Server.	23
segment size, SQL Server	When configuring storage for SQL Server, configure the storage subsystem segment size at 64 KB to equal the SQL Server 2008 extent size.	9
shared storage	Check the Windows Server Catalog to make sure that the shared storage is compatible with Windows Server 2008 R2.	8
storage partitioning	Install the Storage Partitioning premium feature.	6
updates, Exchange 2007	Check the Microsoft web site for the most current updates required for installing Exchange 2007.	17
updates, Hyper-V	Check the Microsoft web site for the most current updates required for installing the Hyper-V role.	11
updates, SQL Server	Check the Microsoft web site for the most current updates required for installing SQL Server 2008.	16
updates, Windows Server 2008	Check the Microsoft web site for the most current updates required for installing Windows Server 2008.	12
updates, Windows Server 2008 R2	Check the Microsoft web site for the most current updates required for installing Windows Server 2008 R2.	9
virtual machines, auto-start	Configure all of the virtual machines to be started automatically by the cluster failover service.	14
virtual machines, stopping	Stop virtual machines individually.	14
Windows disks, formatting	When configuring storage for SQL Server, format the Windows operating system file system using NTFS and a cluster size of 64 KB to equal the sector size. Do not use the quick format option for formatting the Windows disks.	12

Best Practices for Installing and Configuring a SmartSAN Storage System with the Hyper-V Role

Introduction

System administrators today face the continuing challenge of reducing complexity in their environments without compromising efficiency and availability. To achieve this goal, all components must be easy-to-use and reliable. Integrating a SmartSAN storage system with the Microsoft® Hyper-V™ role meets this requirement for reducing complexity. This combination provides server consolidation, failover capabilities, live migration, quick migration, and application support. With this combination, you can move a virtual server from one physical server to another in minutes.

This document lists best practices for integrating the Hyper-V role with the storage hardware. Application-specific elements also are included for Microsoft SQL Server and Microsoft Exchange that run in the virtual machines. This document is not intended to replace existing installation and configuration documentation. Instead, the intent is to complement existing vendor information.

Reference Architecture

Reference Architecture shows the configuration used for the combined setup of the storage subsystem and the Hyper-V role with SQL Server 2008 and Exchange 2007. The operating system was Windows Server 2008 R2 Enterprise Edition with clustered servers.

