

LICENSING MICROSOFT SERVER IN A VIRTUAL ENVIRONMENT

Brought to you by **Altaro Software**,
developers of [Altaro VM Backup](#)

Compiled and written by **Eric Siron**

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Probably the clearest material that Microsoft publishes on the subject is the [Product Use Rights](#) document.

OEM Licenses

This work only deals with Volume Licenses, which are an agreement you make with Microsoft with the assistance of a reseller. OEM licenses can be customized by an equipment manufacturer and therefore might have different rules than you find anywhere else. Do not assume that an OEM license works the same way as a standard volume license. Usually, the greatest difference is that they are not transferable.

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Microsoft licensing provides special benefits when the server operating systems are used in a virtual environment. The details are not complicated, but usually catch the uninitiated by surprise. To make matters worse, there is a great deal of misinformation being passed around. This book serves as a simple guide to the basics of Microsoft Server licensing in virtual environments. This eBook is written for **Hyper-V Server 2012** and **2012 R2**.

Most material in this work has previously appeared on <http://www.altaro.com/vm-backup/>. It has been revised and expanded for this eBook. Visit our site for more great content, including free scripts to help you manage your Hyper-V environment.

The Unbreakable Rule for Windows Server Licensing

At least as far as Standard and Datacenter Editions are concerned, there is one absolutely inviolable rule about Windows Server licensing: a **Windows Server license is always bound to a specific piece or group of hardware**. For 2012 and 2012 R2, the bound hardware is one or two physical CPUs in a single motherboard. A single CPU system requires one license. A dual CPU system requires one license. A quad CPU system requires two licenses. This is pretty easy to work out from here.

Virtual machines are not directly licensed. Yes, you have to plug in keys to activate them, but keys are not licenses, they do not represent licenses, and just because you can get a system to accept a key does not mean that it is properly licensed. You can get yourself into a lot of trouble by thinking that your virtual machines are licensed. Why? Because virtual machines can move, that's why. Remember the unbreakable rule: the physical CPUs are what is licensed.

The nice thing about OEM licenses is that the manufacturer usually plops a sticker onto the chassis of the licensed system. That helps you remember where the license belongs. When you get a Volume License, you don't get a sticker. That's because Volume Licenses are transferable. But, as you'll see, the transferability of a volume license isn't a free-for-all. It is recommended that you find some way to clearly denote which physical hardware is getting which license.

The Hyper-V Server License

The license for Hyper-V Server is a common source of confusion. The product is freely downloadable from Microsoft, it doesn't need to be activated, and no purchase needs to be made. There is a persistent myth that suggests that you cannot run Hyper-V Server in production or that it cannot be used to host certain guest operating systems because of its lack of a built-in license. In truth, Hyper-V Server can run 1,024 virtual machines. Licenses for their contained operating systems must be purchased separately.

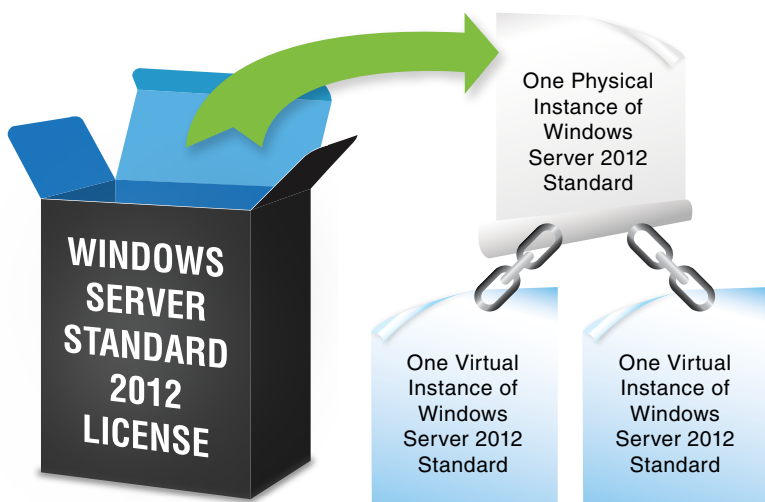
The hypervisor that you install and the operating systems of its virtual machines have no relation. **You always need to buy enough licenses to cover the guests running on a host.**

Virtualization Rights with Windows Server

Windows Server 2012 and 2012 R2 comes in two editions that include virtualization rights.

Windows Server Standard Edition

It used to be that when you bought a Windows license, you got a piece of paper. Nowadays, you don't even get that anymore. You get an e-mail that tells you where to go look at a digital copy of your Windows license. What follows is a graphical representation of the "contents" of your purchase:

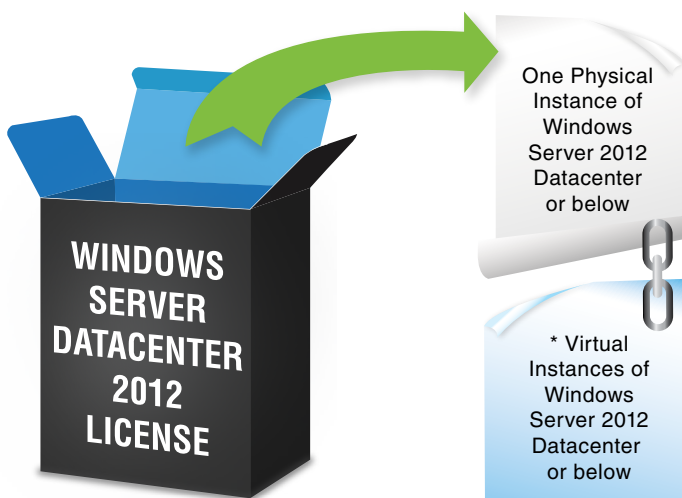


What's in the "box" is a license for one physical instance of Windows Server 2012 Standard and two virtual instances of the same. The crude chains with the odd transparency are intended to show that these are permanently tied together. They can **never** be taken apart. We'll come back to this.

