

# Přehled novinek v Hyper-V 2016

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## Windows 10

Many of these features are available in Windows 10!

# Making Cloud Great

## 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

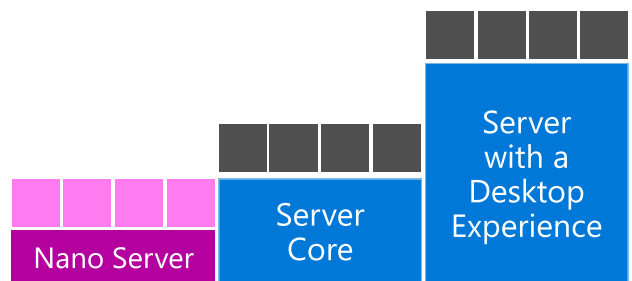
- Roles & features live outside of Nano Server

- No Binaries or metadata in OS image

- Standalone packages install like apps

- Full driver support

- Antimalware



# Security

## 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

New York Times [2014]

1

Espionage malware infects rafts of governments, industries around the world

Ars Technica [2014]

1

Cybercrime costs US economy up to \$140 billion annually, report says

Los Angeles Times [2014]

2

How hackers allegedly stole "unlimited" amounts of cash from banks in just a few hours

Ars Technica [2014]

2

The biggest cyberthreat to companies could come from the inside

Cnet [2015]

3

Malware burrows deep into computer BIOS to escape AV

The Register [September 2014]

3

Forget carjacking, soon it will be carhacking

The Sydney Morning Herald [2014]

3

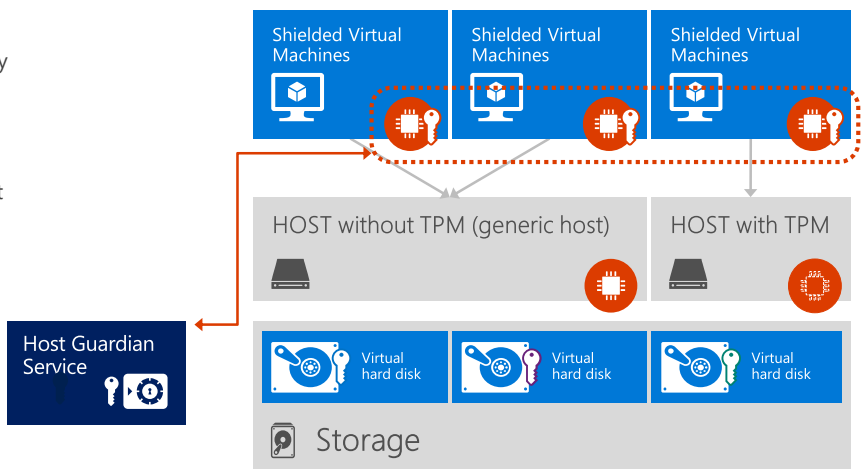
# Virtual TPM & Linux Secure Boot

## 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



Designing for cloud scale with commodity hardware

Preserve tenant VM session state in the event of transient storage disruption



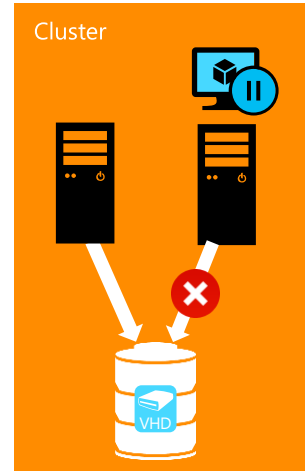
VM stack quickly notified on failure

Intelligent and quick VM response to block or file based storage infrastructure issues



VM moved to PausedCritical state and will wait for storage to recover

Session state retained on recovery

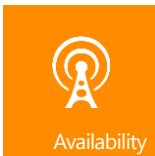


# VM Compute Resiliency



Designing for cloud scale with commodity hardware

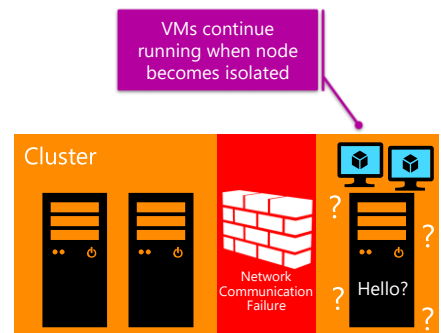
Configurable based on your SLA's



VMs continue to run even when a node falls out of cluster membership



Resiliency to transient failures





# Quarantine of Flapping Nodes



Protection

Unhealthy nodes are quarantined and are no longer allowed to join the cluster

Prevents flapping nodes from negatively affecting other nodes and the overall cluster



Resiliency

Node is quarantined if it ungracefully leaves the cluster three times within an hour

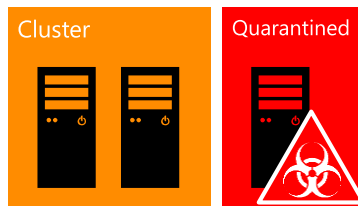
VMs are gracefully drained once quarantined



Control

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



VHDX Resize

Guest Clusters can now resize Shared VHDX without downtime



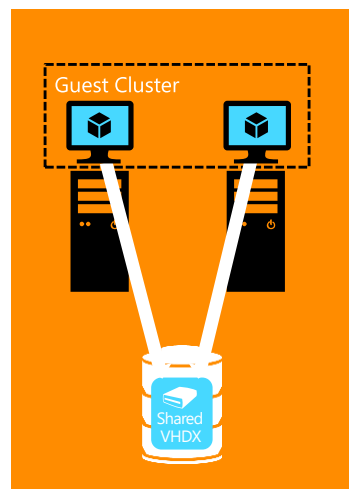
Hyper-V Replica

Guest Clusters can now have Shared VHDX protected by Hyper-V Replica for disaster recovery



Host Level Backup

Guest Clusters can now have host level backups in addition to guest level backups of Shared VHDX



# Availability

## Online VM Configuration Changes



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



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



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.