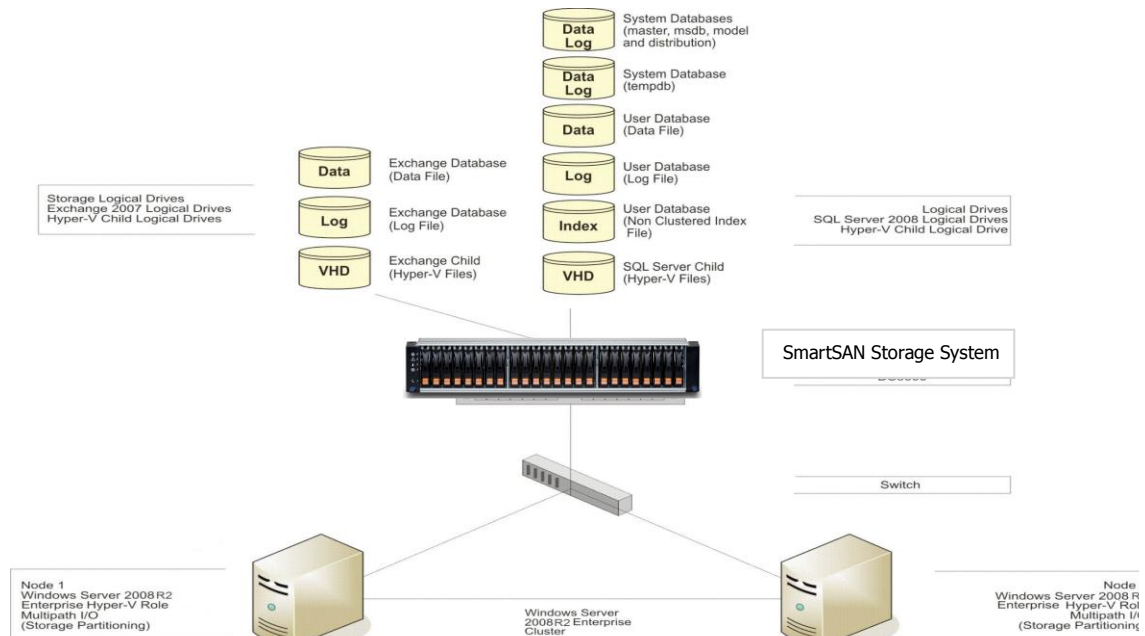


Figure 2-1 Reference Architecture

Software Components

There are two supported software applications:

- SQL Server 2008 Enterprise Edition, 64-bit

- Exchange 2007, Service Pack 1

Hardware Components

- 64 KB segment size
- RAID 10 arrays
- Storage Partitioning premium feature

The SmartSAN Storage Management Software

Adding, deleting, and configuring storage is easy with extends manageability by providing an easy-to-use interface. You can choose between a graphical interface or a command line.

For more information about the Celeros storage subsystem, go to:

<http://www.celeros.com/pdf/SmartSAN%20Initial%20Setup%20Guide.pdf>

System administrators can add only those features that are needed—such as the storage partitioning.

For more information about Storage Partitioning or any of the premium features of the SmartSAN storage management software go to:

<http://www.celeros.com/pdf/SmartSAN%20Initial%20Setup%20Guide.pdf>

storage partitioning

BEST PRACTICE: Install the Storage Partitioning premium feature.

When

Install the Storage Partitioning during Manager Installation.

How

For instructions, refer to “Enabling the Premium Features Pack” in the online help of Storage Manager.

Benefits

You can map and customize individual storage partitions.

Combining Hyper-V with the SmartSAN Storage System

This section gives general steps for installing the combination of the Hyper-V role with a storage system. The Windows Server 2008 R2 Enterprise Edition server is set up in a clustered environment.

Adding a Celeros SmartSAN Storage System

When incorporating a SmartSAN storage system into a Hyper-V environment, follow these steps. These steps make sure that planned failover (live migration and quick migration) and unplanned failover (stopping individual cluster service) occur seamlessly.

- 1** Use out of band management.
- 2** Configure the switch with the world-wide name (WWN) information for the host bus adapter (HBA).
- 3** Establish the internet protocol (IP) addresses for the storage subsystem.
- 4** Specify the best size for the storage subsystem. The best size depends on what application is being supported as well as on the purpose and the workload for the child partitions.
- 5** Select the applicable RAID level. The best RAID level depends on what application is being supported as well as on the purpose and the workload for the child partitions.
- 6** Select the applicable segment size. The best segment size depends on what application is being supported as well as on the purpose and the workload for the child partitions.
- 7** Specify the host type as Windows 2000 / Server 2003 / Server 2008 Clustered. The reference architecture uses Server 2008 R2, clustered.
- 8** Establish logical drive-to-LUN mappings.
- 9** Make sure that all server nodes that participate in the cluster can identify the shared storage and have been tested for read/write capability.
- 10** Based on the requirements of the application and of the environment, identify which storage option to use for the Hyper-V role. For more information about Hyper-V storage options, refer to Storage Options for Windows Server 2008 R2 Hyper-V. Go to:

<http://www.microsoft.com/windowsserver2008/en/us/hyperv-main.aspx>

shared storage

BEST PRACTICE: Check the Windows Server Catalog to make sure that the shared storage is compatible with Windows Server 2008 R2.

When

Check for product compatibility during the planning phase of the hardware implementation, before installation.

How

For information about product compatibility, go to:

<http://www.windowsservercatalog.com/>

Check the compatibility of the following products:

- Hyper-V role
- Shared storage
- Firmware versions

Benefits

Checking for product compatibility makes sure that the Hyper-V role is compatible with the shared storage.

hardware compatibility

BEST PRACTICE: Check the Windows Server Catalog for host server hardware compatibility.

