Windows Server 2012 – Hyper-V

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Windows Server 2012 Hyper-V

Scalability

Přehled edic

Features	WS 2008 R2 SP1 s Hyper-V Standard	WS 2008 R2 SP1 s Hyper-V Enterprise	WS 2008 R2 SP1 s Hyper-V Datacenter	Microsoft Hyper-V Server 2008 R2 SP1
Logical Processors	64	64	64	64
Virtual Processors per Logical Processor	8:1 12:1*	8:1 12:1*	8:1 12:1*	8:1 12:1*
Max # of VMs per Host (Supported)	192	384	384	384
Virtual Networks	Unlimited	Unlimited	Unlimited	Unlimited
Guest Virtual NICs	4 Legacy 8 Synthetic	4 Legacy 8 Synthetic	4 Legacy 8 Synthetic	4 Legacy 8 Synthetic
Guest Storage Adapters	2 IDE 4 SCSI	2 IDE 4 SCSI	2 IDE 4 SCSI	2 IDE 4 SCSI
Guest Storage Devices	4 IDE 256 SCSI	4 IDE 256 SCSI	4 IDE 256 SCSI	4 IDE 256 SCSI
Virtual Floppy Devices	1	1	1	1
Serial (COM) Ports	2	2	2	2
Included Use Rights	1 Physical 1 VM	1 Physical 4 VMs	1 Physical Unlimited VMs	None

Podporované OS - serverové

- Windows Server 2012
- Windows Server 2008 R2 SP1
- Windows Server 2008 R2
- Windows Server 2008 SP2
- Windows Home Server 2011
- Windows Small Business Server 2011
- Windows Server 2003 R2 SP2
- Windows Server 2003 SP2
- CentOS 6.0 – 6.2
- Red Hat Enterprise Linux 6.0 –6.2
- SUSE Linux Enterprise Server 11 SP2
- FreeBSD 8.2

Podporované OS - klientské

- Windows 8
- Windows 7 SP1
- Windows 7
- Windows Vista SP2
- Windows XP SP3
- Windows XP x64 SP2

Expanded Processor & Memory Support

System	Resource	Maximum Number		Improvement Factor
		Windows Server 2008 R2	Windows Server 2012	
Host	Logical processors on hardware	64	320	5x
	Physical Memory	1 TB	4 TB	4x
	Virtual processors per host	512	2,048	4x
Virtual Machine	Virtual processors per virtual machine	4	64	16x
	Memory per virtual machine	64 GB	1 TB	16x
	Active virtual machines per server	384	1,024	2.7x
Cluster	Nodes	16	64	4x
	Virtual machines	1,000	8,000	4x

