Přehled novinek v Hyper-V 2016

Kamil Roman
Mail: IT@KamilRT.net | Twitter: @KamilRT | blog: ITblog.KamilRT.net

Windows 10

Many of these features are available in Windows 10!
Making Cloud Great

- Enabling Cloud Born Environments
- Security
- Isolation
- Availability
- Operational Improvements
- Scale
Enabling Cloud Born Environments

Hyper-V on Nano Server

**Nano Server**: A new headless, 64-bit only, deployment option for Windows Server

Deep refactoring with cloud emphasis
- Cloud fabric & infrastructure (clustering, storage, networking)
- Born-in-the-cloud applications (PaaS v2, ASP.NET v5)
- VMs & Containers (Hyper-V & Docker)

Extend the Server Core pattern
- Roles & features live outside of Nano Server
- No Binaries or metadata in OS image
- Standalone packages install like apps
- Full driver support
- Antimalware
Evolving security threats
Rising number of organizations suffer from breaches

1. Increasing incidents
2. Bigger motivations
3. Bigger risk

- Cyberattacks on the rise against US corporations

- Espionage malware infects rafts of governments, industries around the world
  - Ars Technica (2014)

- Cybercrime costs US economy up to $140 billion annually, report says
  - Los Angeles Times (2014)

- How hackers allegedly stole "unlimited" amounts of cash from banks in just a few hours
  - Ars Technica (2014)

- The biggest cyberthreat to companies could come from the inside
  - Cnet (2015)

- Malware burrows deep into computer BIOS to escape AV
  - The Register [September 2014]

- Forget carjacking, soon it will be carhacking
  - The Sydney Morning Herald (2014)
Shielded VMs

*Shielded Virtual Machines* can only run in fabrics that are designated as owners of that virtual machine.

Shielded Virtual Machines will need to be *encrypted* (by *BitLocker* or other means) in order to ensure that only the designated owners can run this virtual machine.

You can *convert* a running *virtual machine* into a Shielded Virtual Machine.
Secure Boot Support for Linux

Providing kernel code integrity protections for Linux guest operating systems.
Works with:
• Ubuntu 14.04 and later
• SUSE Linux Enterprise Server 12

Isolation
Host Resource Protection

Dynamically identify virtual machines that are not “playing well” and reduce their resource allocation
Pioneered in Azure and enabled by default
Designed to help prevent a VM consuming excessive hardware resources
Looks for patterns of activity that shouldn’t occur within a non-malicious VM

Availability
**VM Storage Resiliency**

- **Resiliency:** Designing for cloud scale with commodity hardware
  - Preserve tenant VM session state in the event of transient storage disruption
- **Visibility:** VM stack quickly notified on failure
  - Intelligent and quick VM response to block or file based storage infrastructure issues
- **Reliability:** VM moved to PausedCritical state and will wait for storage to recover
  - Session state retained on recovery

**VM Compute Resiliency**

- **Flexibility:** Designing for cloud scale with commodity hardware
  - Configurable based on your SLA's
- **Availability:** VMs continue to run even when a node falls out of cluster membership
- **Reliability:** Resiliency to transient failures

[Diagram showing a cluster with nodes and icons indicating resiliency and flexibility features.]
Quarantine of Flapping Nodes

- Unhealthy nodes are quarantined and are no longer allowed to join the cluster.
- Prevents flapping nodes from negatively effecting other nodes and the overall cluster.
- Node is quarantined if it ungracefully leaves the cluster three times within an hour.
- VMs are gracefully drained once quarantined.
- No more than 25% of nodes can be quarantined at any given time.
- Nodes prevented from joining the cluster for 2 hours (by default manual).

Shared VHDX Integration

- Guest Clusters can now resize Shared VHDX without downtime.
- Guest Clusters can now have Shared VHDX protected by Hyper-V Replica for disaster recovery.
- Guest Clusters can now have host level backups in addition to guest level backups of Shared VHDX.
Availability

Online VM Configuration Changes

Network

Network adapters can be added and removed from Generation 2 virtual machines while they are running.

Memory

For Windows Server Technical Preview / Windows 10 guests, you can now increase and decrease the memory assigned to virtual machines while they are running.

Replicated Disks

When you add a new virtual hard disk to a virtual machine that is being replicated – it is automatically added to the not-replicated set. This set can be updated online.
Virtual machine upgrades

**Compatibility mode:** When a VM is migrated to a Windows Server Technical Preview host, it will remain in Windows Server 2012 R2 compatibility mode. Upgrading a VM is separate from upgrading host. VMs can be moved back to earlier versions until they have been manually upgraded. 

`Update-VMVersion vmname`

Once upgraded, VMs can take advantage of new features of the underlying Hyper-V host.

**Servicing model:** VM drivers (integration services) updated as necessary. Updated VM drivers will be pushed directly to guest operating system via Windows Update.