Windows Server Standard License with Guest Privileges

The Windows Server Datacenter Edition License

The Datacenter Edition comes in a similar "package", but this time you get unlimited guest instances. You can also downgrade to Standard edition in any of the instances, as shown in this image:



As with the Standard Edition, the physical and the virtual cannot be split from each other. Not at all. Don't ask, don't try.

The Windows Server Datacenter Edition License

What the Chains Mean

Remember the inviolable rule: the licenses are bound to specific hardware. All of them.

You can't split guest privileges across hardware, whether in the same machine or across different machines. If you use one Datacenter license for a quad CPU machine, then you have a problem: two of the CPUs are unlicensed. Since there's no way to restrict the physical instance or the virtual instances, then you are out of compliance and in trouble. If you have one Datacenter edition license and two physical computers, you have a problem. It's theoretically possible to have all the guests running on a single host in a pure failover environment, but you definitely want a true licensing expert to say if that's legal. One thing is for certain, if you ever Live Migrate from one to the other and have more than one active guest, you're out of compliance. The only way you might possibly be able to work the "pure failover" angle is if the only time guests ever moved was in response to a complete host failure. Even if it's legal, it's certainly dangerous.

If you're struggling with the idea of the license belonging specifically to the hardware, try to remember that the guests aren't actually licensed at all. Let's say you buy a Standard license for physical host SV-HyperV1. You install Windows Server Standard on it. You then install a guest virtual machine with Windows Server Standard. There's nothing wrong with that; everything is fine. Later, you build a new computer, SV-HyperV2, and Live Migrate the guest to it. You are now out of compliance. The virtual guest privilege stays with its hardware on SV-HyperV1. It does not follow the virtual machine, no matter where it goes. The destination system must have a ready and available license.

What the Chains Do Not Mean

In addition to the myth that Hyper-V Server can't host licensed virtual machines, there is another myth being circulated that certain licensing benefits are only bestowed when you install Windows Server as the management operating system. This is absolutely not true. You can't separate the physical instance from the virtual instances, but by no means are you required to use them all. You can buy one Standard Edition license, install Windows Server as the physical instance, and use only one Windows Server guest. You do not have to use the other virtual instance. But, you also can't use it on another piece of hardware because of the inviolable rule.

Most importantly, you don't have to install a copy of Windows Server in the physical instance to use its rights. You can most certainly buy a Datacenter license, install Hyper-V Server, and still take advantage of your unlimited guest privileges... provided that you don't use that Datacenter license on any other hardware. You are never required to install the licensed physical operating system environment in order to take advantage of its guest virtualization rights.

In fact, you can install any hypervisor you want. The only rule is that you can't split up the physical license and its guest privileges.

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 a Cluster

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 have a Datacenter license, you can use Standard in its place. If you have Windows Server 2012 R2 licenses, you can use Windows Server 2008 R2. This is true for both the physical instance and any guest instances.
- If you install any role, feature, or application in the management operating system that is not Hyper-V, related to Hyper-V, or needed to service Hyper-V or its virtual machines in some way (like backup software or hardware management utilities), then the management operating system needs a full license. So, if you have a Standard license and you're running a general file server from the management operating system, you forfeit one of the two guest privileges. I've never seen an official explanation for this, but my assumption is that it's to prevent you from getting a three-for-two license.
- Desktop operating systems (Windows 8, etc.) are never covered by guest licensing privileges. Licensing desktop operating systems in a virtual environment is tricky and you're going to want help from an expert on that.
- New in Windows Server 2012 R2 is Automatic Virtual Machine activation. This is a feature, and it only works when the Datacenter edition is installed as the management operating system. You still get the privileges even if you don't install Datacenter, but the automatic licensing tool won't be available.
- 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.

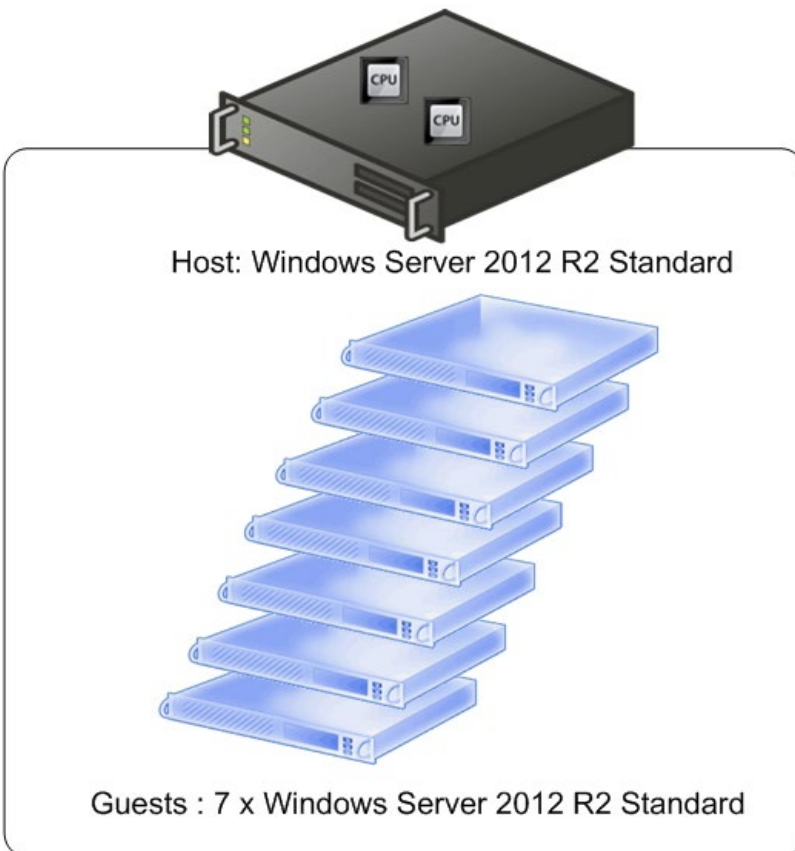
Examples

We've seen a few simple examples. Let's build on that with a few advanced configurations.