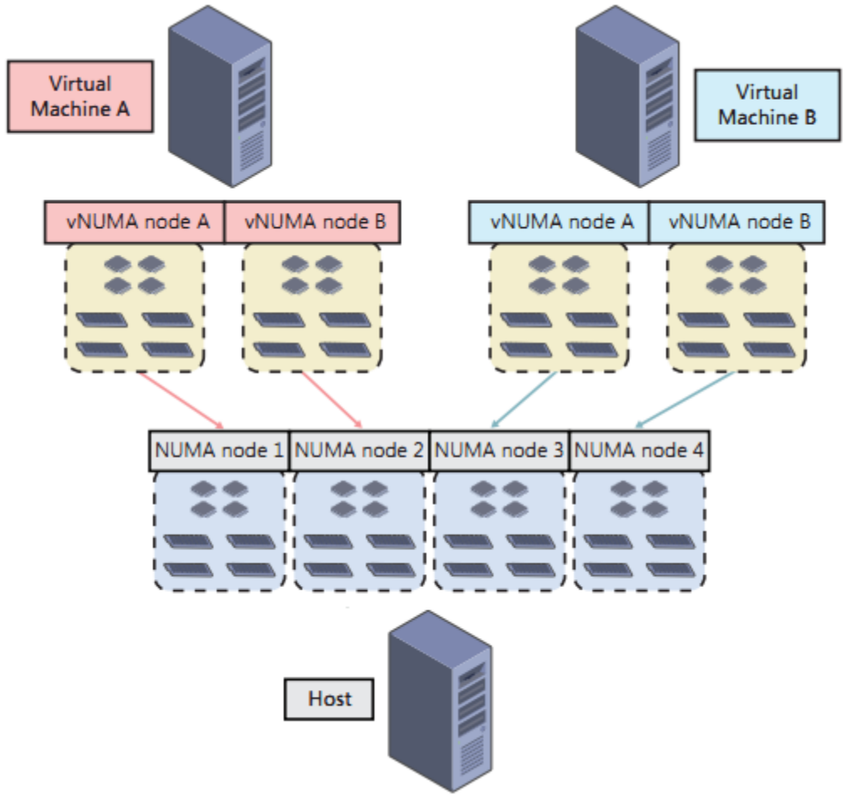
Virtual NUMA

VMs are NUMA-aware

- Dynamic memory cannot be configured on the host
- Performance of applications like SQL Server are significantly better
- Support extends into high-availability solutions built using Windows Server 2012 Failover Clustering

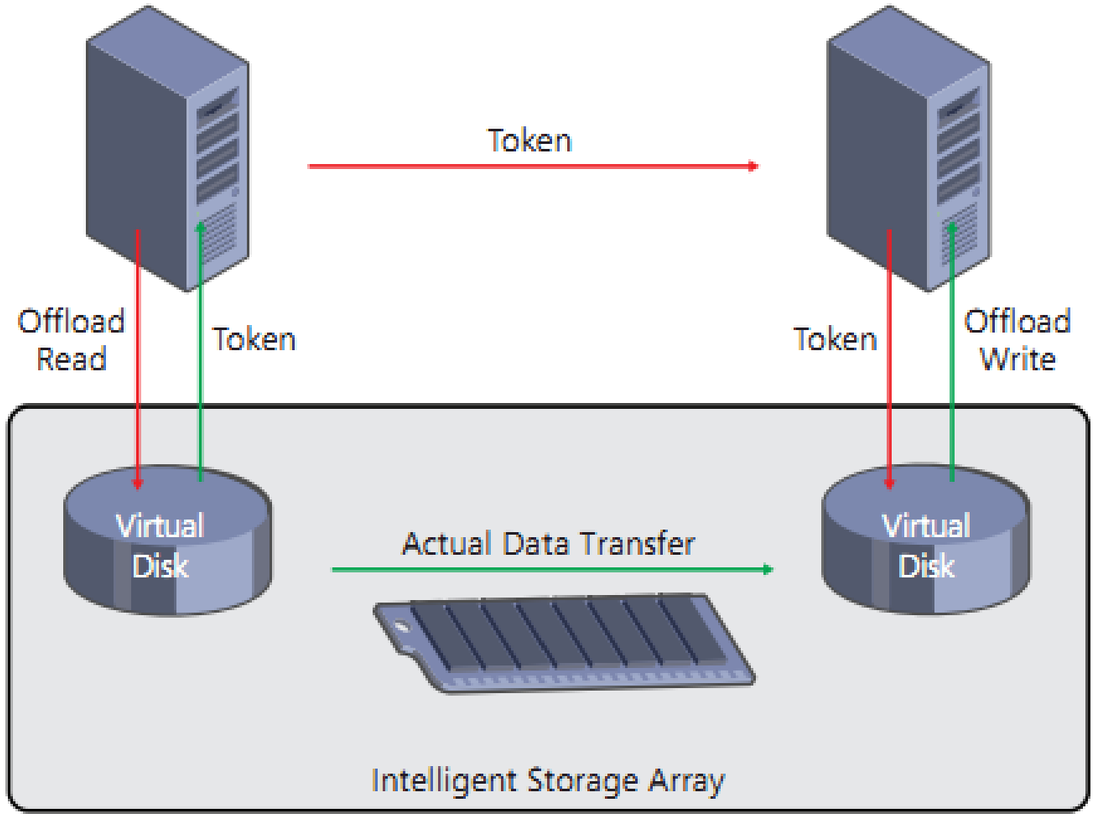
How NUMA works…

- Guest OS and applications make intelligent decisions about thread and memory allocation
- Decisions are reflected in the physical NUMA topology of the host



