What to Know: Licensing in a Virtualized World

A side effect of a business shifting to a virtualized environment is the impact on licensing. While licensing can be overwhelming, a business needs to understand what's changed and how it can comply with licensing requirements.
License to Virtualize

**Virtualization was supposed** to make life easier for admins, limiting the need to work with all that clunky hardware. While that may be true, licensing in a virtualized environment certainly complicates duties of IT staff.

When going virtual, entrenched hardware restrictions are removed from the equation, and, in this guide, IT architect Brian Kirsch writes about the implications of licensing without those restrictions. Licensing was once skewed in the customer’s favor; it was done on a per-CPU basis with multiple cores fitting in each CPU. But in a virtual environment, with multiple virtual cores per a single physical core, vendors are shifting to licensing on a per-core basis. With suppliers now shipping CPUs with up to 18 cores, licensing prices could soar, Kirsch writes, to the point that companies may consider altering how they configure servers.

Microsoft MVP Brien Posey notes the differences between installing Microsoft’s Hyper-V as a server role in Windows Server or on a standalone Hyper-V Server, and how licensing affects that decision. While downloading Hyper-V server is free, Posey writes that businesses with many VMs may want to consider the Windows Server 2012 R2 Datacenter edition license, which allows you to run Windows Server 2012 on an unlimited number of VMs.

When licensing Oracle products in a VMware environment, technical consultant Robert Sheldon writes about the confusion created by Oracle’s lack of clarity in its contracts. Businesses that intend to use VMs should be aware of Oracle’s and VMware’s differing licensing policies, as failing to adhere to Oracle’s rules can lead to financial penalties.

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Virtualization Creates New Licensing Environment

**Licensing is a** challenge for many companies. Confusing terms, unique conditions and different product variations make it confusing and time-consuming. Still, one thing always remained consistent: the hardware. Licensing moved with hardware, and, while troublesome, it was still workable.

That all changed with virtualization. No longer are we bound by hardware restrictions—we can allocate core, CPUs and memory as needed. However, many licensing agreements have struggled to keep up, leaving customers wondering whether what they’re doing is legal. The gray area is wide, and the consequences of not following the rules can be severe.

**Core Changes in Licensing**

One of the most popular ways companies license is by CPU. Before hyper-threading and multi-cores, a processor had a single brain and things were simple—one CPU (or brain) usually equaled one license. As servers need multiple CPUs, they often would have dual or quad CPUs, but still just one brain per CPU.

After a few years, as the hardware evolved, the core concept was introduced. This enabled multiple cores or brains per CPU, which skewed licensing in favor of the customer—they got more horsepower while still paying for a single CPU license.

Intel went a step further, enabling a single core to virtually split the workload between two virtual cores per single physical core. You could now have a single CPU with four physical cores and each core could do the work of two cores. Your single CPU could now look like it had eight brains. In most cases this benefited the customer, so it was only a matter of time before licensing caught up with the hardware.

Now many vendors use a per-core model for licensing, and it’s added confusion. For
example, Microsoft’s Windows Server 2012 Datacenter edition was licensed per CPU (not core), and for virtualized environments, you were allowed to run unlimited VMs per host once you licensed all of the physical CPUs.

**The idea that more CPUs/cores are better may shift to reducing the cores and taking advantage of the software licensing.**

It was simple, and the customer benefited. In the 2016 Datacenter release, Microsoft requires a license for each core. The core licenses are sold in packs of two and are about the same price as the old licensing scheme—until you go above eight physical cores per CPU socket, which is the minimum number of cores per CPU you can use with Datacenter.

While this sounds reasonable, the real issue is what happens when a company goes above eight cores per CPU. In early 2016, Intel was shipping CPUs with up to 18 physical cores per CPU. This could cause Microsoft to dramatically increase the price from the eight-core base model. The price could soar so high that it would cause companies to rethink how they configure servers. The idea that more CPUs/cores are better may fall away in favor of reducing the cores to better take advantage of the software licensing.

When it comes to virtualization, the server license is often the easy part for admins. Placing desktops or using virtual desktop infrastructure (VDI) almost requires legal assistance to figure out the agreements. Desktop OSes were always tied to the hardware in an OEM agreement, which made them fairly easy to work with. Now you will need to pay for services such as software assurance or Virtual Desktop Access (VDA) subscriptions to run virtual desktops. These agreements can be confusing in what they include and are often licensed per user, which can be difficult to track in an environment with shared resources.