When

Check for host server compatibility during the planning phase of the hardware implementation, before installation.

How

For information about host server compatibility, go to:

<http://www.windowsservercatalog.com/>

Check the compatibility of the following products:

- Hyper-V role
- Physical server components
- Processor
- Bios that participates in the cluster

Benefits

Checking for host server compatibility makes sure that your server can run the Hyper-V role.

Windows Server 2008 R2 updates

BEST PRACTICE: Check the Microsoft web site for the most current updates required for installing Windows Server 2008 R2.

When

Check for current updates before installing Windows Server 2008 R2 on a parent partition.

How

Follow the Microsoft update implementation steps listed for each update.

Benefits

Applying Windows Server 2008 R2 updates makes sure that the latest fixes have been applied to resolve operability issues and performance issues.

SQL Server segment size

BEST PRACTICE: When configuring storage for SQL Server, configure the storage subsystem segment size at 64 KB to equal the SQL Server 2008 extent size.

When

Segment the logical drives when you create the hardware storage subsystem and set up logical drives at the storage subsystem layer where the log files, data files, and tempdb files will be located.

How

Use the software to configure storage subsystem segment size.

Benefits

Setting the proper segment size establishes correct alignment between the physical disk drive and the operating system file system. Correct alignment maximizes I/O request efficiency based on the SQL Server 2008 64 KB extent space allocation value. SQL Server 2008 allocates space in 64 KB extents.

SQL Server logical drives

BEST PRACTICE: When configuring storage for SQL Server, create individual logical drives for separate database files and Hyper-V configuration files based on their workload and function.

When

During the creation of logical drives for shared storage that will be used in the Windows Server 2008 R2 cluster.

How

Use the . Separate the following database files and Hyper-V configuration files:

- SQL Server 2008 system databases
- tempdb
- SQL Server 2008 user databases
- Hyper-V child partition configuration files

Benefits

There are several benefits that result from separating the specified database files and configuration files onto individual logical drives:

- Assigning user database files to their own dedicated logical drive (Windows disk) maximizes the efficiency of I/O requests. The dedicated Windows disk also provides performance flexibility and space management flexibility.
- Assigning the tempdb database files to their own dedicated logical drive (Windows disk) provides performance flexibility and space management flexibility.
- Assigning the Hyper-V *.VHD configuration files to a specific logical drive creates a central, shared location for the child partition.

BEST PRACTICE: When configuring storage for Exchange, create individual logical drives to separate database files and Hyper-V configuration files based on their workload and function.

Exchange logical drives**When**

During the creation of logical drives for shared storage that will be used in the Windows Server 2008 R2 cluster.

How

Use the Storage Manager to create individual logical drives for the following files:

- Exchange datafiles
- Exchange log files
- Hyper-V child partition configuration files (*.VHD)

Benefits

There are two major benefits that result from separating the specified database files and configuration files onto individual logical drives:

- Assigning database data and log data to their own dedicated logical drive (Windows disk) maximizes the efficiency of I/O requests. The dedicated Windows disk also provides performance flexibility and space management flexibility.
- Assigning the Hyper-V *.VHD configuration files to a specific logical drive creates a central shared location for the child partition.

Installing the Hyper-V Role and the Failover Feature

Hyper-V release notes

BEST PRACTICE: Read the release notes for the Hyper-V role.

When

Read the Hyper-V release notes before installing the Hyper-V role on the individual physical servers.

How

For the latest Hyper-V release notes, go to:

<http://www.microsoft.com/en/us/default.aspx>

Benefits

Reading the latest release notes alerts you to any recent changes to the Hyper-V product offering that were not included in the Hyper-V documentation at release time.

Hyper-V updates

BEST PRACTICE: Check the Microsoft web site for the most current updates required for installing the Hyper-V role.

When

Check for updates before installing the Hyper-V role on the individual physical servers.

How

Follow the Microsoft update implementation steps listed for each update.