Offload Data Transfer (ODX)

A feature of high-end storage arrays that uses a token-based mechanism to read and write data within and between arrays



Support for Large Sector Disks

To meet demands for increased disk capacity, Windows Server 2012 supports…

- 512-byte sector format is replace by 4,096-byte (4 KB) format

Hyper-V in Windows Server 2012…

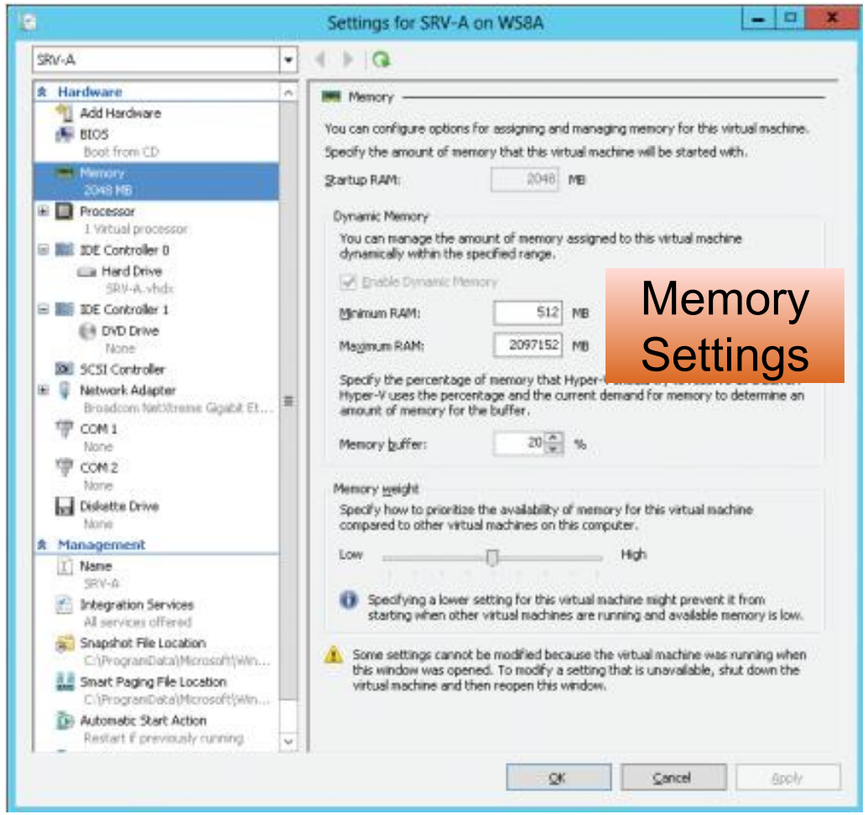
- Supports hosting VHD files on native 4 KB format or 512-byte emulation (512e) mode
- Mitigates the RMW impact when accessing data within VHD files and when updating metadata structures