Additionally, the thin-client itself may require an OS license to access your virtual desktop. This is often why VDI has struggled with the cost benefits. Some virtual desktop licenses may come with certain hardware;
verify it with the OS manufacturer, as it tends to change often.

ORACLE PRESENTS CHALLENGES
Licensing often applies to the application world as well. Applications differ as they can be handled by user/connection or by CPU/core for unlimited connections. Several products, such as Microsoft SQL, have now made that transition from CPU to core models.

While this is mostly as straightforward as server licensing, there is one notable exception: Oracle. Since Oracle offers a competing product to what the major hypervisor players sell, it has done two key things to discourage the use of any hypervisor except its own.

The first is Oracle supports its application on a non-Oracle virtualized platform, but does not certify it. What this means is if a known issue crops up with an Oracle product, you can obtain support. If it is a new issue, you will have to contact the hypervisor vendor for support and, in some cases, replicate the issue on physical hardware. It gets worse—Oracle additionally does not support what it calls soft-partitioning of resources. This means you cannot use a hypervisor to limit the number of CPUs or cores in a VM. Therefore, all CPUs/cores must be licensed in the host, as the VM can run on any of them. For many, this simply makes it too expensive to virtualize Oracle on a traditional hypervisor.

Licensing is full of confusing language, terms with limited descriptions and licensing paths that confuse as much as clarify. A few things, however, are becoming certain. For one, per-CPU licensing is being dislodged by the core licensing or per-user model. Also, memory limits on licensing have mostly faded away.

Subscriptions and bundles are becoming the norm, but great care must be given with them, as the different products they contain may have different licensing models. It will take time and research to determine what you need. Take into account what you’re currently using, what you want to use and the interaction between the different products. It’s not an ideal situation, but with time and diligence, you can be successful. —Brian Kirsch
Licensing Plays Key Role in Deploying Hyper-V

There are two approaches to installing Microsoft’s Hyper-V: as a server role in Windows Server, or by using the standalone Hyper-V Server. But which is better?

When deciding between Hyper-V Server and Windows Server 2012 R2 with Hyper-V, the two main criteria to consider are licensing needs and which capabilities you need most.

Licensing Requirements

Hyper-V Server 2012 R2 is free. You can download it, install it, and use it forever without paying a licensing fee to Microsoft.

Hyper-V Server also offers the same capabilities as Windows Server 2012 R2 Hyper-V. Better still, Hyper-V Server is not burdened with a true host OS. It is a bare metal hypervisor, and therefore lighter than its Windows Server counterpart. This translates directly to a smaller potential attack surface, and possibly to better overall performance and lower resource consumption.

So why would a business pay for a Windows Server 2012 R2 license for its Hyper-V host servers when it can get Hyper-V for free simply by downloading Hyper-V Server? From a licensing standpoint, there is one distinct advantage to using Windows Server 2012 R2 Hyper-V: When you purchase Windows Server 2012 R2, the corresponding license grants you permission to install Windows Server 2012 R2 onto your VMs.

Windows Server 2012 R2 Standard edition isn’t suitable for this purpose because it includes such a small number of VM licenses. But the Windows Server 2012 R2 Datacenter edition license allows you to install Windows Server 2012 R2 onto an unlimited number of VMs, so long as those VMs are running on the licensed host. Conversely, if you opt to use Hyper-V Server, then you need to pay for OS
licenses for all your VMs.

At first, the idea of individually licensing the OSes for numerous VMs sounds cost prohibitive. However, in some situations it is possible to avoid spending money. Consider if you want to perform a physical to virtual migration of some servers in your data center. If the OSes on those servers are already licensed, then those licenses will usually transfer to the virtual environment, which means OS licenses won’t need to be purchased for the VMs. Similarly, you may avoid purchasing OS licenses for future VMs by using an open source OS. Of course, if you want to install Windows on new VMs, then you will have to appropriately license the Windows OS.

OTHER SERVER ROLES AND CAPABILITIES
The other criterion for evaluating which hypervisor is best for your organization is determining what capabilities you need. The free Hyper-V Server includes exactly the same capabilities as Windows Server 2012 R2 Hyper-V. Even so, it’s worth mentioning that with Windows Server 2012 R2, Hyper-V is one of many available server roles. If Hyper-V is the only role you need (and there aren’t any licensing issues to consider), then Hyper-V Server is a safe choice. But if you need some of the Windows Server features or capabilities that are not directly related to Hyper-V, then you should deploy a full Windows Server OS.

