VM BACKUP
Hyper-V | VMware

Licensing Windows Server 2016 in a Virtual Environment

Hosted by Hyper-V MVPs

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Agenda

1. Introduction
2. Licensing Presentation
3. Example Scenarios
4. Brief Overview of Altaro Hyper-V Backup
5. Q&A
6. Conclusion

During this session you will hear from Thomas Maurer regarding MS Licensing in Virtual Environments.
You will have the opportunity to ask questions about Licensing Windows Server.

Introduction

ANDY SYREWICZE | @asyrewicze | http://www.altaro.com/hyper-v | http://www.altaro.com/vmware
Technical Evangelist with Altaro Software and Microsoft Hyper-V MVP with 13+ Years experience. My focus has been in Virtualization, Managed Services, Public Cloud Services and the Microsoft Server Stack, with an emphasis on Hyper-V

THOMAS MAURER | @thomasmaurer | http://www.thomasmaurer.ch
Microsoft MVP for Hyper-V. Works as a Cloud Architect for itnetx gmbh, a consulting and engineering company located in Bern/Switzerland. Focused on Microsoft Technologies, especially Microsoft Cloud Solutions based Microsoft System Center, Microsoft Virtualization and Windows Azure.

About Altaro Software

- Altaro is a fast-growing developer of easy to use and affordable backup solutions for small- to medium-sized businesses, specializing in backup for virtualized environments.
- Virtual Backup trusted by 30,000 SMBs
- Flagship product: Altaro VM Backup

altaro.com/vm-backup

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Windows Server 2012 Certified

Windows Server 2012R2 Certified

vmware READY APPLICATION SOFTWARE

vmware PARTNER TECHNOLOGY ALLIANCE

Microsoft Partner
Gold Application Development

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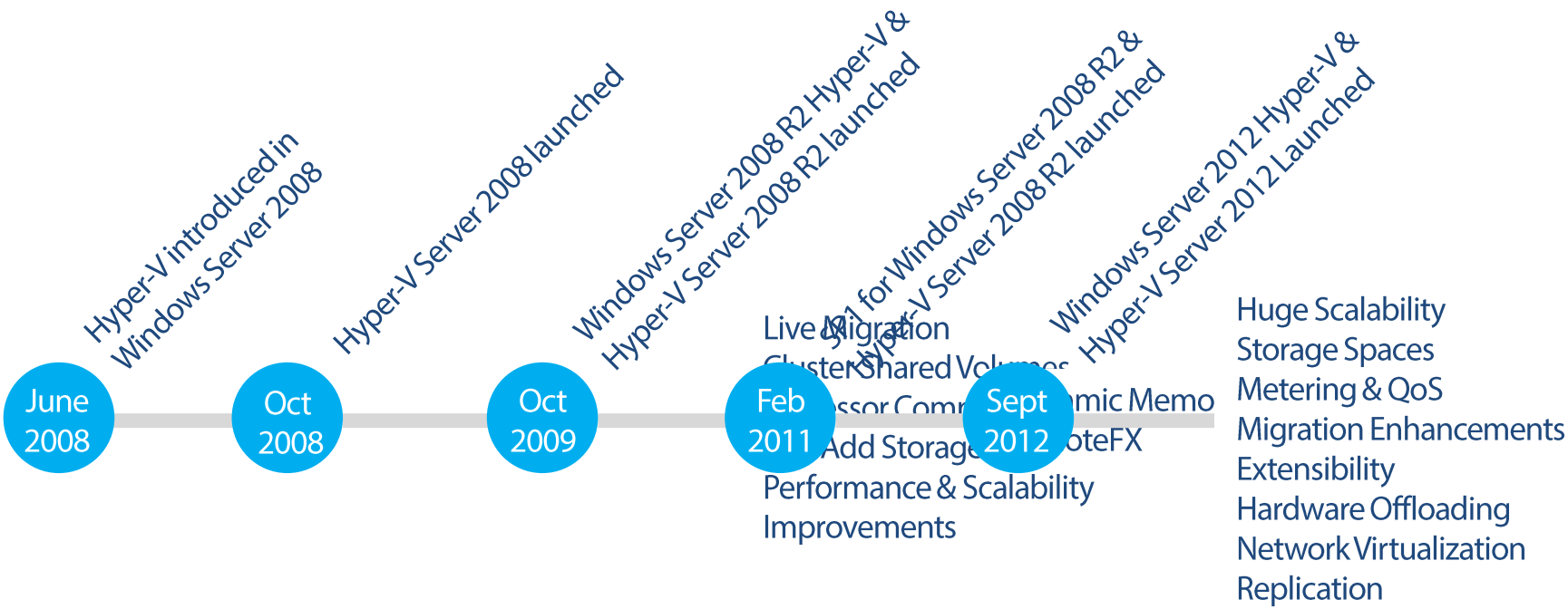
Windows Server Hyper-V

History of Hyper-V



Windows Server 2012 / 2012 R2 Hyper-V

High performance live migration (compression/RDMA)

Zero downtime upgrades

Automatic VM Activation

Live VM export

Guest backup improvements

Enhanced VMConnect

Dynamic memory host balancing

First class Linux support – Dynamic memory, file system consistent host based backup

RemoteFX over WAN

Generation 2 Virtual Machines

Secure boot in a VM

User defined meta data for VHDX

PowerShell for all Hyper-V operations

Hyper-V Metrics

Shared nothing live migration

High performance auto tiered storage spaces

Write back cache with spaces

Storage QoS

Shared VHDX for guest clustering

VHDX online resize

Storage deduplication with live VMs for VDI

Hyper-V Recovery Manager (Microsoft Azure Site recovery)

Azure Backup

Inbox multi-tenant site-to-site VPN gateway for physical & virtual networks

Protected VM Networks/Virtual RSS

Enhanced LBFO performance with NIC teaming

Hyper-V Extensible Switch

4K Sector support

Hyper-V over SMB

Hyper-V over Spaces & ReFS

64 VP, 1 TB VMs

SR-IOV for 10+GB networking

64TB VHDX

Hyper-V Replica

Network Virtualization

USB redirection over RemoteFX vGPU

Hot add/remove of storage

VHDX resiliency

Dynamic & differencing VHDX performance improvements

384 LP, 4TB physical system

2+ Million IOPS to a single VM

Resource Pools

NUMA in a VM

1024 running VMs on a host

Windows Server 2016 Hyper-V

High performance live migration (compression/RDMA)
Zero downtime upgrades
Automatic VM Activation
Live VM export
Guest backup improvements
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PowerShell for all Hyper-V operations
Hyper-V Metrics
Shared nothing live migration