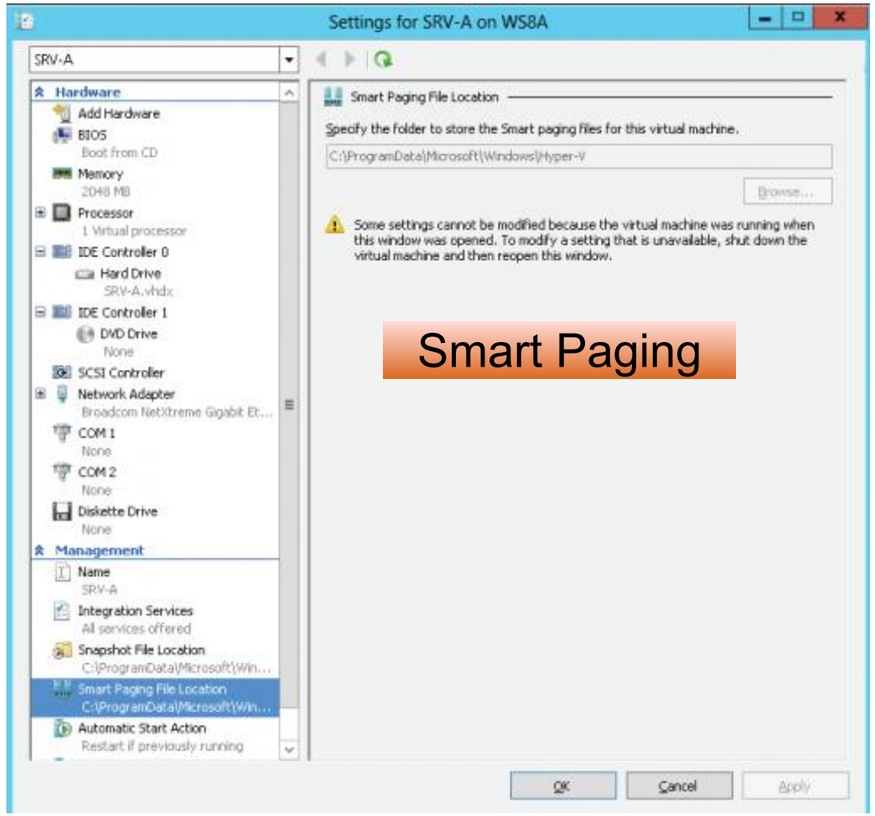
Read-Modify-Write (RMW)

1. The disk reads the 4 KB physical sector into its internal cache, which contains the 512-byte logical sector referred to in the write
2. Data in the 4 KB buffer is modified to include the updated 512-byte sector
3. The disk performs a write of the updated 4 KB buffer back to its physical sector on the disk

Dynamic Memory Improvements

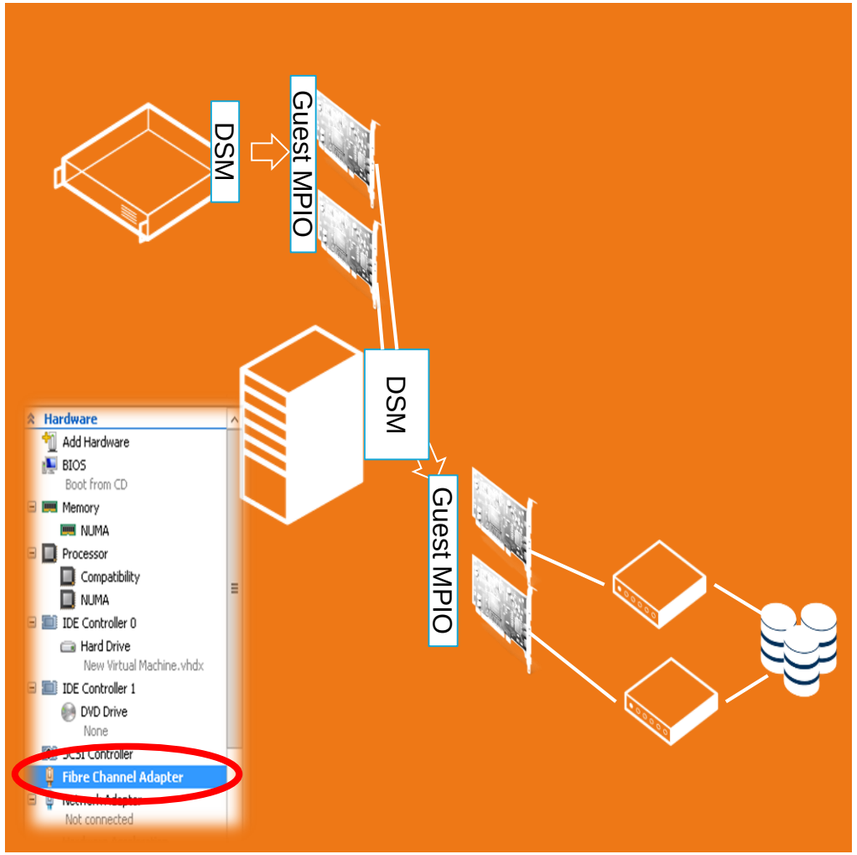
- New Minimum Memory setting
- Minimum/Maximum memory settings can be modified while VM is running