Benefits

Applying Hyper-V updates makes sure that the latest fixes have been applied to resolve operability issues and performance issues.

Validating and Creating Failover Clustering

cluster validation

BEST PRACTICE: Validate the server configuration that will participate in the cluster.

When

Validate the server configuration before creating the cluster.

How

Validate the server configuration using the Failover Cluster Management tool in Windows Server 2008 R2.

Benefits

Validating the server configuration before creating the cluster makes sure that errors in the configuration are resolved before you create the cluster.

Creating, Installing, and Configuring Child Partitions

Windows Server 2008 updates

BEST PRACTICE: Check the Microsoft web site for the most current updates required for installing Windows Server 2008.

When

Check for updates before installing Windows Server 2008 on a child partition.

How

Follow the Microsoft update implementation steps listed for each update.

Benefits

Applying Windows Server 2008 updates makes sure that the latest fixes have been applied to resolve operability issues and performance issues.

formatting Windows disks

BEST PRACTICE: When configuring storage for SQL Server, format the Windows operating system file system using NTFS and a cluster size of 64 KB to equal the sector size. Do not use the quick format option for formatting the Windows disks.

When

Format the file system in the Windows operating system after you create the Windows disk and partitions.

How

Use the NTFS file system with a 64 KB cluster size when formatting Windows disk where log files, data files, and tempdb database files will be located. Perform this formatting in the Windows operating system, either by using the built-in GUI "Disk Management" or at the Windows operating system command line with the format command.

Benefits

The NTFS format process detects any bad sectors that might be on the Windows disk. The quick format option does not check for bad sectors on the Windows disk. Matching the file system cluster size with the partition sector size provides maximum I/O request efficiency and maximum use of space between the SQL Server 2008 extents and the file system.

BEST PRACTICE: Create a virtual network and bind the physical network interface card (NIC) to the virtual NIC device. Then bind the heartbeat connection from the virtual network adapter to the corresponding physical network adapter.

**bind
physical
to virtual network**

When

Bind the virtual network to the physical network after you create the child partition, install the operating system, and install the integration services.

How

After you configure the NICs and the adapters in Microsoft Network Connections, Windows automatically assigns the Microsoft Virtual Network Switch Protocol property.

Benefits

The physical network adapter is dedicated to the Virtual Network Switch Protocol and allows the virtual network adapter to consume all of the standard protocols and services.

BEST PRACTICE: Configure all of the virtual machines to be started automatically by the cluster failover service.

auto-start virtual machines

When

Wait until after you create the child partition, install the operating system, install integration services, and create the virtual network before you configure the virtual machines to start automatically.

How

In the Hyper-V Manager in Windows Server 2008 R2, for **Automatically Start Action**, select **Nothing** to prevent the Hyper-V role from starting the virtual machines. Then by default the cluster failover service will manage the automatic start.

Benefits

Configuring virtual machines to start automatically makes sure that the cluster failover services—rather than the Hyper-V Manager—manages the starting of virtual machines during planned and unplanned failovers.

Configuring Virtual Machines for High Availability

stopping virtual machines

BEST PRACTICE: Stop virtual machines individually.

When

Stop an individual virtual machine before configuring it for high availability.

How

Use the Hyper-V Manager in Windows Server 2008 R2 to stop an individual virtual machine.

Benefits

Stopping virtual machines individually reduces the risk of errors during the process of configuring for high availability.

disk path error

BEST PRACTICE: Configure virtual machines not to use any DVD device or CD device because these devices cannot be shared.

When

You must configure the virtual machines to use neither DVD media nor CD media before configuring those virtual machines for high availability.

How

Use the Hyper-V Manager in Windows Server 2008 R2. Select **None** when you are asked to "Specify the media to use with your virtual CD/DVD drive."

Benefits

Using no DVD devices or CD devices makes sure that you do not get the disk path error shown in [Disk Path Error](#). This disk path error is caused by the inability of DVD devices and CD devices to be shared across different nodes in the Windows cluster.