Shielded VM support
vTPM
Key Storage Drive for Gen 1 VM
Guest VSM (enable Device Guard & Credential Guard in a VM)
VM Isolation
Linux Secure Boot
RemoteFX improvements
Discrete Device Assignment of GPU
Headless mode support

Distributed Storage QoS
REFS Block
REFS Fast Fixed Disk Creation

High performance auto tiered storage spaces
Write back cache with spaces
Storage QoS
Shared VHDX for guest clustering
VHDX online resize
Storage deduplication with live VMs for VDI
Hyper-V Recovery Manager (Microsoft Azure Site recovery)
Azure Backup
Inbox multi-tenant site-to-site VPN gateway for physical & virtual networks
Protected VM Networks/Virtual RSS
Enhanced LBFO performance with NIC teaming
Hyper-V Extensible Switch
4K Sector support

Nested virtualization
VMCX configuration file
Nano Server Host Support
Multi-host management (WMI)
Hypervisor Power Management (connected standby works)
Virtual machine grouping
IC Upgrade via Windows Update
HvSocket (Guest-Host)
TimeSync improvements
240 VP, 16TB VMs
Support for Containers

Resilient Change Tracking (RCT)
Backup improvements
Backup of Shared VHDX

Hyper-V over SMB
Hyper-V over Spaces & ReFS
64 VP, 1 TB VMs
SR-IOV for 10+GB networking
64TB VHDX
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Network Virtualization
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384 LP, 4TB physical system
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VM configuration version & upgrade
Runtime Memory Resize
Hot / add remove of NICs
Production Checkpoints
Storage Resiliency - All Paths Down
Online Resize for Shared VHDX
Hot add / remove of replicated VHD
Rolling Cluster Upgrade
Cluster Compute Resiliency
Cluster Node Quarantine
Device Naming of NIC
512LP, 24TB Host
Direct Device Assignment

Hyper-V Host Scale

Improvements from Windows Server 2008 R2 to 2012 R2 to 2016

System	Resource	Windows Server 2008 R2 Hyper-V	Windows Server 2012 Hyper-V	Windows Server 2016 Hyper-V	Improvement Factor
Host	Logical Processors	64	320	512	**1.6x**
	Physical Memory	1 TB	4 TB	24 TB	6x
VM	Virtual CPUs per VM	4	64	240	3.75x
	Memory per VM	64 GB	1 TB	16 TB	16x
	Maximum Virtual Disk	~2 TB	64 TB	64 TB	
Cluster	Maximum Nodes	16	64	64	
	Maximum VMs	1,000	8,000	8,000	

Host OS SKU In Windows Server 2012 R2

Windows Server 2012 R2 Overview

Feature	Standard	Datacenter	Hyper-V Server
Maximum RAM	4TB	4TB	4TB
Maximum physical CPUs	320	320	320
Failover Clustering	Yes	Yes	Yes
Hyper-V	Yes	Yes	Yes
Virtual Image use right	Host + 2VMs	Unlimited	No
Management	Full Installation or Server Core	Full Installation or Server Core	Server Core

Host OS SKU In Windows Server 2016

Windows Server 2016 Overview

Feature	Standard	Datacenter	Hyper-V Server
Maximum RAM	24TB	24TB	24TB
Maximum physical CPUs	512	512	512
Failover Clustering	Yes	Yes	Yes
Hyper-V	Yes	Yes	Yes
Virtual Image use right	Host + 2VMs	Unlimited	No
Management	Full Installation or Server Core or Nano	Full Installation or Server Core or Nano	Server Core

Licensing Windows Server Basics

License Transfers

- **You can transfer an operating license from one piece of hardware to another, but once it moves, it can't move again for 90 days.** Exceptions are made in the event of host failures. This 90-day clause is always true for Windows Server. Clusters do not change this rule.
- Other server products, like SQL Server, have their own rules about how they can move in virtual instances, and these are usually a lot more lenient.

License Stacking

- Windows Server Standard edition comes with two virtualization rights. That doesn't mean that you need to purchase Datacenter edition if you want to run a third virtual machine. One more Standard edition license will provide licensing for another two virtual instances.
- Stacked licenses are just as immobile as unstacked licenses. The license is bound to the hardware and cannot transfer except in accordance with the 90-day rule.

Implications For Clusters

- Because **licenses are always bound to a specific piece of hardware**, this means that you cannot use a single license set for multiple computers, even when they are in a cluster. When a virtual machine moves from one host to another, the destination host must already have an available license for that virtual machines' operating system.
- Consider a three node cluster with eight virtual machines. You'll need to **determine the maximum number of active guests that every single node** might ever possibly run, and license each node accordingly. If any single node might run all eight virtual machines, then every single node must either have four Standard edition licenses or a single Datacenter edition license. If the nodes won't run that many, then you can license a smaller amount per host.

Other Considerations

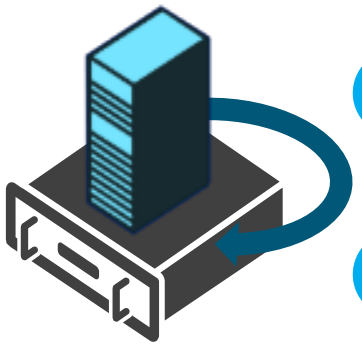
- Volume Licensing gives you **downgrade and down-edition rights**
- If you **install any role, feature, or application in the management operating system** that is not Hyper-V, then the management operating system needs a full license.
- **Desktop operating systems** (Windows 8, etc.) are never covered by guest licensing privileges.
- **Automatic Virtual Machine activation** is very useful for service providers.
- For Hyper-V Replica, **the replicas count as distinct virtual machines**. That means you must have enough privileges for all the guests on the source host and, separately, enough licenses for all the guests on the replica host. Software assurance erases the need to provide separate licenses to cover the replicas.

Automatic Virtual Machine Activation

Simplifying Activation of Windows Server 2012 R2 and 2016 VMs

Simplifying Activation of Windows Server 2012 R2 and 2016 VMs

- Activate VMs without managing product keys on a VM by VM basis
- VMs activated on start-up
- Reporting & Tracking built-in
- Activate VMs in remote locations, with or without internet connectivity
- Works with VM Migration
- Generic AVMA key for VMs activates against a valid, activated Windows Server 2012 R2 or 2016 Hyper-V host



1. Windows Server 2012 R2 Datacenter host activated with regular license key
2. Windows Server 2012 R2 VM is created, with an AVMA key injected in the build
3. On start-up, VM checks for an **activated, Windows Server 2012 R2 Datacenter Hyper-V** host
4. Guest OS activates and won't recheck against host until next guest reboot, or after 7 days.