PowerShell configuration: Set-VM cmdlet

Virtual Fibre Channel



Přímý přístup do SAN

Jeden Hyper-V připojený do odlišných SAN

Až 4 Virtual Fibre Channel HBAs pro virtuální stroj

Podpora MPIO a Live Migration

Improved VM Import

To help prevent configuration problems that prevent the import process from completing successfully

- Configuration validation during import
- Can manually copy VM files between hosts and then import them
  - No need to export first!
- Improved Import wizard

VHDX Disk Format

New default format for VHDs in Hyper-V in Windows Server 2012

- Supports virtual disks up to 64 TB
- Aligns to megabyte boundaries to support large sector disks (4 KB sector disks)
- Uses large block sizes to provide better performance
- Includes a new log to protect from corruption due to power failure
- Has much greater resiliency
- Allows for embedded custom user-defined metadata into VHDX files

Bezpečná virtualizace AD DS

Virtualizované DC používají unikátní atribut GenerationID:
Aplikace snapshotu
Kopie virtuálního stroje

GenerationID se změní v případě posunutí virtuálního stroje v čase

Při startu, DC porovná hodnotu GenerationID s hodnotou v directory

Pokud nesouhlasí (rollback event) je vyvoláno bezpečné zajištění konvergence

Virtualizace doménových řadičů v clusteru – s možností opětovného spuštění clusteru

Live Migrations

Cluster Live Migrations

Live Migration Queuing

Konkurenční Live Migrations

Vyšší mobilita VM v rámci clusteru

Konkurenční Live Migrations:
Více současně spuštěných LM pro daný zdroj i cíl

Mobilita VM v clusteru:
Node Drain, failback, Cluster aware updating…

Live Migration Queuing:
Cluster zařazuje a spravuje velké množství migrovaných VM

Monitoring VM

Obnova na úrovni aplikace
(Service Control Manager (SCM) nebo vyvolané událost)

Obnova hosta pomocí HA
(Failover Clustering korektně restartuje VM)

Obnova na úrovni hostitele
(Failover Clustering přesune VM na jiný node)