For the sake of simplicity, each of these examples will only talk about version 2012 R2 of Windows Server, as that is the only type of license that can be currently be purchased through volume channels. In all instances, the Windows Server and Hyper-V Server products are interchangeable with any version as far back as 2003 R2 due to downgrade rights.

Example 1

HOST: WINDOWS SERVER 2012 R2 STANDARD



- One physical host with two eight-core physical CPUs, running Windows Server 2012 R2 Standard with Hyper-V; no other roles in management operating system; backup software for VMs installed
- Seven virtual machines with Windows Server 2012 R2 Standard

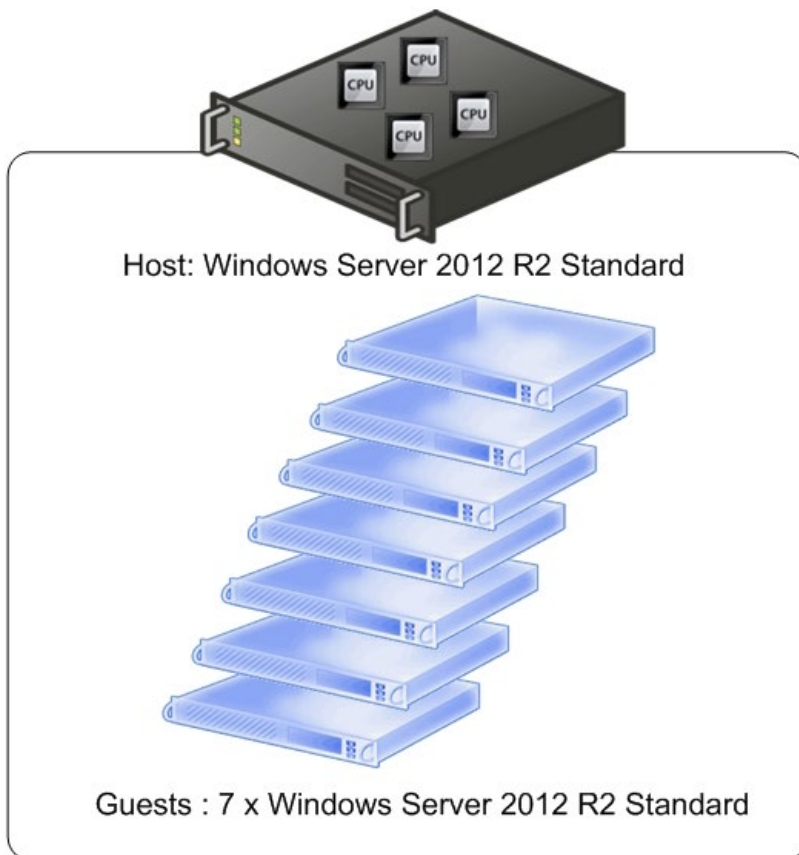
LICENSE: 4X Windows Server 2012 R2 Standard.
One spare guest license.

This is a fairly simple example. Four Windows Server 2012 R2 Standard licenses will completely cover this deployment. One of the physical licenses applies to the management operating system. Each license provides for two of the VM operating system instances, resulting in a total of eight. Because the management operating system isn't running anything that makes it anything other than a host, the eighth license is open for use by another VM on this host.

Another option would be a single Windows Server 2012 R2 Datacenter license. Nothing would be required to change in this installation, although it would optionally allow for any of the existing instances to be upgraded to the Datacenter edition and for any number of additional Windows Server virtual instances to be added.

Example 2

HOST: WINDOWS SERVER 2012 R2 STANDARD



- One physical host with four four-core physical CPUs, running Windows Server 2012 R2 Standard with Hyper-V; no other roles in management operating system; backup software for VMs installed
- Seven virtual machines with Windows Server 2012 R2 Standard

LICENSE: 8x Windows Server 2012 R2 Standard.

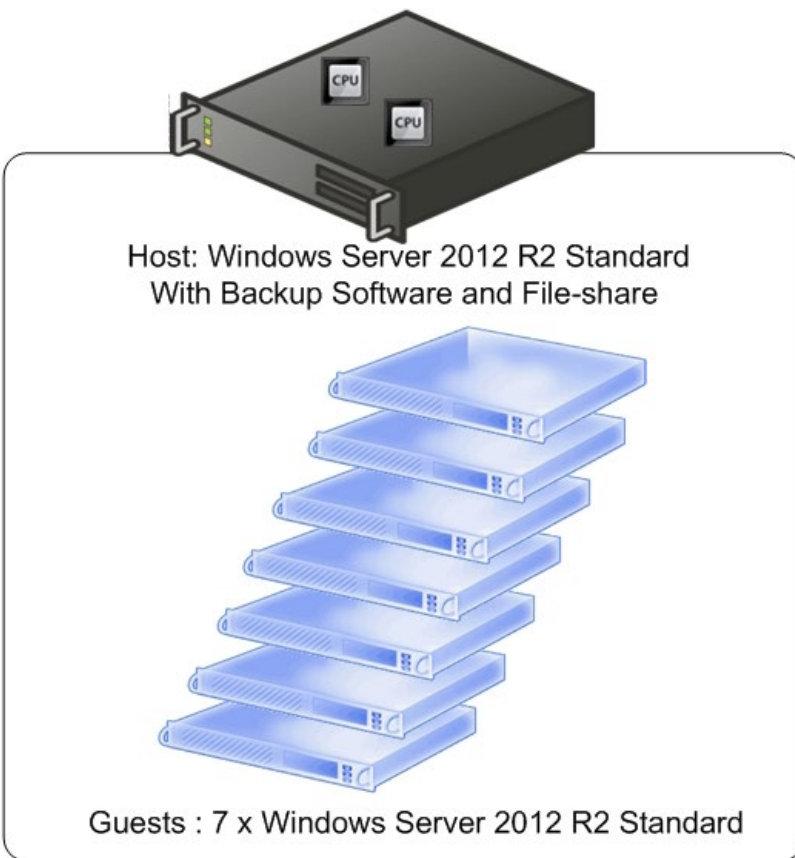
One spare guest license.