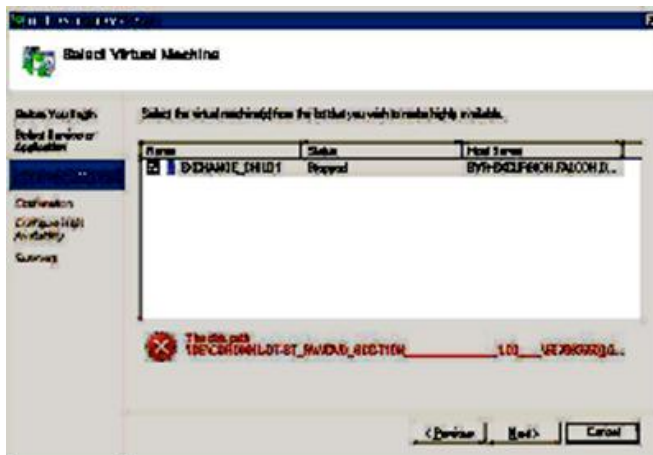


Figure 2-2 Disk Path Error

Installing and Configuring SQL Server 2008 on a Child Partition

SQL Server 2008 release notes

BEST PRACTICE: Read the release notes for SQL Server 2008.

When

Read the SQL Server release notes before you install SQL Server 2008 on a child partition.

How

For the latest SQL Server 2008 release notes, go to:

<http://www.microsoft.com/sqlserver/2008/en/us/default.aspx>

Benefits

Reading the latest release notes alerts you to any recent changes to the SQL Server 2008 product offering that were not included in the SQL Server 2008 documentation at release time.

SQL Server 2008 updates

BEST PRACTICE: Check the Microsoft web site for the most current updates required for installing SQL Server 2008.

When

Check for updates before installing SQL Server 2008 on a child partition.

How

Follow the Microsoft update implementation steps listed for each update.

Benefits

Applying SQL Server 2008 updates makes sure that the latest fixes have been applied to resolve operability issues and performance issues.

Installing and Configuring Exchange 2007 on a Child Partition

Exchange 2007 release notes

BEST PRACTICE: Read the release notes for Exchange 2007.

Exchange 2007 updates

When

Read the Exchange 2007 before installing Exchange 2007 on a child partition.

How

For the latest Exchange 2007 release notes, go to:

<http://www.microsoft.com/exchange/en-us/default.aspx>

Benefits

Reading the latest release notes alerts you to any recent changes to the Exchange 2007 product offering that were not included in the Exchange 2007 documentation at release time.

BEST PRACTICE: Check the Microsoft web site for the most current updates required for installing Exchange 2007.

When

Check for updates before installing Exchange 2007 on a child partition.

How

Follow the Microsoft update implementation steps listed for each update.

Benefits

Applying Exchange 2007 updates makes sure that the latest fixes have been applied to resolve operability issues and performance issues.

Testing the Planned Failover Capability

Combining the Hyper-V role with a SmartSAN storage system expedites planned failover—also known as live migration and quick migration. After you configure the Windows Server 2008

R2 clustering and make the Hyper-V child partitions cluster-aware, you can move child partitions to other nodes within the cluster. This mobility gives system administrators the ability to consolidate virtual machines and to quickly offload applications for server maintenance downtime with only a momentary loss of application connectivity. Live migration provides continuous application availability during planned failovers for virtual machines. Live migration will eliminate the momentary loss of application connectivity. For more information about live migration, go to “Implementing Live Migration and Cluster Shared Volumes” and

planned failover **BEST PRACTICE: Test the planned failover (quick migration) capabilities.**

When

Test the planned failover as specified in your Service Level Agreement.

How

Test the quick migration (planned failover) by moving the configured child partition (service) to a different node from the Failover Cluster Management console. When planning your quick migration, keep in mind that applications that use SQL Server 2008 or Exchange 2007 experience a momentary loss in connectivity during quick migration.

Benefits

Testing a planned failover (quick migration) in advance reduces the risk of issues when this process actually occurs.