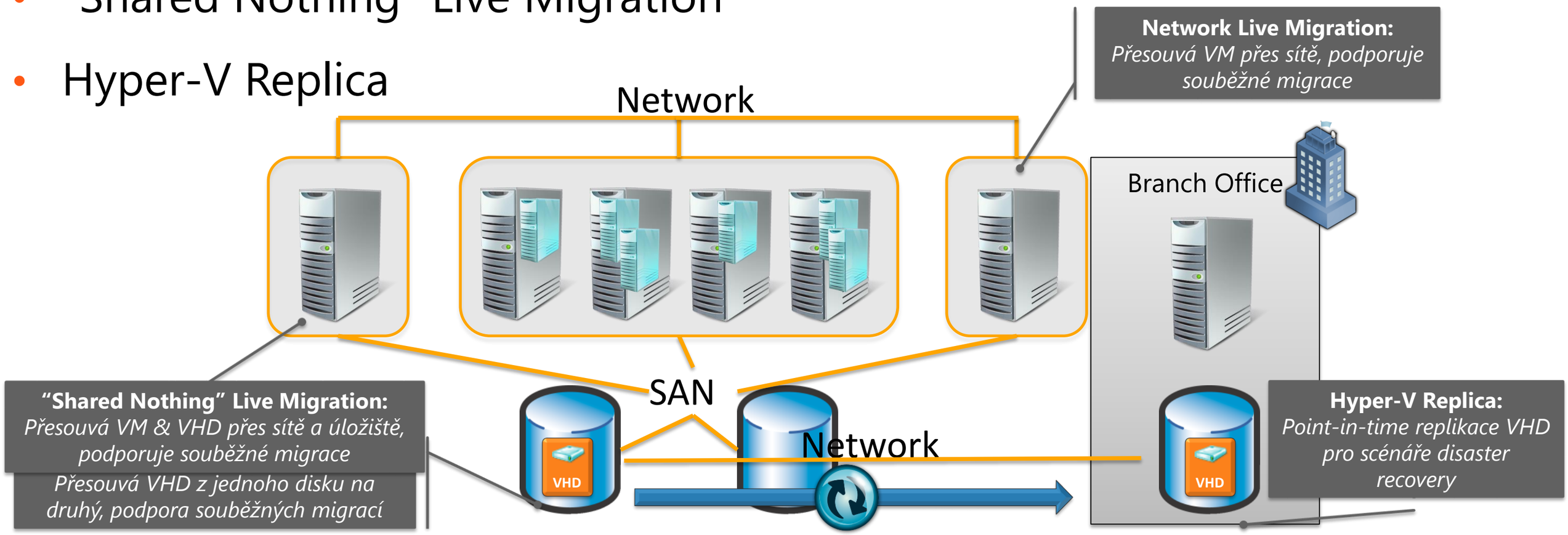
Obecné monitorování pro jakoukoliv aplikaci

Služby: Jakákoliv NT služba
(např. SQL, IIS, Print spooler)

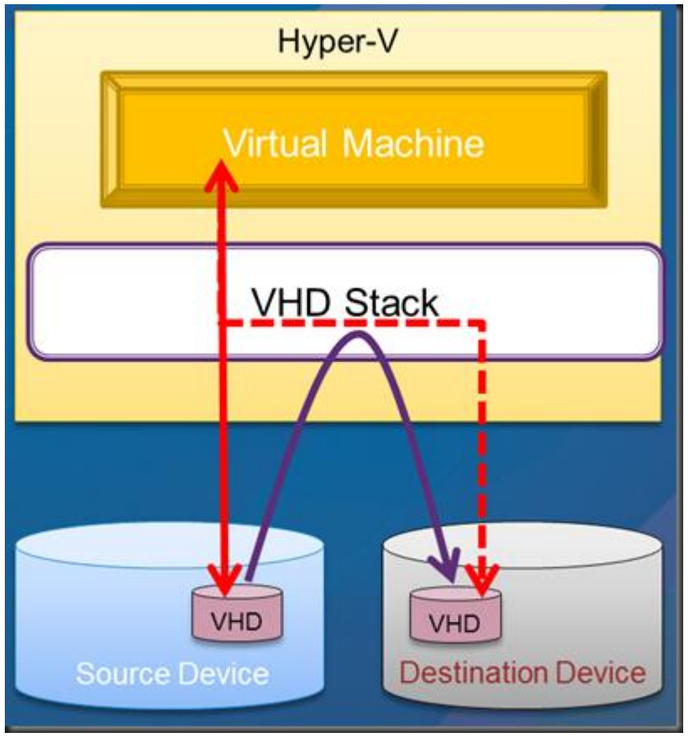
Události: systémový, aplikační, bezpečnostní log
(jakákoliv aplikace, která využívá EV logging)

New Live Migrations

- Storage Live Migration
- Network Live Migration
- “Shared Nothing” Live Migration
- Hyper-V Replica