This is almost exactly like the first example, except the host is now a quad CPU or processor. Even though it has the same number of logical processors, it will require eight Standard licenses or two Datacenter licenses. Each license can only be assigned to a physical processor pair.

There is no way to split licenses across a CPU set inside the same motherboard.

Example 3

HOST: WINDOWS SERVER 2012 R2 STANDARD BACKUP SOFTWARE AND FILE SHARE



- One physical host with two eight-core physical CPUs, running Windows Server 2012 R2 Standard with Hyper-V; backup software for VMs installed; hosting a file share for systems administrators to place downloaded files
- Seven virtual machines with Windows Server 2012 R2 Standard

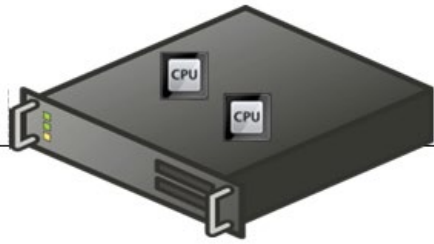
LICENSE: 4x Windows Server 2012 R2 Standard.
No spare guest licenses.

This is almost exactly like the first example. However, the management operating system is now performing something besides hosting and servicing virtual machines. Even though it's relatively benign, this requires the management operating system to use one of the guest virtualization rights. Four Standard licenses will still cover it, but there is nothing extra for another virtual machine.

A Datacenter license would cover everything and the unlimited guest licenses would be intact.

Example 4

HOST: WINDOWS SERVER 2012 R2 DATACENTER



Host: Windows Server 2012 R2 Datacenter



Guests : 1 x Windows Server 2012 R2 Standard

- One physical host with two eight-core physical CPUs, running Windows Server 2012 R2 Datacenter edition with Hyper-V; backup software for VMs installed
- One virtual machine with Windows Server 2012 R2 Standard

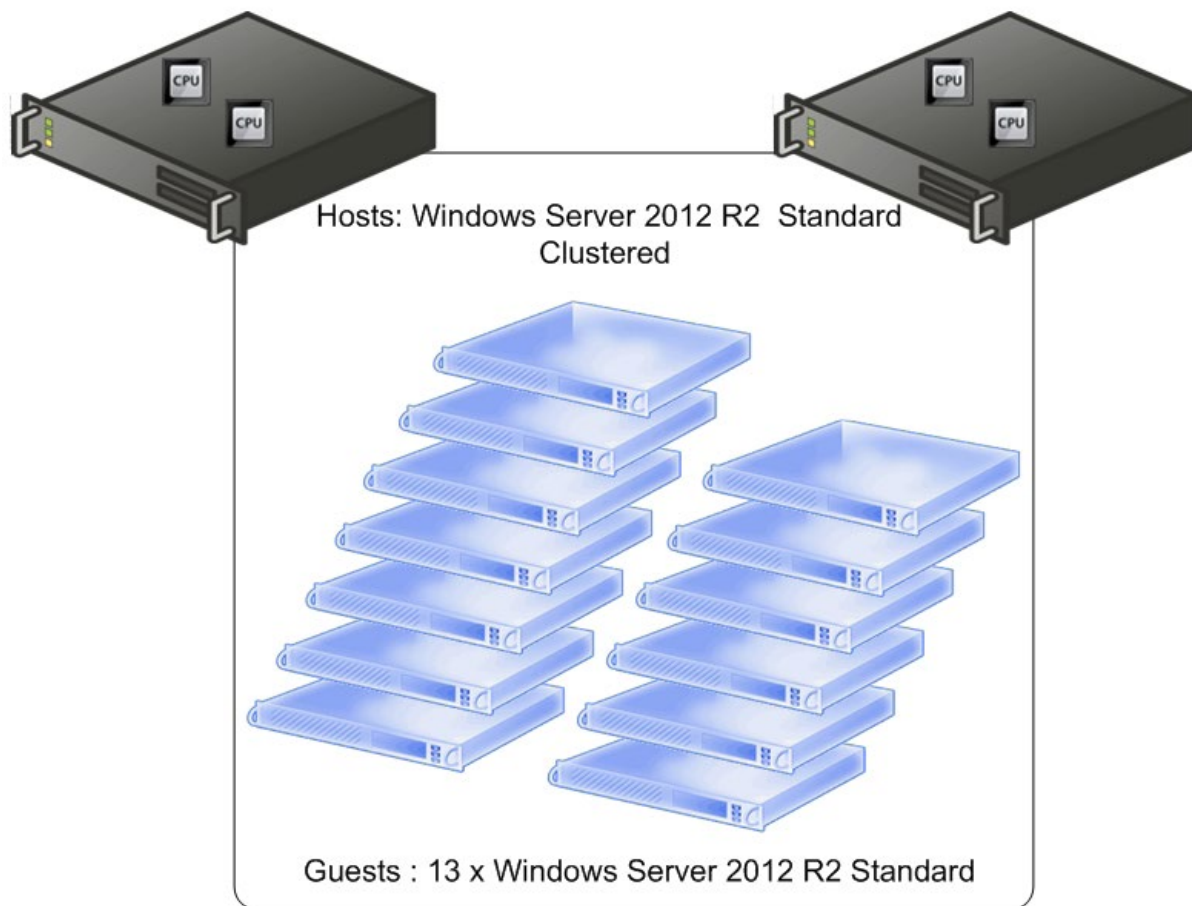
LICENSE: 1x Windows Server 2012 R2 Datacenter.

This installation requires a single Datacenter license because that's the operating system running as the management operating system.

The guest is covered under the host's unlimited Windows Server licensing. This scenario would be much better served by a Standard license.