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Licensing Windows Server 2016 Changes

Windows Server 2016 Editions

	Datacenter Edition	Standard Edition
Core functionality of Windows Server	●	●
OSEs/Hyper-V containers*	Unlimited	2
Windows Server containers	Unlimited	Unlimited
Nano Server	●	●
New storage features including Storage Spaces Direct and Storage Replica**	●	
New Shielded Virtual Machines and Host Guardian Service**	●	
New networking stack**	●	
www.thomasmaurer.ch Licensing Model***	Core + CAL	Core + CAL
Price+	$6,155	$882

* Windows Server Standard Edition license permits 2 OSEs (operating system environments) when all physical cores are licensed.

** Azure-inspired features for advanced software-defined datacenter scenarios.

*** See Licensing Datasheet for additional detail. Minimum license requirement: 8 cores per processor, 16 cores per server.

+ Pricing represents Open No Level (NL) ERP for 16 cores

Core Based Licensing

Number of 2-core pack licenses needed

(Mininum 8 cores/proc; 16 cores/server)

Procs per server	Physical cores per processor: 2	4	6	8	10
1	8	8	8	8	8
2	8	8	8	8	10
4*	16	16	16	16	20

Licensing costs are same as 2012 R2

Additional licensing required

* *Standard Edition may need additional licensing*

Windows Server 2016 Licensing

- License all the physical cores in the server
- Minimum of 8 core licenses required for each proc
- Minimum of 16 core licenses required for each server
- Core licenses will be sold in packs of two.
- 8 two-core packs will be the minimum required to license each physical server.
- The two-core pack for each edition is 1/8th the price of a two proc license for corresponding 2012 R2 editions.

LTSB servicing model

This is the traditional servicing model Windows Server has always used

5 + 5 years of servicing

Security and quality fixes only

No new features or functionality

Two Windows Server 2016 installation options use this model

Server with Desktop Experience

Server Core

Current Branch for Business (CBB)

Nano Server will be CBB only

What does this change?

Nano Server will not have an LTSB with Windows Server 2016 and therefore not have 5+5 years of servicing

Nano Server installations will have to move forward to future CBB releases of Nano Server to continue to be serviced

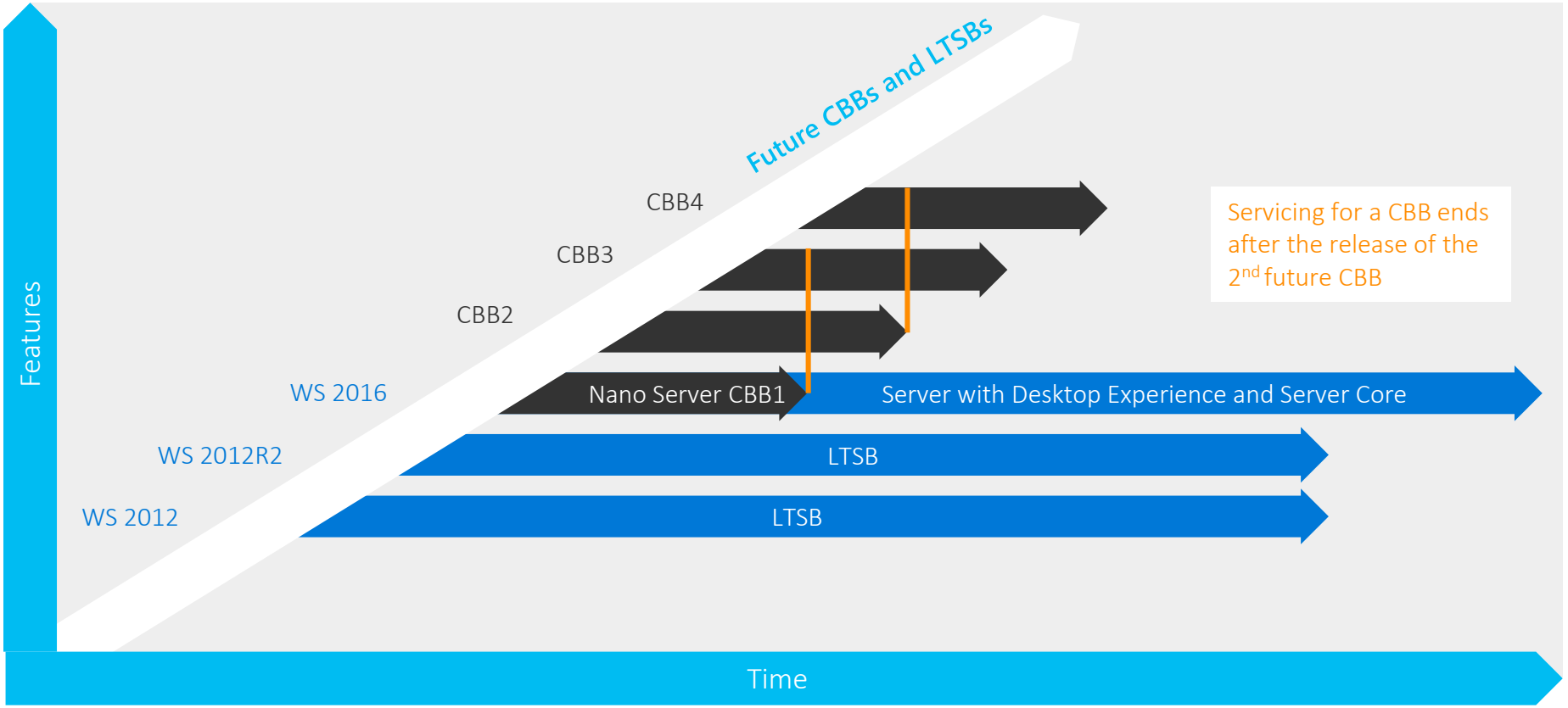
Licensing Nano Server will require Software Assurance (SA)

What doesn't this change?

The quality, features, and functionality of Nano Server

Installation of new CBBs are always controlled by administrators, no forced upgrades

Windows Server Servicing



Example Scenarios

Core Licenses

- A single license is applied to two CPU cores in the same physical host
- Each physical processor must have sufficient licenses to cover a minimum of eight cores (four licenses). This is true even if the physical processor does not have eight cores. More licenses might be required, depending on physical core count.
- Each physical host must be licensed as though it has at least two physical processors, even if it has only one. This sets a hard minimum of 16 physical cores (8 licenses) for any single system.
- Every core in a host must be licensed.
- Windows Server Standard licenses provide for one pOSE and two vOSEs on a licensed core pair.
- Windows Server Datacenter licenses provide for one pOSE and unlimited vOSEs on a licensed core pair.