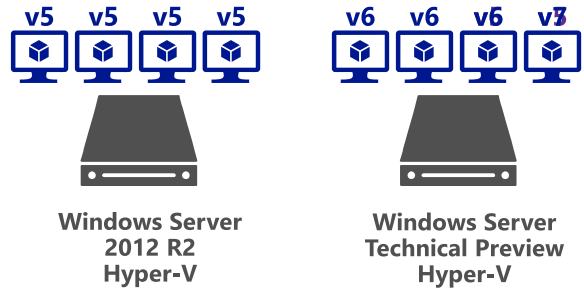
`Update-VMVersion vmname`

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.

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



# VM versions support tables

Hyper-V host Windows version	Supported virtual machine configuration versions
Windows 10 Anniversary Update	8.0, 7.1, 7.0, 6.2, 5.0
Windows Server 2016 Technical Preview	7.1, 7.0, 6.2, 5.0
Windows 10 build 10565 or later	7.0, 6.2, 5.0
Windows 10 builds earlier than 10565	6.2, 5.0
Windows Server 2012 R2	5.0
Windows 8.1	5.0

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

# Seamless Cluster OS Rolling Upgrades



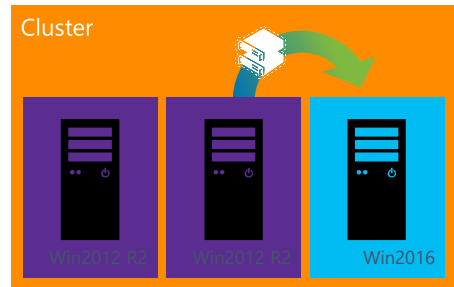
Simple

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

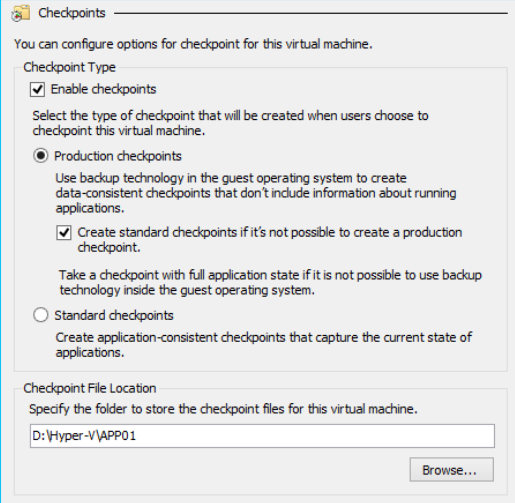
**Full support for key workloads:** Easily create “point in time” images of a virtual machine, which can be restored later on in a way that is completely supported for all production workloads.

**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.



The screenshot shows the 'Checkpoints' configuration dialog box in Hyper-V. The title bar reads 'Checkpoints'. Below the title bar, it says 'You can configure options for checkpoint for this virtual machine.' The dialog is divided into two main sections. The first section is 'Checkpoint Type'. It has a sub-section 'Enable checkpoints' with a checked checkbox. Below that, it says 'Select the type of checkpoint that will be created when users choose to checkpoint this virtual machine.' There are two radio button options: 'Production checkpoints' (which is selected) and 'Standard checkpoints'. Under 'Production checkpoints', there is a checked checkbox for 'Create standard checkpoints if it's not possible to create a production checkpoint.' Below this, there is a line of text: 'Take a checkpoint with full application state if it is not possible to use backup technology inside the guest operating system.' Under 'Standard checkpoints', there is a line of text: 'Create application-consistent checkpoints that capture the current state of applications.' The second section is 'Checkpoint File Location'. It says 'Specify the folder to store the checkpoint files for this virtual machine.' Below this is a text box containing 'D:\Hyper-V\APP01' and a 'Browse...' button.

# 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 }
```

## Powershell Direct JEA

Just Enough Administration (JEA) is a security feature

- Reducing administrators on machines
- Limiting user's actions – cmdlets, functions, external commands
- Auditing user's actions – „Over the shoulder“ transcriptions

## 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

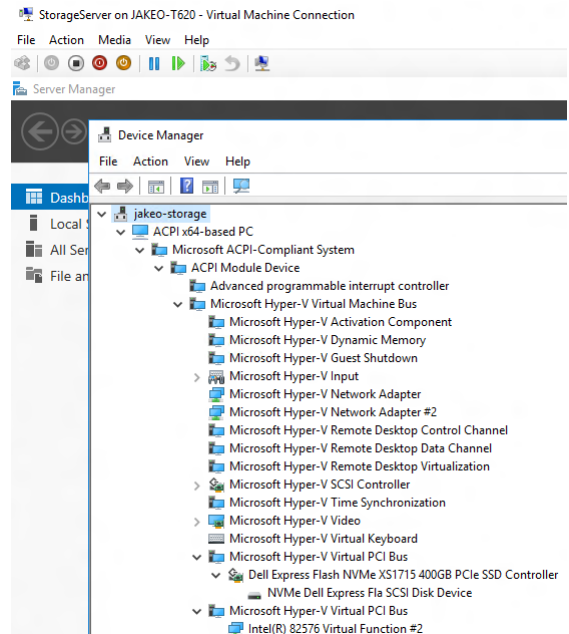
Results in lower latency

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)



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