Example 5

HOSTS: WINDOWS SERVER 2012 R2 STANDARD CLUSTERED



LICENSE: 2x Windows Server 2012 R2 Datacenter or 14x Windows Server 2012 R2 Standard.

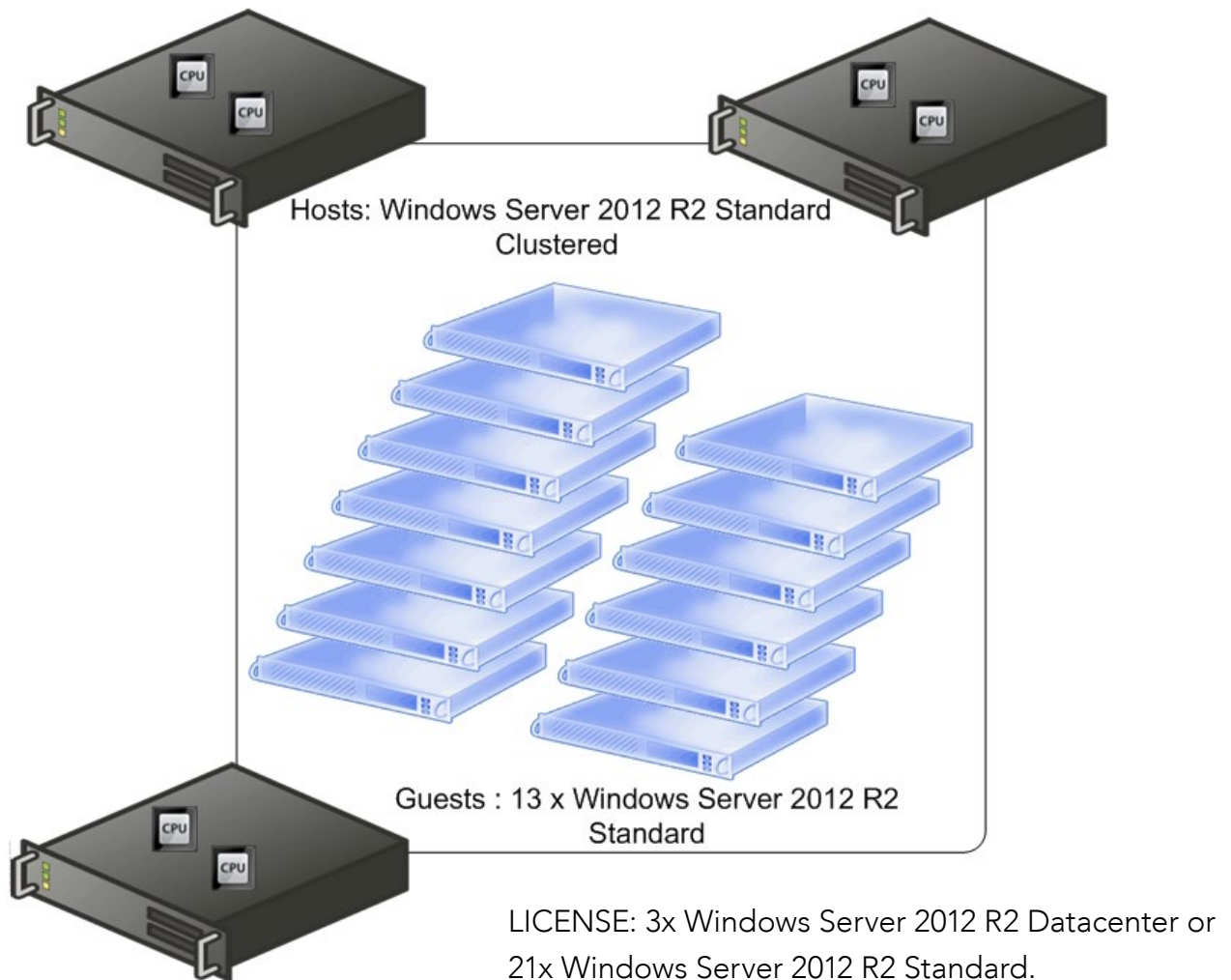
This configuration requires fourteen Windows Server Standard 2012 R2 licenses (seven per host) or two Windows Server 2012 R2 Datacenter licenses (one per host). This is because if all thirteen virtual machines are highly available, then it is plausible that either of the hosts will run all of them, such as during patching.

For any one host to run them all, it must have its own licenses for them all, meaning that each host separately requires seven of its own Standard licenses (two guest rights per) or its own Datacenter license.

- Two physical hosts with two eight-core physical CPUs, clustered, running Windows Server 2012 R2 Standard; backup software for VMs installed
- Thirteen highly-available virtual machines with Windows Server 2012 R2 Standard