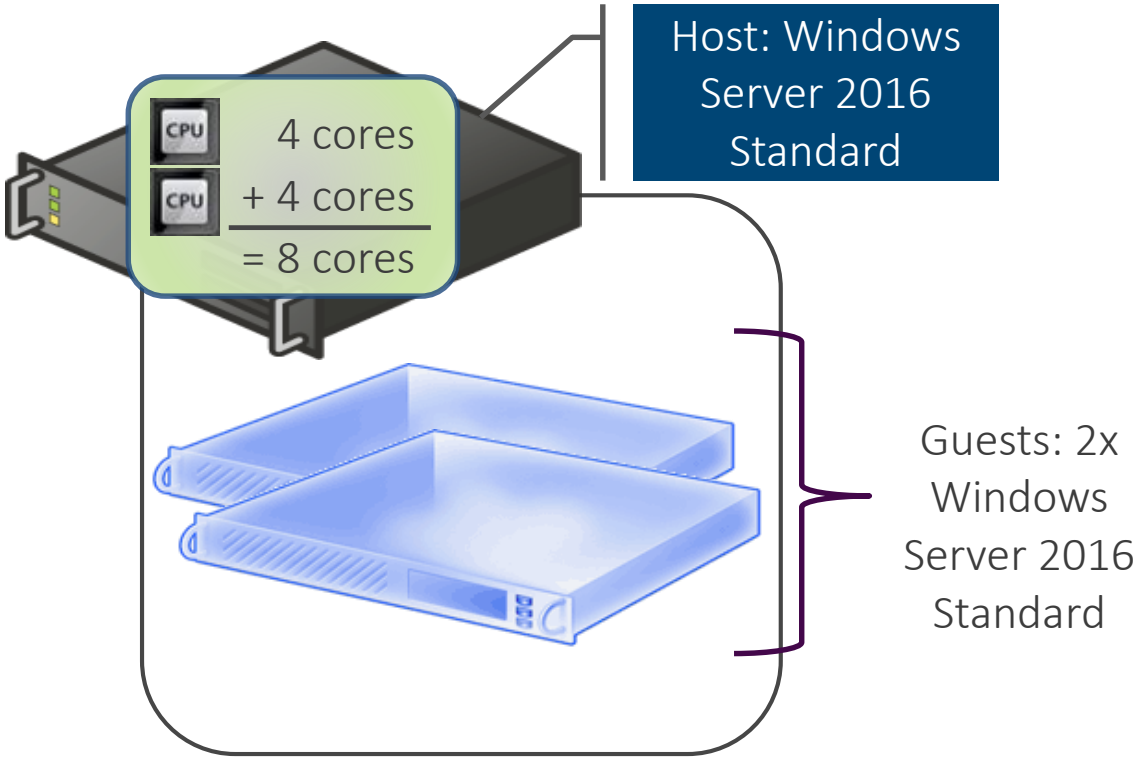
Standard Edition

(number of physical cores / 2 rounded up) * (Standard Edition vOSEs / 2) = licenses (at least 8)

Datacenter Edition

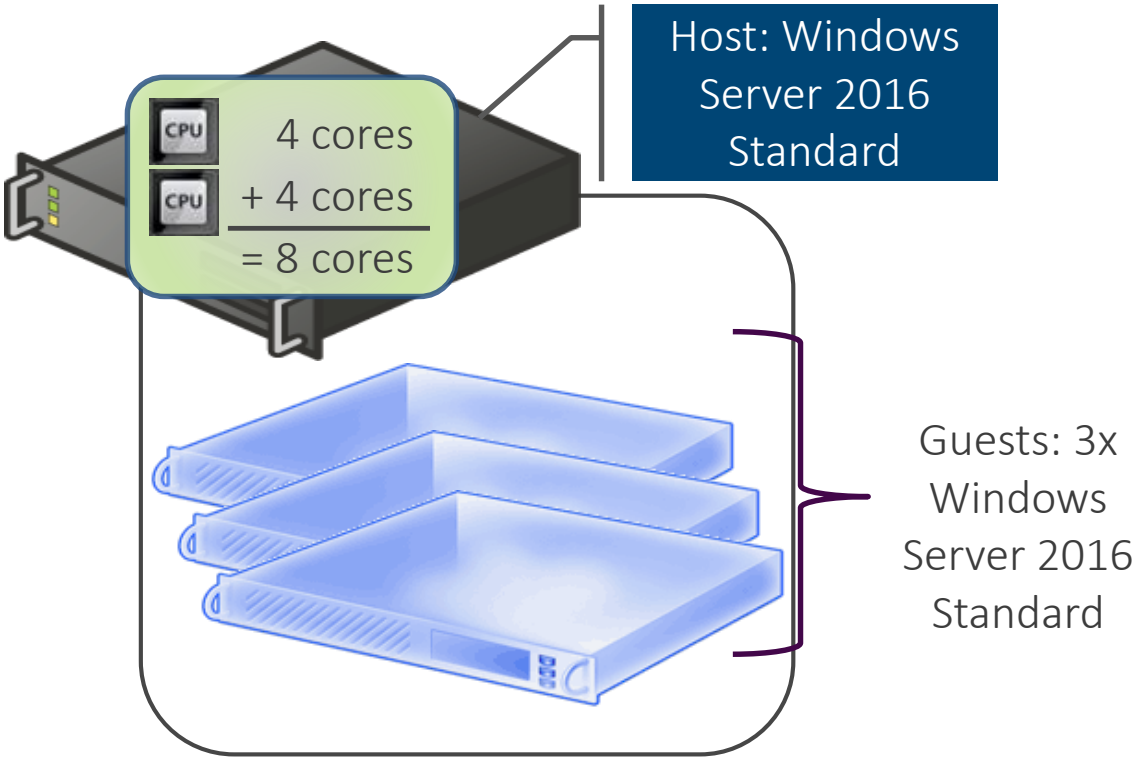
Datacenter Edition: (number of physical cores / 2 rounded up) = licenses (at least 8)