---

VM versions support tables

<table>
<thead>
<tr>
<th>Hyper-V host Windows version</th>
<th>Supported virtual machine configuration versions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 10 Anniversary Update</td>
<td>8.0, 7.1, 7.0, 6.2, 5.0</td>
</tr>
<tr>
<td>Windows Server 2016 Technical Preview</td>
<td>7.1, 7.0, 6.2, 5.0</td>
</tr>
<tr>
<td>Windows 10 build 10565 or later</td>
<td>7.0, 6.2, 5.0</td>
</tr>
<tr>
<td>Windows 10 builds earlier than 10565</td>
<td>6.2, 5.0</td>
</tr>
<tr>
<td>Windows Server 2012 R2</td>
<td>5.0</td>
</tr>
<tr>
<td>Windows 8.1</td>
<td>5.0</td>
</tr>
</tbody>
</table>

By running `Update-VMVersion`, VM will be upgraded to newest hardware version and can use the new Hyper-V features.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Minimum VM configuration version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hot Add/Remove Memory</td>
<td>6.2</td>
</tr>
<tr>
<td>Secure Boot for Linux VMs</td>
<td>6.2</td>
</tr>
<tr>
<td>Production Checkpoints</td>
<td>6.2</td>
</tr>
<tr>
<td>PowerShell Direct</td>
<td>6.2</td>
</tr>
<tr>
<td>Virtual Machine Grouping</td>
<td>6.2</td>
</tr>
<tr>
<td>Virtual Trusted Platform Module (vTPM)</td>
<td>7.0</td>
</tr>
<tr>
<td>Virtual machine multi queues (VMMQ)</td>
<td>7.1</td>
</tr>
<tr>
<td>XSAVE support</td>
<td>8.0</td>
</tr>
<tr>
<td>Key storage drive</td>
<td>8.0</td>
</tr>
<tr>
<td>Guest Virtualization Based Security support (VBS)</td>
<td>8.0</td>
</tr>
<tr>
<td>Nested virtualization</td>
<td>8.0</td>
</tr>
<tr>
<td>Virtual processor count</td>
<td>8.0</td>
</tr>
<tr>
<td>Large memory VMs</td>
<td>8.0</td>
</tr>
</tbody>
</table>
Seamless Cluster OS Rolling Upgrades

- Simple
  - Rolling Upgrades with Win2012 R2 and Win2016 nodes within the same cluster
  - Easily roll in nodes with new OS version

- Seamless
  - Zero downtime cloud upgrades for Hyper-V and Scale-out File Server

Cluster VM priority sets

- Allows defining of starting order and dependencies
- No GUI, just PowerShell:
  - `New-ClusterGroupSet`
  - `Add-ClusterGroupSetDependency`
  - `Get-ClusterGroupSet`
  - `...`
Hot Add & Upgrade

Operational Improvements
Production checkpoints

**Full support for key workloads:** Easily create “point in time” images of a virtual machine, which can be restored later on in a way that is completely supported for all production workloads.

**VSS:** Volume Snapshot Service (VSS) is used inside Windows virtual machines to create the production checkpoint instead of using saved state technology.

**Familiar:** No change to user experience for taking/restoring a checkpoint. Restoring a checkpoint is like restoring a clean backup of the server.

**Linux:** Linux virtual machines flush their file system buffers to create a file system consistent checkpoint.

**Production as default:** New virtual machines will use production checkpoints with a fallback to standard checkpoints.

PowerShell Direct

Bridge the boundary between Hyper-V host and guest VM in a secure way to issue PS cmdlets and run scripts easily. Currently supports Win 10/WS2016 guest on Win 10/WS2016 host.

No need to configure PS Remoting
Or Network Connectivity
Just need the guest credentials
Can only connect to particular guest from that host.
Using PowerShell Direct

Enter-PSSession -VMName VMName

Invoke-Command -VMName VMName
-ScriptBlock { Fancy Script }
Hyper-V Manager Improvements

Multiple improvements to make it easier to remotely manage and troubleshoot Hyper-V Servers:

- Support for alternate credentials
- Connecting via IP address
- Connecting via WinRM

Operational Improvements
Enhancing the Platform

VM Configuration Changes

New virtual machine configuration file
  Binary format for efficient performance at scale
  Resilient logging for changes
New file extensions
  .VMCX and .VMRS
Hypervisor power management improvements

Updated hypervisor power management model to support new modes of power management. Connected Standby works!

RemoteFX Improvements

Support for OpenGL 4.4 and OpenCL 1.1 API
Larger dedicated VRAM and configurable VRAM
Support for Generation 2 virtual machines
Available on Windows 10
Discrete device assignment

Lets you give direct and exclusive access to PCIe device
Results in lower latency
No GUI
Supported devices:
  • GPU
  • NVMe SSD
  • RAID/SAS controllers (later)
  • Others... (later)
Chipset requires: Intel VT-d or AMD I/O MMU, Intel EPT or AMD NPT

Virtual Machine Multi Queues

Enhancement to VMQ
Multiple hardware queues are allocated per virtual machine
Reduces latency
ReFS Accelerated VHDX Operations

Resilient File System
It maximizes data availability, despite errors that would historically cause data loss or downtime
Taking advantage of an intelligent file system for:
  - Instant fixed disk creation
  - Instant disk merge operations

Looking forward...
Nested Hyper-V

Allows running Hyper-V inside VM on Hyper-V host
Great for learning labs and testing
Requires same Windows build inside VM as at HV host
No AMD support (to date)

Using Nested Hyper-V
Summary

Windows Server 2016 available at Eval Center!

Following lecture: Vytvoření vlastního testovacího prostředí Hyper-V clusteru za pár chvil (Sunday, 10:40 – 11:55)

Přehled novinek v Hyper-V 2016

Kamil Roman
Mail: IT@KamilRT.net | Twitter: @KamilRT | blog: ITblog.KamilRT.net