Example 6

HOSTS: WINDOWS SERVER 2012 R2 STANDARD CLUSTERED

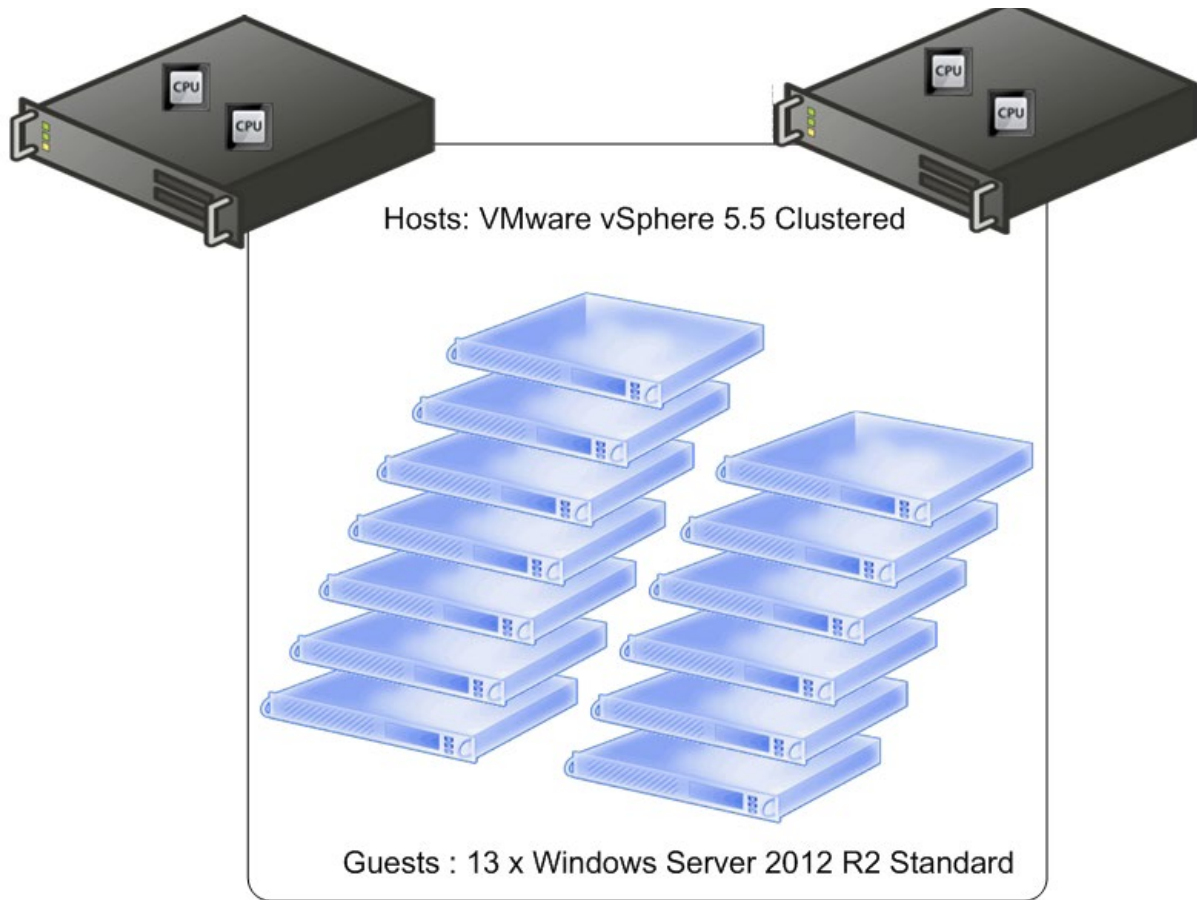


This example is similar to example 5, except that a third host has been added. The installation requires that the third host be fully licensed as well, bringing the total requirement up to twenty-one Standard licenses or three Datacenter licenses. The license count could potentially be reduced if the cluster were architected to prevent any single node from ever running all virtual machines, but this is legally risky.

Because of the licensing changes incurred by adding hosts, architecting for high density is often more cost-effective than scaling out.

- Three physical hosts with two eight-core physical CPUs, clustered, running Windows Server 2012 R2 Standard; backup software for VMs installed
- Thirteen highly-available virtual machines with Windows Server 2012 R2 Standard

Example 7 HOSTS: VMWARE VSPHERE 5.5 CLUSTERED



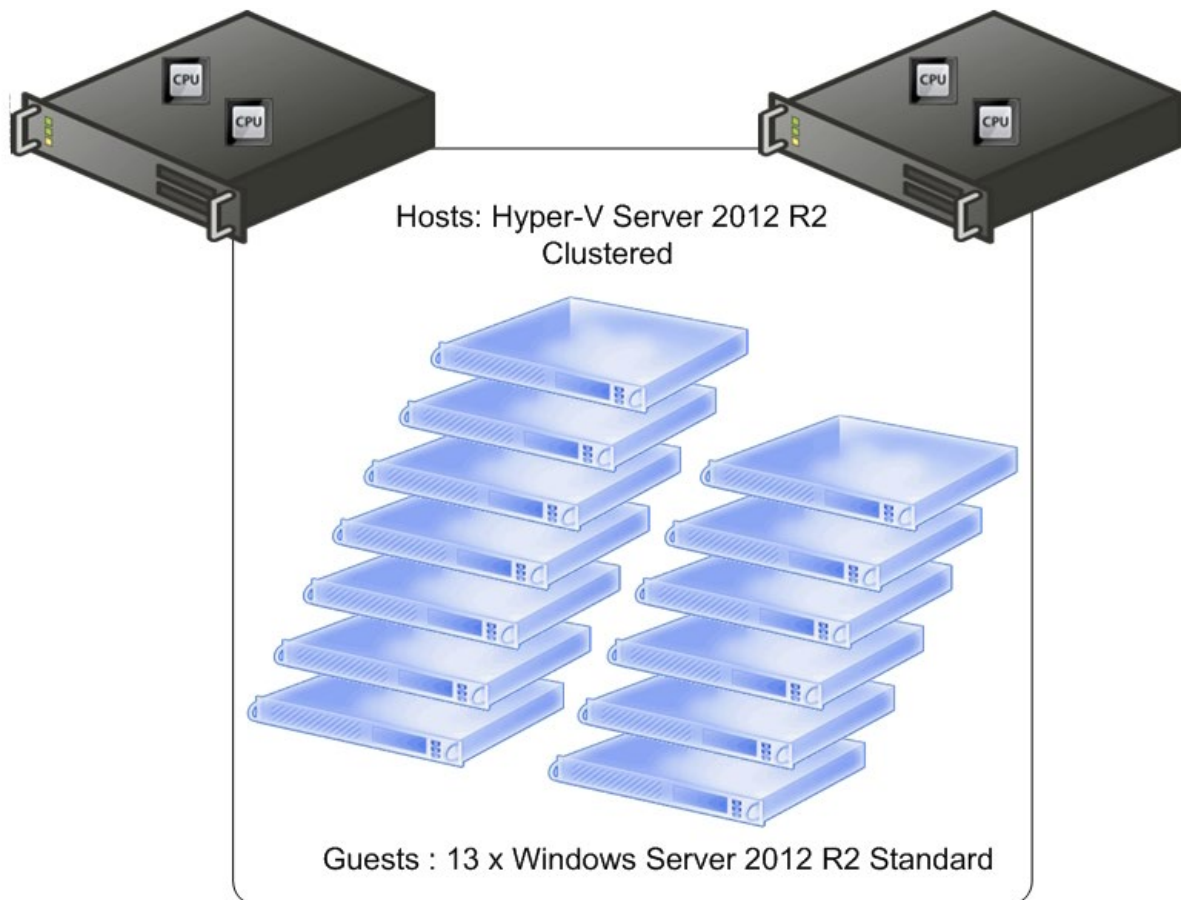
LICENSE: 2x Windows Server 2012 R2 Datacenter or
14x Windows Server 2012 R2 Standard.