Example 1



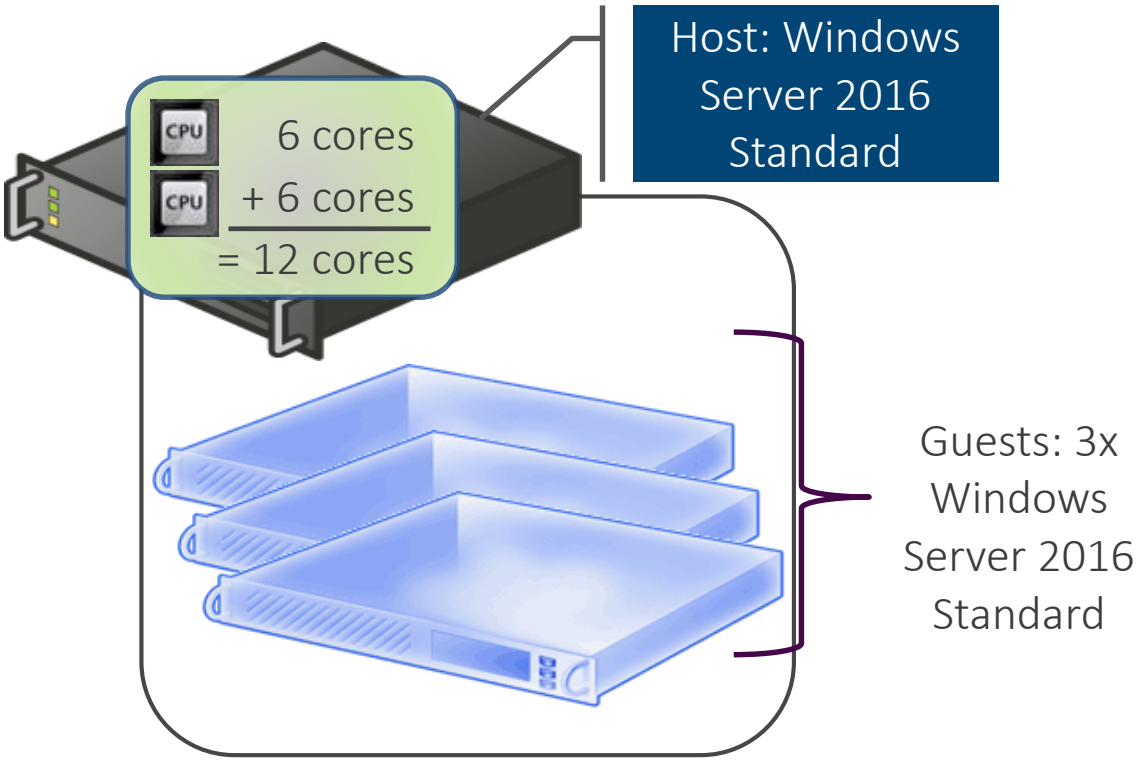
Necessary License: 8x Windows Server 2016 Standard Edition (2-core)

Example 2



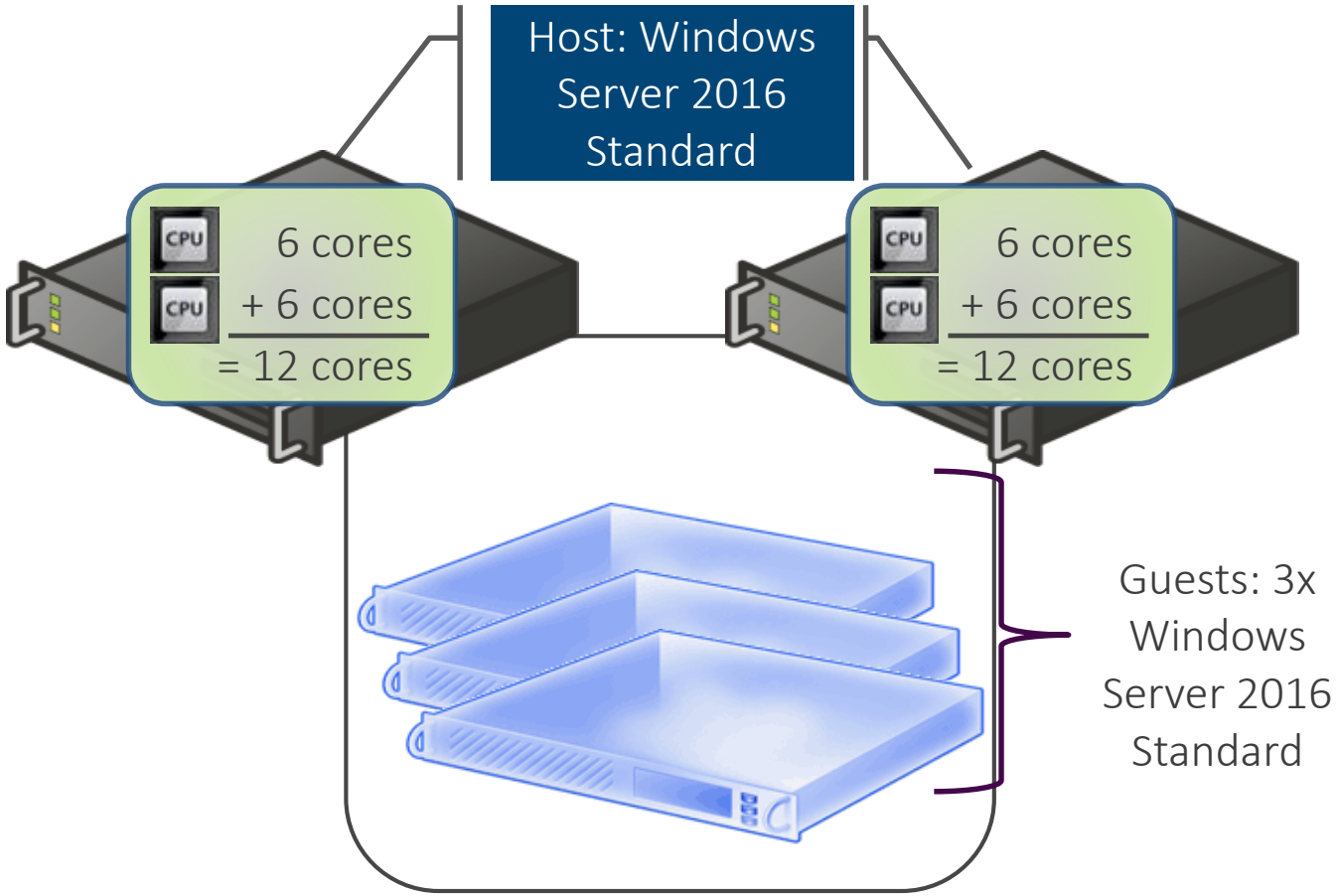
Necessary License: 8x Windows Server 2016 Standard Edition