Testing the Unplanned Failover Capability

Unplanned failovers result when a cluster service is stopped unexpectedly for any reason, such as a power failure. Your Hyper-V environment can benefit from the protection provided by Windows Server 2008 R2 cluster service. For example, if a node that is the owner of a Hyper-V child partition (virtual machine) fails due to an unplanned power loss, the physical server and its associated Hyper-V child partitions (virtual machine) will failover to a different node. All applications, including those applications that use SQL 2008 or Exchange 2007, experience a momentary loss of connectivity during this failover.

unplanned failover**BEST PRACTICE: Test the unplanned failover capabilities.****When**

Test the unplanned failover as specified in your Service Level Agreement.

How

Test the unplanned failover capability by stopping the cluster service from the Failover Cluster Management console of the current Hyper-V child partition node owner. This action starts the unplanned failover process to an alternate node in the cluster.

Benefits

Testing an unplanned failover reduces the risk of issues when this process occurs unexpectedly.

Implementing Live Migration and Cluster Shared Volumes

Integrating the storage system with Hyper-V Role on Windows Server 2008 R2 offers a Failover clustering solution without any downtime for the virtual machine. This solution uses a new feature called "Cluster Shared Volume" or CSV and is called "Live Migration". Live Migration requires the failover clustering feature to be added and configured on the servers running Hyper-V and allows you to transparently move running virtual machines from one node of the failover cluster to another node in the same cluster without a dropped network connection or perceived downtime. Failover clustering requires shared storage for the cluster nodes. This can include an iSCSI or Fiber-Channel Storage Area Network (SAN) of the storage system.

Cluster Shared Volumes are volumes in a failover cluster that multiple nodes can read from and write to at the same time. The nodes coordinate the reading and writing activity so that the disk is not corrupted. In contrast, disks (LUNs) in cluster storage that are not Cluster Shared Volumes are always owned by a single node. Cluster Shared Volumes have the same requirements as non-Cluster Shared Volumes disk resources. The Storage location in the Cluster Shared Volumes is under SystemRoot/ClusterStorage (for example, C:\ClusterStorage).

cluster shared volumes

BEST PRACTICE: Enable cluster shared volumes (CSV) feature in Failover Cluster Management console. Add storage to CSV volumes. Create virtual machines on these CSV volumes.

When

Enable the Cluster Shared Volumes feature after creating the cluster to implement live migration.

How

Use Failover Cluster Manager in Windows Server 2008 R2. Select **Enable Cluster Shared Volumes** option to create Cluster Shared Volumes. For more information about how to enable Cluster Shared Volumes, go to:

<http://blogs.msdn.com/b/clustering/archive/2009/02/19/9433146.aspx>

Benefits

By enabling CSV for a failover cluster, all nodes in the cluster will be enabled to use shared volumes. All virtual machines are stored on the shared storage, and the state of the running virtual machine is managed by one of the nodes.

network adapters

BEST PRACTICE: Configure the network to use the live migration feature of Hyper-V. Get the detailed list of networking configuration requirements for optimal performance and reliability.

When

Check the network connectivity on cluster nodes for implementing Live Migration of highly available virtual machines using Failover Cluster Manager.

How

Each node of the failover cluster need dedicated network adapters:

- One network adapter for remote management access to the Hyper-V Server
- One network adapter with Gigabit speed for live migration traffic
- One network adapter with Gigabit speed for storage traffic, such as access to Cluster Shared Volumes (CSV), and to monitor the heartbeat of the node
- One or more network adapters to provide virtual machines with network connectivity

Benefits

Using the same subnet IP for all nodes in failover cluster, virtual machines can retain the same IP address even after live migration.

processor compatibility

BEST PRACTICE: Enable virtual machine's compatibility with different processor versions. Then Hyper-V normalizes the processor feature set and only exposes guest visible processor features that are available on all Hyper-V enabled processors of the same processor architecture.

When

Move the running virtual machine from one node to another node in a cluster with different processor features, without any downtime of virtual machine.