This installation is exactly like example 5, except that the hypervisor is now VMware. The licensing requirement is still fourteen Standard licenses or two Datacenter licenses. vSphere requires its own license from VMware.

- Two physical hosts with two eight-core physical CPUs, clustered, running VMware vSphere 5.5; backup software for VMs installed
- Thirteen highly-available virtual machines with Windows Server 2012 R2 Standard

Example 8

HOSTS: HYPER-V SERVER 2012 R2 CLUSTERED

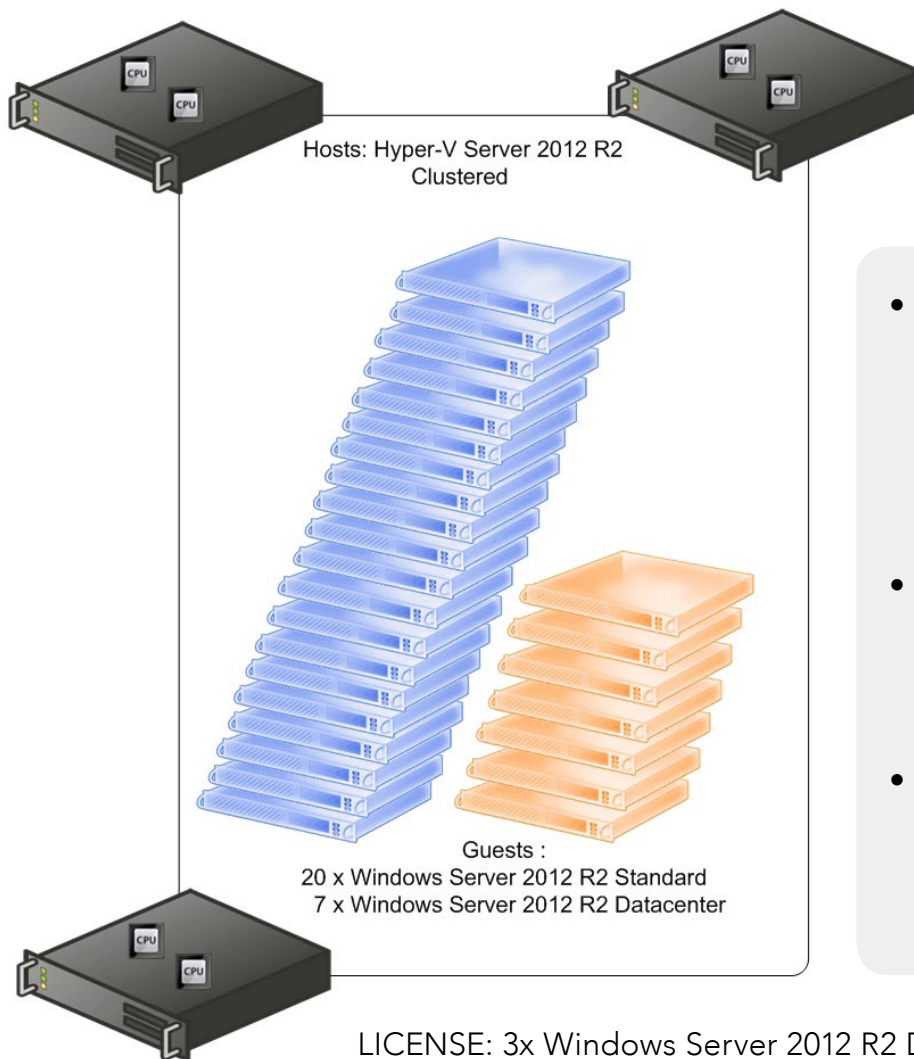


LICENSE: 2x Windows Server 2012 R2 Datacenter or
14x Windows Server 2012 R2 Standard.

This installation is exactly like examples 5 and 7, except that the hypervisor is now Hyper-V. Like 5 and 7, it requires fourteen Standard licenses or two Datacenter licenses. The point of these two examples is to show that the installed hypervisor has no effect on the licensing requirements for running Windows Server in a guest instance.

- Two physical hosts with two eight-core physical CPUs, clustered, running Hyper-V Server 2012 R2; backup software for VMs installed
- Thirteen highly-available virtual machines with Windows Server 2012 R2 Standard