Example 3



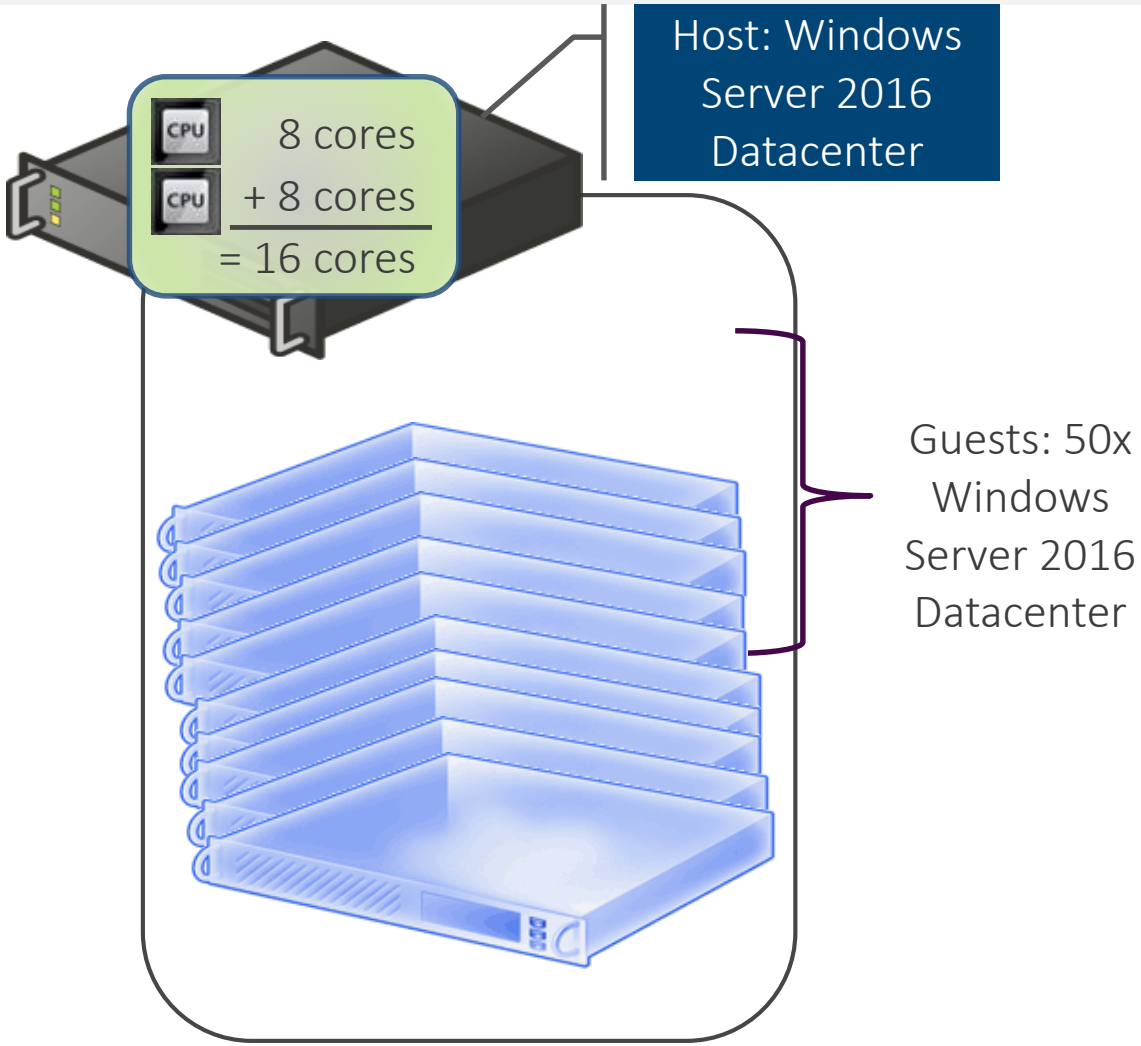
Necessary License: 12x Windows Server 2016 Standard Edition

Example 4



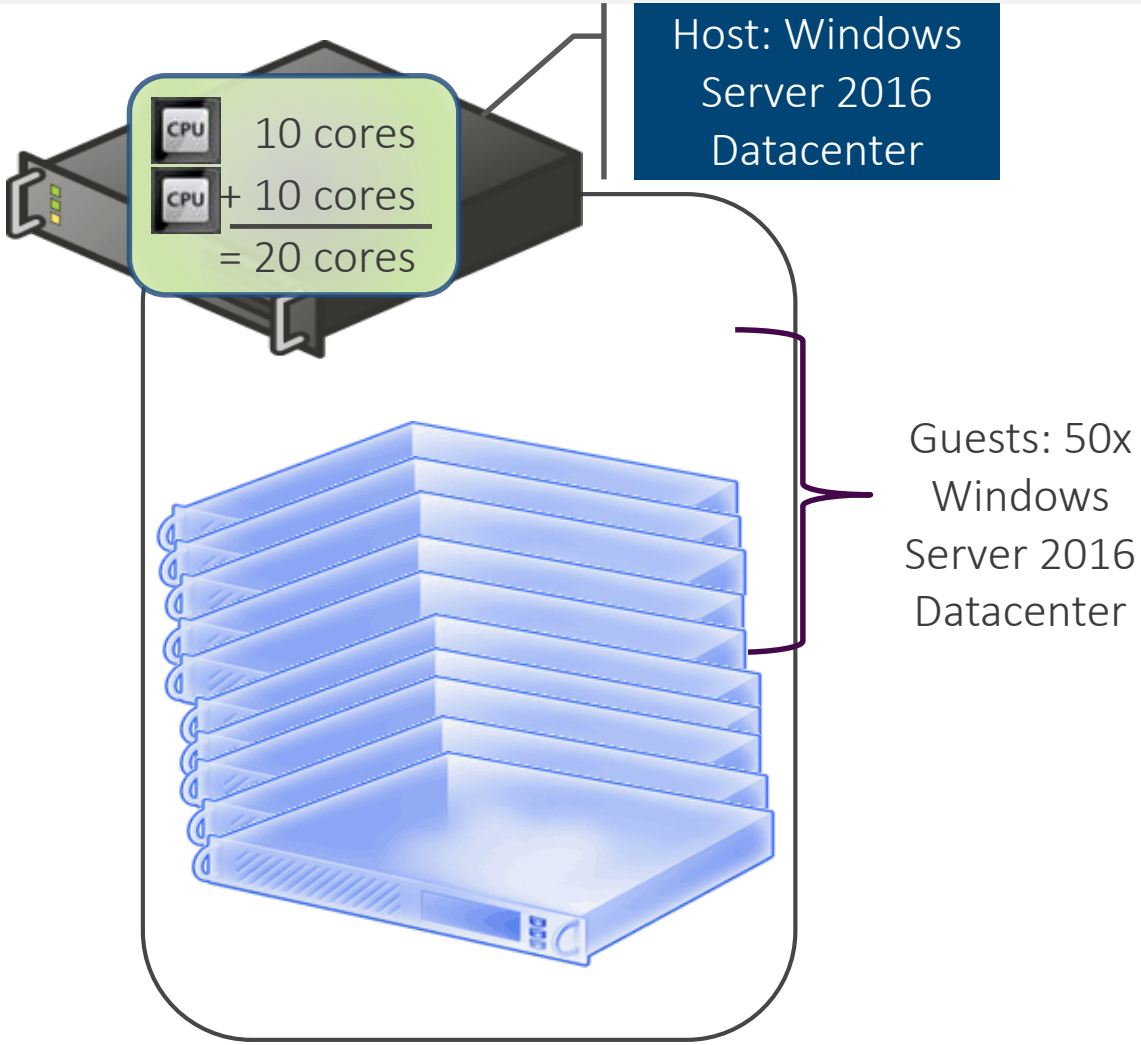
Necessary License: 24x Windows Server 2016 Standard Edition