How

Enable the processor compatibility of each virtual machine on Hyper-V Manager by checking **Migrate to a physical computer with a different processor version** checkbox on the processor page of virtual machine settings.

Processor Compatibility shows how to enable virtual machine's processor compatibility with different processor versions under Virtual Machine settings in Hyper-V Manager.

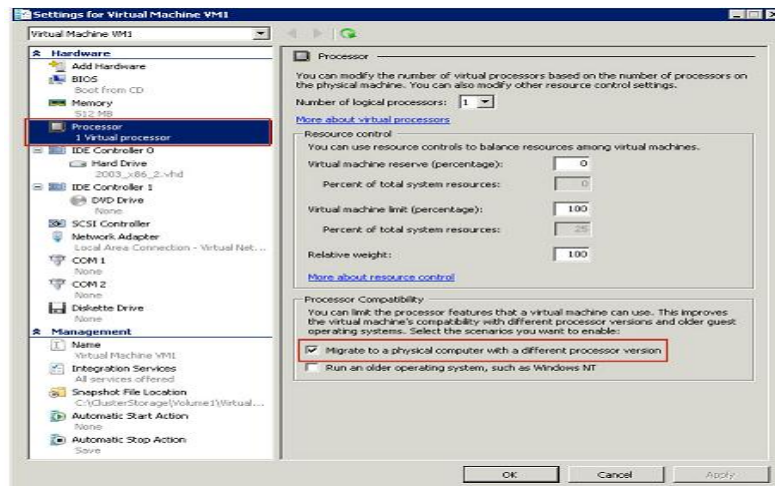


Figure 2-3 Processor Compatibility

Benefits

This setting ensures that the virtual machine uses only the features of the processor that are available on all versions of a virtualization-capable processor by the same processor manufacturer. This setting makes it easier to move a highly available virtual machine to another node in a cluster or restore the virtual machine to different hardware.

For more information about virtual machine's processor compatibility, go to:

<http://download.microsoft.com/download/F/2/1/F2146213-4AC0-4C50-B69A-12428FF0B077/VM%20processor%20compatibility%20mode.doc>

live migration

BEST PRACTICE: Download the Hyper-V Live Migration white paper from Microsoft website.

When

Download and go through the Hyper-V Live Migration document before configuring the setup for live migration.

How

Go to the following link to download the Live Migration white paper:

<http://www.microsoft.com/downloads/en/details.aspx?FamilyID=FDD083C6-3FC7-470B-8569-7E6A19FB0FDF>

Benefits

Reading the live migration white paper alerts you to follow up the steps to achieve live migration efficiently.

failover cluster manager

BEST PRACTICE: Verify virtual machine's Live Migration process using Failover Cluster Manager.

When

Migrate a virtual machine using Failover Cluster Manager after enabling the **highly available** option in Failover Cluster Management console.

How

Use Failover Cluster Manager in Windows Server 2008 R2. Select the cluster to which the source and destination Hyper-V hosts belong. Select the node on which the virtual machine is currently running, right click on the virtual machine and select **Live Migrate virtual machine to another node** option.

For more information about Live Migration using Failover Cluster Manager, go to:

<http://blogs.technet.com/b/chrade/archive/2009/09/06/real-world-example-of-troubleshooting-r2-live-migration-using-csv-s.aspx>

Benefits

Failover Cluster Manager enables you to easily verify the migrated virtual machine's availability in the new node.

For more details about benefits of live migration using Failover Cluster Manager, go to:

http://download.microsoft.com/download/E/4/1/E41EC58F-172D-4F70-A67F-FB7992EDAF18/MS_HVS_livemigration.doc

PowerShell scripts

BEST PRACTICE: Write a PowerShell script to automate live migration process and migrates multiple virtual machines from one node to another node.

When

Migrate a virtual machine using powershell scripts after enabling the **highly available** option in Failover Cluster Management console.

How

Use Windows PowerShell command prompt.