Example 9 HOSTS: HYPER-V SERVER 2012 R2 CLUSTERED

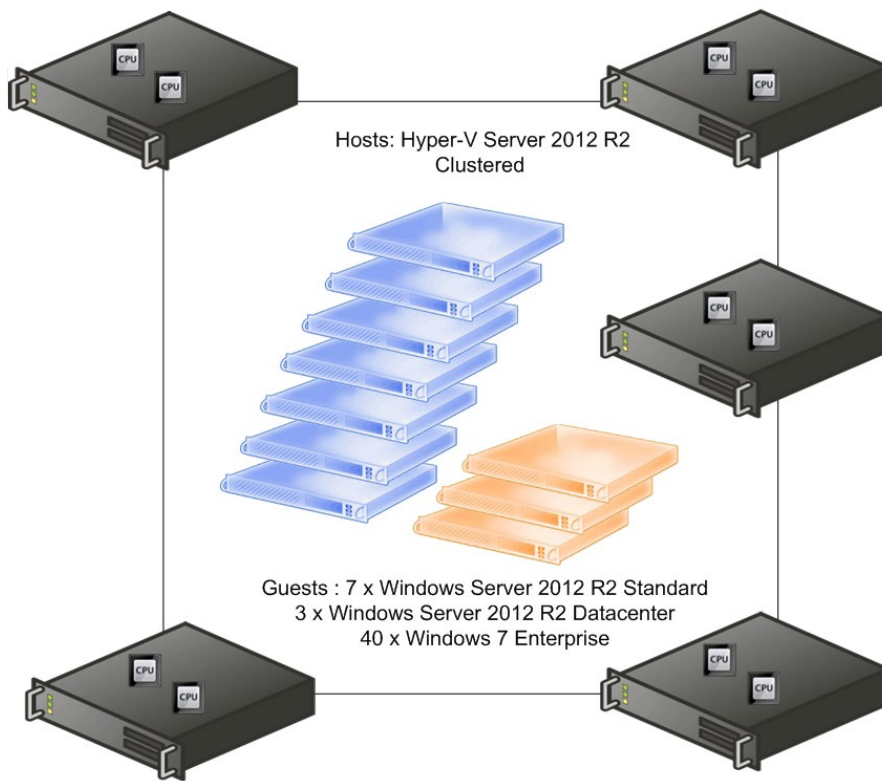


- Three physical hosts with two eight-core physical CPUs, clustered, running Hyper-V Server 2012 R2; backup software for VMs installed
- Twenty highly-available virtual machines with Windows Server 2012 R2 Standard
- Seven highly-available virtual machines with Windows Server 2012 R2 Datacenter

This installation requires three Datacenter licenses, one per host. You cannot cover Datacenter edition in a guest using a Standard license, so that is the minimum. The Datacenter license also provides unlimited licensing for the Standard edition guests because of down-edition rights.

However, there is no value in running Windows Server 2012 R2 Datacenter in this fashion. Inside a guest, Datacenter offers absolutely nothing that cannot be found in Standard edition. That said, it is almost undoubtedly cheaper to purchase three Datacenter licenses than forty-two Standard licenses.

Example 10 HOSTS: HYPER-V SERVER 2012 R2 CLUSTERED



- Five physical hosts with two eight-core physical CPUs, clustered, running Hyper-V Server 2012 R2; backup software for VMs installed
- Seven highly-available virtual machines with Windows Server 2012 R2 Standard
- Three highly-available virtual machines with Windows Server 2012 R2 Datacenter
- Forty highly-available virtual machines with Windows 7 Enterprise

LICENSE: 5x Windows Server 2012 R2 Datacenter and 400x Windows 7 Enterprise (possible additional).

To start, this installation will need five licenses of Windows Server Datacenter, one per host. That will cover all of the Windows Server licenses. It does not, in any way, cover the Windows 7 installations. Terms vary with client operating systems in a virtual environment, but the typical way is to first acquire sufficient retail licenses of Windows 7 (200 total; forty per host), then the same number of volume licenses to upgrade the retail licenses to Windows 7 Enterprise (volume licenses are upgrade licenses and require a base license first).

Then, in some cases, Software Assurance for those volume licenses might also be required. The purpose of this example is twofold. First, Windows Server virtualization rights only cover Windows Server. Client operating systems, like Windows 7, are not covered by any virtualization rights. The second point is that virtual desktop infrastructure (VDI) licensing is expensive and complicated. It should never be approached without the aid of a credentialed licensing expert.

- Three physical hosts with two eight-core physical CPUs, clustered, running Hyper-V Server 2012 R2; backup software for VMs installed
- Sixty Ubuntu Linux 14.04 guests

Example 11

This installation requires no license fee be paid to Microsoft. Hyper-V Server has no licensing fee of its own and Microsoft does not charge anything for a virtual machine. Microsoft is only interested in licensing Microsoft operating systems and Microsoft applications.

- Three physical hosts with two eight-core physical CPUs, clustered, running Hyper-V Server 2012 R2; backup software for VMs installed
- Sixty Ubuntu Linux 14.04 guests
- One highly-available Windows Server 2012 R2 Standard guest

Example 12

This requires three Windows Server 2012 Standard license, one per host. This is only to accommodate the Windows Server guest anywhere it might happen to move.

The Linux guests aren't counted at all for Microsoft licensing purposes.



About the Author: Eric Siron

I have worked in the information technology field since 1998. I have designed, deployed, and maintained server, desktop, network, and storage systems. I provided all levels of support for businesses ranging from single-user through enterprises with thousands of seats. Along the way, I have achieved a number of Microsoft certifications and was a Microsoft Certified Trainer for four years. In 2010, I deployed a Hyper-V Server 2008 R2 system and began writing about my experiences. Since then, I have been writing regular blogs and contributing what I can to the Hyper-V community through forum participation and free scripts.

About Altaro

Altaro Software (www.altaro.com) is a fast growing developer of easy to use backup solutions targeted towards SMBs and focused on Microsoft Hyper-V. Altaro take pride in their software and their high level of personal customer service and support, and it shows; Founded in 2009, Altaro already service over 15,000 satisfied customers worldwide and are a Gold Microsoft Partner for Application Development.

About Altaro VM Backup

Altaro VM Backup is an easy to use, yet powerful backup solution for Microsoft Hyper-V, which takes the guesswork out of backing up VMs and does all the complex Hyper-V backup configuration for the admin. This means best in class technology at the most competitive price on the market.

Demonstrating Altaro's dedication to Hyper-V, they were the first backup provider for Hyper-V to support Windows Server 2012 and 2012 R2 and also continues support Windows Server 2008 R2.

For more information on features and pricing, please visit:
<http://www.altaro.com/vm-backup/>

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