Example 5



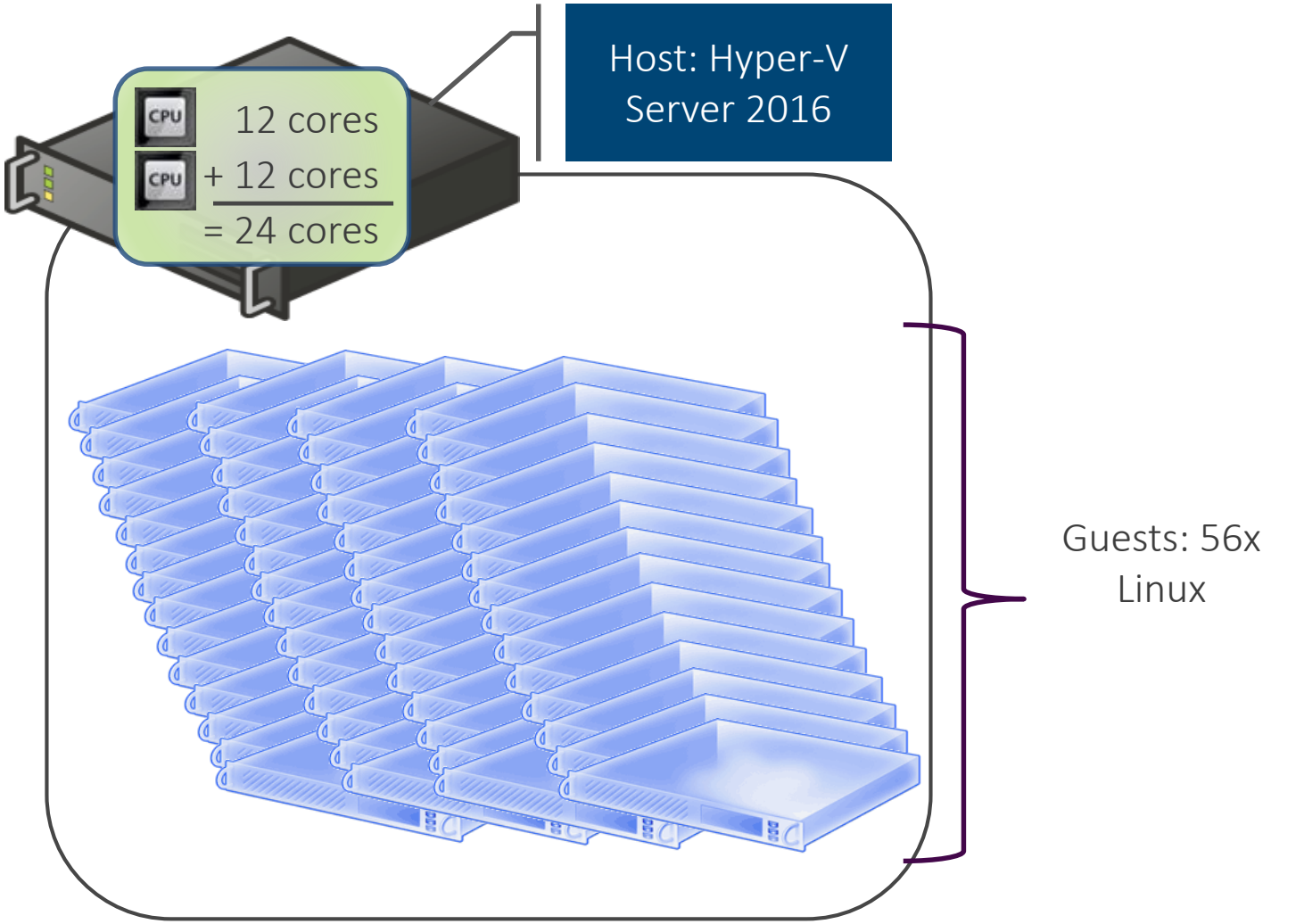
Necessary License: 8x Windows Server 2016 Datacenter Edition

Example 6



Necessary License: 10x Windows Server 2016 Datacenter Edition

Example 7

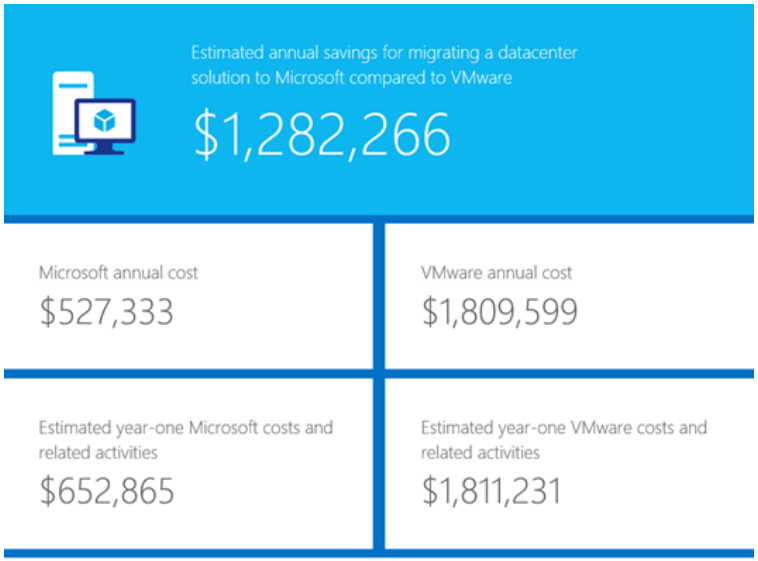


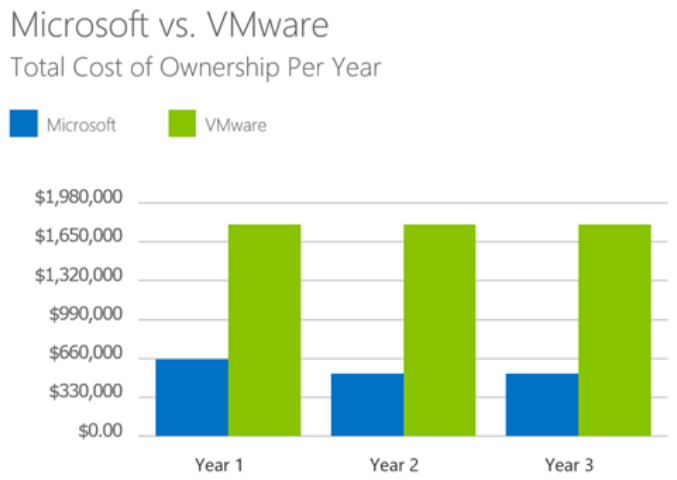
Necessary Windows Server License: None

Switch now!