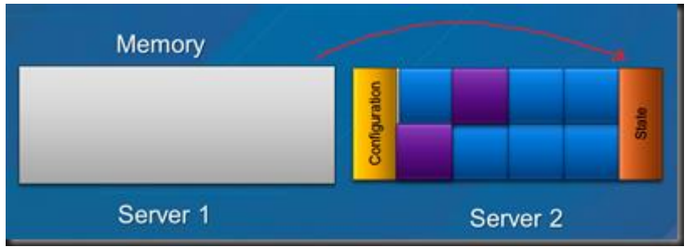


Live Migration – Moving a Running VM without Shared Storage



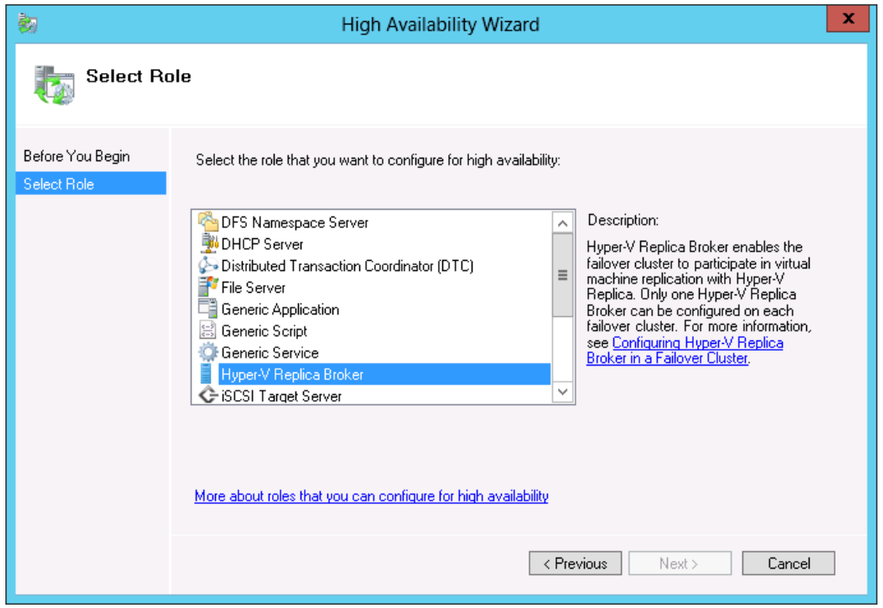
standard Ethernet connection

1. Live Migration setup occurs
2. Memory pages are transferred from the source server to the destination server
3. Modified pages are transferred to destination server
4. State is transferred to destination server
5. VM brought online on destination server
6. Network cleanup occurs



Hyper-V Replica & Failover Clustering

- Failover Clusters can participate in replication, but only as a single replication server.
- Failover Clusters have a new clustered role, the Hyper-V Replica Broker
  - Highly-Available role that moves between nodes
  - One instance per cluster
- Changes traditional Hyper-V multi-site (disaster recovery) Failover Clustering. Previously replication across sites was done between nodes within a single cluster.
- Primary and Replica servers do not need to be in the same domain unless part of a Failover Cluster
- Replication Scenarios
  - Cluster to Cluster
  - Cluster to Standalone
  - Standalone to Cluster
  - Standalone to Standalone



Hyper-V over SMB

Hyper-V over SMB

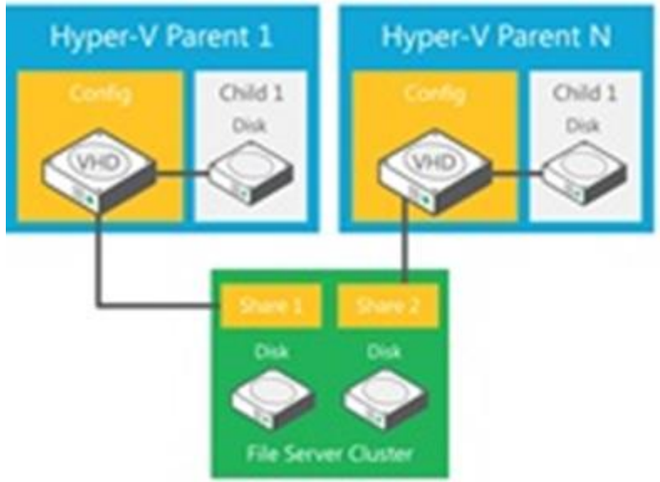
Server Message Block (SMB) protocol…

- Is a network file sharing protocol that allows applications on a computer to read and write to files and to request services from server programs in a computer network
- Windows Server 2012 introduces the new 3.0 version of the SMB protocol