Hyper-V Server is free, but lacks a true GUI or parent OS. The preferred method of managing Hyper-V Server involves using Windows PowerShell, but you can remotely manage Hyper-V Server using the Windows Server Manager and related tools such as Hyper-V Manager. It is also possible to join a server that’s running the free version of Hyper-V to an Active Directory domain. You can even include the server in a failover cluster.

As such, you aren’t surrendering any features or capabilities with the free version of Hyper-V. You simply must consider the licensing implications and whether you will need the other Windows Server roles or features. —Brien Posey
Making Sense of Oracle Licenses

Licensing Oracle products has long been a controversial and confusing topic. Particularly frustrating is licensing Oracle products in a VMware environment. Information on the licenses is often inaccurate, and those running Oracle products on VMware are left with few specifics and run the risk of an Oracle audit that could cost millions.

Buyers often point to the scare tactics Oracle sales reps use to keep them away from VMware, including threats of astronomical licensing fees that include all servers in all clusters.

VMware has released a white paper that attempts to serve as the definitive guide for how Oracle licensing is supposed to work in a VMware environment. Oracle has neither sanctioned the white paper nor come out with anything as concrete.

Oracle provides documents that ostensibly clarify the company’s stance on its licensing policies. However, documents like the Oracle software investment guide (SIG) and Oracle partition policy state quite clearly that the publications are for educational purposes only. They are not to be incorporated into any contract and do “not constitute a contract or a commitment to any specific terms.”

Licensing Individual Servers

Since Oracle considers VMware to be a soft partitioning technology, a VM cannot be used to determine the number of Oracle licenses needed to run an Oracle application in that environment. In this case, the Processor licensing rules revert to the host system, which means, according to the Oracle SIG, “All processors where the Oracle programs are installed and/or running must be licensed.” Even though the SIG is a non-binding document, it suggests that Oracle will let you run as many VMs on a server as you want, as long as you license all of
the server’s processor cores.

But what if you’re running an Oracle product in only one VM, and, as expected, only some of the processors are allocated to the VM? Oracle policy indicates that you’re out of luck—all processor cores must be licensed.

However, VMware’s white paper suggests otherwise. It tells customers that they can use vSphere CPU Affinity to restrict VMs to specific cores and then only need to license those cores. The white paper also says that customers can use a server’s BIOS to turn off some of the sockets as a way to license fewer cores.

**LICENSING CLUSTERED SERVERS**

If licensing Oracle in a VM on a single server seems fraught with peril, imagine what happens when you start incorporating clusters. The debate now moves from a single host to the entire cluster and whether you must license all hosts, even if you implement an Oracle product on only a subset of the hosts.

If a product is installed on or runs on all hosts, licensing is normally not an issue. Oracle, VMware and the rest of the world are generally in agreement that processor licensing requires that all machines be licensed. There still might be debate over whether an Affinity-like strategy can be used on a per-server basis, but the general guidelines remain. Oracle doesn’t count the number of VMs, only the number of servers and their processor cores.

Suppose, however, that you’re running VMs with Oracle products on only a subset of hosts—or even just one host. As a result of technologies like VMware’s vMotion, Oracle still wants you to license all hosts in the cluster, going so far as to also include all hosts managed by a vCenter server, even those outside the cluster where the Oracle product resides.

Because these technologies make it possible to move VMs from host to host, Oracle expects all hosts to be licensed. It does not matter whether the Oracle product touches only one machine. The potential for moving the VMs to other hosts appears to be cause enough for Oracle to threaten its customers with hefty penalties if unlicensed hosts are discovered during an audit.

Despite Oracle’s insistence that all hosts in
a cluster (or beyond) are fair licensing game, the VMware white paper suggests that it is perfectly acceptable to license only a subset of hosts because you can use DRS Host Affinity rules to restrict VM movement within the cluster, effectively making certain hosts unavailable. In this way, you need to license only the hosts where the product will run.

Nothing we’ve seen so far from Oracle suggests that Affinity is an acceptable alternative. On the other hand, those who agree with VMware’s interpretation point to the non-contractual nature of many of Oracle’s licensing documents as well as to Oracle’s own language, which states, “All processors where the Oracle programs are installed and/or running must be licensed.” It does not say anything about processors that could run the Oracle program but currently are not. There remains no consensus on the correct way to proceed, and Oracle has yet to release precise guidelines to assist its customers, other than an all-or-nothing view of servers and clusters. But the company still can impose fines for licensing violations, and fighting the Oracle machine is no small task.

—Robert Sheldon
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