From September 1, 2016, through June 30, 2017, customers who switch workloads from VMware to Hyper-V can get free Windows Server Datacenter licenses when buying Windows Server Datacenter + Software Assurance.

http://www.thomasmaurer.ch/2016/08/microsofts-new-vmware-migration-offer-for-windows-server-2016/





Summary

- Windows Server 2016 Standard and Datacenter Edition
- Hyper-V Server 2016 is free
- Automated Virtual Machine Activation is pretty cool
- Core Based Licensing
- Nano Server requires SA
- Hyper-V Containers are Licenses as VMs

Altaro VM Backup

- Virtual backup trusted by 30,000+ SMBs and 4,600+ IT Resellers and MSPs
- Easy to use and deploy
  - Admin doesn't need to get into complexities of configurations and saves time/hassle
- Highly capable, unbeatable value
  - **All the tools needed** for a solid backup strategy for Hyper-V & VMware
  - **Honest price and simple pricing structure**
  - **Scales** – Central (and Remote) management capabilities for larger environments
- Outstanding Support
  - **Premium support** offered as part of the package - **Experts** in Hyper-V and VMware

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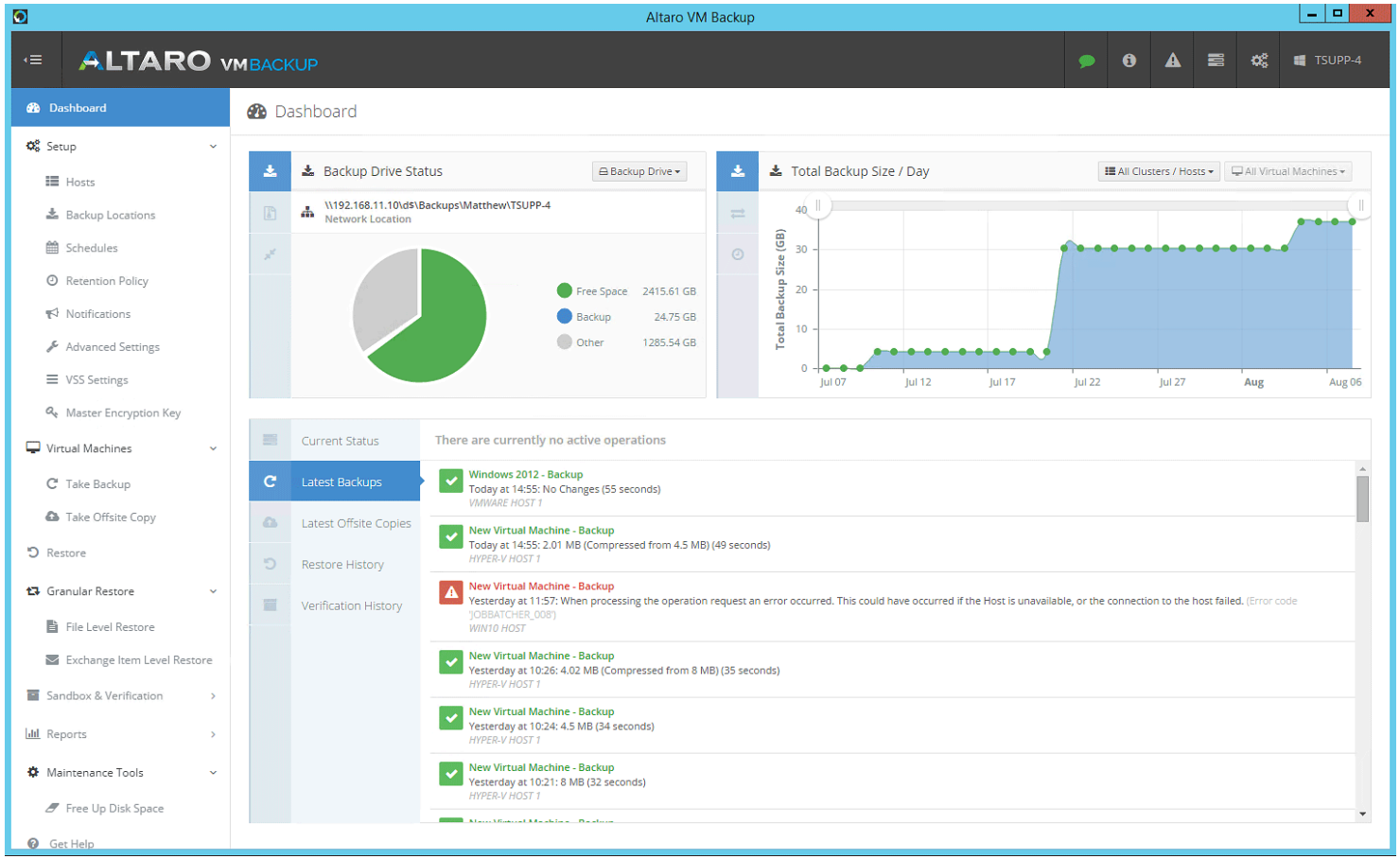
Altaro VM Backup



More info here: altaro.com/vm-backup

Download your copy here: altaro.com/download

Altaro VM Backup

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  - Free Partner training & certification
  - 0 Commitment
  - Attractive discounts
  - Also available for MSPs!

For more info:

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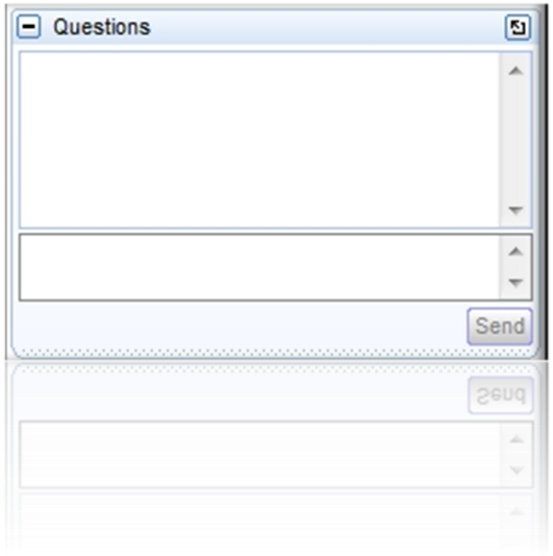
- Email: sales@altaro.com

Q & A – Questions?

Feel Free to Use the Questions Form!



Thank you for Attending!