With Windows Server 2012, Hyper-V…

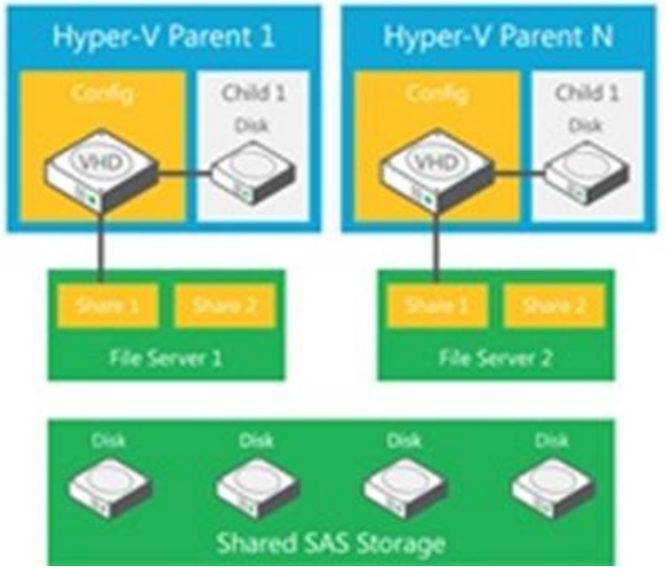
- Can store virtual machine files (configuration, VHD, snapshots) in files shares over the SMB 3.0 protocol
- Is supported for both stand-alone and clustered servers that use Hyper-V with shared file storage for the cluster
- Can support scale-out file shares and clusters
- Can leverage SMB Multi-Channel

Common Configurations



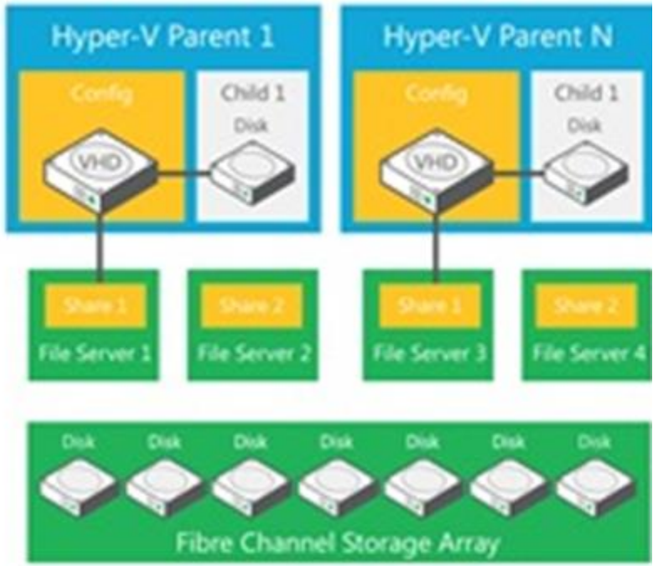
Single-Node File Server

- Lowest cost for share storage
- Shares not continuously available



Dual-Node File Server

- Low cost for continuously available shared storage
- Limited scalability (up to a few hundred disks



Multi-Node File Server

- Highest scalability (up to thousands of disks)
- Higher cost, but still lower than connecting all Hyper-V hosts with FC

Hyper-V Over SMB Workflow

1. Install the Hyper-V role on a Windows Server 2012 machine
2. Install the File Services role on a Windows Server 2012 machine
3. Create an SMB file share
4. Create a virtual machine and virtual machine hard disk on the file share
5. Migrate existing virtual machine storage to the file share

QUESTIONS & ANSWERS

THANK YOU