- Import Failover Cluster module into PowerShell Command prompt
- Execute the following command to migrate a virtual machine:

```
Get-Cluster <cluster> | Move-ClusterVirtualMachineRole -Name <vm group> -Node <destination node>
```

Where:

- <cluster> represents the name of the cluster that contains the virtual machine to be migrated
- <vm group> represents the virtual machine resource group containing the virtual machine
- <destination node> represents the name of the destination host node within the failover cluster to which the virtual machine is to be migrated

Benefits

Using Windows PowerShell Scripts, live migration for more than one virtual machine can be processed without user intervention.

SCVMM R2

BEST PRACTICE: Manage Hyper-V hosts and migrate virtual machines using System Center Virtual Machine Manager R2 (SCVMM R2) Server.

When

Migrate a virtual machine using SCVMM R2 Server after enabling the **highly available** option in SCVMM R2 Server.

How

Use SCVMM Admin console. Make sure the **highly available** option enabled for each virtual machine to be migrated. Right click virtual machine, select **Migrate** option and follow up on screen instructions.

RDP connection for VMs**Benefits**

Using SCVMM Admin console, you can live migrate the virtual machines without considering the network setting issues and storage configuration issues.

BEST PRACTICE: Manage virtual machines using Remote Desktop connection.

When

Connect the virtual machines through RDP (Remote Desktop Protocol) instead of using Hyper-V Manager, Failover Cluster Manager or SCVMM Admin Console while migrating a virtual machine.

How

Connect the virtual machines using RDP connection by enabling the remote desktop connection in virtual machines.

Benefits

Connecting virtual machines through RDP (Remote Desktop Protocol)

- Will eliminate the disconnection of Virtual Machine Console after live migration process.
- Can live migrate a virtual machine without VM user's knowledge.
- Helps to save approximately 10MB of RAM memory per VM

A Foundation for Change

The Hyper-V role lowers the entry barrier to virtualization by using existing Windows Server 2008 R2 architecture that is familiar to system administrators. When implementing virtualization into your environment, you need a storage foundation that you can build on. The SmartSAN storage system provides not only this strong storage foundation but also provides the necessary features with the tools to manage those features. By using both product offerings—the Hyper-V role and the Celeros SmartSAN storage system—you can create an infrastructure with the ability to adapt to change, yet remain manageable.

References

Cluster Shared Volumes

<http://blogs.msdn.com/b/clustering/archive/2009/02/19/9433146.aspx>

Exchange 2007 release notes

<http://www.microsoft.com/exchange/en-us/default.aspx>

Failover Cluster Manager

For more information about Live Migration using Failover Cluster Manager, go to:

<http://blogs.technet.com/b/chrad/archive/2009/09/06/real-world-example-of-troubleshooting-r2-live-migration-using-csv-s.aspx>

For more details about benefits of live migration using Failover Cluster Manager, go to:

http://download.microsoft.com/download/E/4/1/E41EC58F-172D-4F70-A67F-FB7992EDAF18/MS_HVS_livemigration.doc

Host server compatibility

<http://www.windowsservercatalog.com/>

Hyper-V release notes

<http://www.microsoft.com/en/us/default.aspx>

Hyper-V storage options

Refer to Storage Options for Windows Server 2008 R2 Hyper-V. Go to:

<http://www.microsoft.com/windowsserver2008/en/us/hyperv-main.aspx>

Live Migration

<http://www.microsoft.com/downloads/en/details.aspx?FamilyID=FDD083C6-3FC7-470B-8569-7E6A19FB0FDF>

Processor compatibility

<http://download.microsoft.com/download/F/2/1/F2146213-4AC0-4C50-B69A-12428FF0B077/VM%20processor%20compatibility%20mode.doc>

Product compatibility

<http://www.windowsservercatalog.com/>

Storage Partitioning

For more information about Storage Partitioning, refer to the Celeros website:

<http://www.celeros.com/pdf/SmartSAN%20Initial%20Setup%20Guide.pdf>

SQL Server 2008 release notes

<http://www.microsoft.com/sqlserver/2008/en/us/default.aspx>

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