

Licensing Windows Server for use with virtualization technologies

This brief applies to all Microsoft Licensing programs.

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Summary

This document discusses how Microsoft Windows Server is licensed when used with virtualization technologies like VMware ESX/ESXi, Microsoft System Center (Virtual Machine Manager component), or Virtuozzo, or Azure Windows Server virtual machines.

Introduction and foundational licensing information

With the growing prevalence of virtualization technologies, many customers ask how they should license Windows Server products with these technologies. Before delving into licensing details and examples, however, it is useful to review some basic licensing concepts to understand how they apply in virtualized scenarios. Windows Server 2022 is licensed under the Per Core + Client Access License (CAL) model. More information on Windows Server core licensing can be found in the Windows Server Licensing Guide.

We refer to the use of software in virtual machines or VMs in this brief. In our license terms, these are virtual operating system environments or virtual OSEs. The host operating system and applications running on it, are physical operating system environments or physical OSEs.

For foundational licensing information on topics such as assignment of licenses, storing instances, licensing running instances of the software, licensing for peak capacity, running prior versions or other editions, and details on CALs and External Connectors, customers should review the licensing guide for the appropriate software version.

Clustering, failing over, and moving instances

In addition to understanding foundational licensing concepts mentioned above, it is helpful to understand how software is typically deployed and used. Two common scenarios for higher availability and dynamic datacenters involve:

- Running the same workload simultaneously on two servers, or
- Running a workload on a primary server and periodically moving it to a second server due to a failure, load balancing, patching, or planned downtime.

In both scenarios, regardless of whether the workloads are running in physical OSEs or VMs, each server must have the appropriate number of licenses assigned to it prior to the workload running on it. This holds true regardless of whether you plan the workload to:

- Always run on a single server.
- Run in parallel on the server as a backup when the primary server fails.
- Run the workload if the primary server is down.
- Load balance when the primary server has high use.
- Only run the workload during maintenance.

Servers with workloads running in VMs may be licensed based on physical cores or by virtual machine.

Figures 1A – 1D demonstrate examples of usage scenarios that are properly licensed either based on physical cores or by virtual machine.

Licensing based on physical cores

Licensing based on physical cores requires allocating licenses to a physical server. Licenses can be reassigned to a different physical server, but not on a short-term basis. As the example in 1(C) demonstrates, moving workloads between servers when licensing based on physical cores is most practical when the servers remain separately licensed.

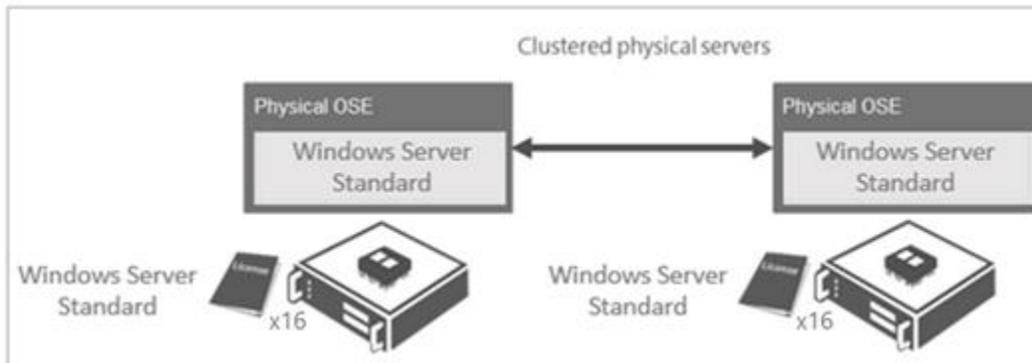


Figure 1A. Example: The servers are clustered, each fully licensed with Windows Server based on physical cores, and both running the same workload in parallel.

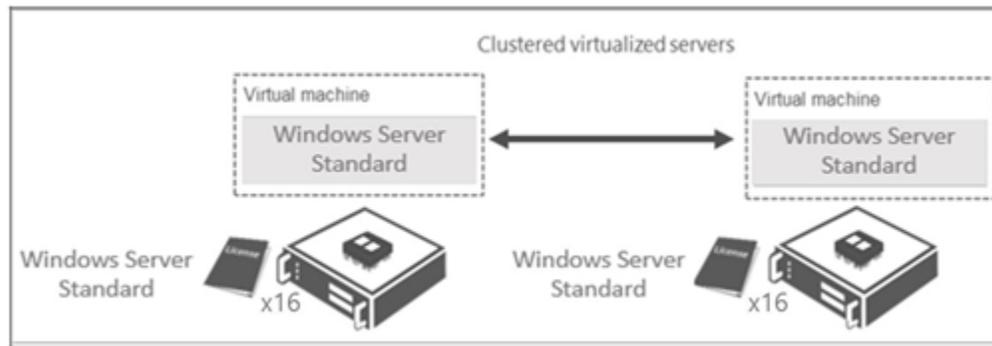


Figure 1B. Example: The servers are clustered, each fully licensed with Windows Server based on physical cores and both running the same virtualized workload in parallel.

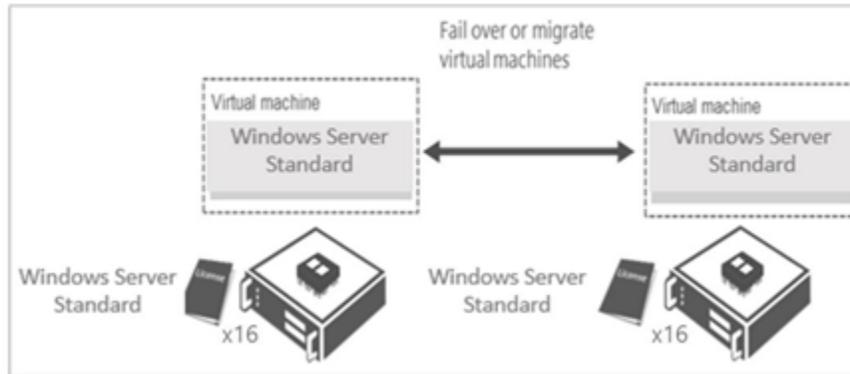


Figure 1C. Example: Both servers are fully licensed with Windows Server based on physical cores. The workload is moved from the first server to the second server. In this case, the licenses do not move with the workload.

When licensing based on physical cores, a server running Windows Server Standard must have assigned licenses equal to the number of physical cores on the server (subject to a minimum of eight per processor and sixteen per server) for every two OSEs (e.g., virtual machines), so you need to consider what the peak capacity for the server will be. Even if you typically only need two OSEs, you must still license for the peak capacity if you occasionally need more than two at the same time. Licenses allocated to servers based on physical cores cannot be reassigned on a short-term basis, so it is not practical to shift licenses with workloads.

Licensing by virtual machine

Licensing by virtual machine allows licenses to move at any time as needed (e.g., with the workload), provided they are moving between servers within the same server farm (e.g., between a primary server and a secondary server).

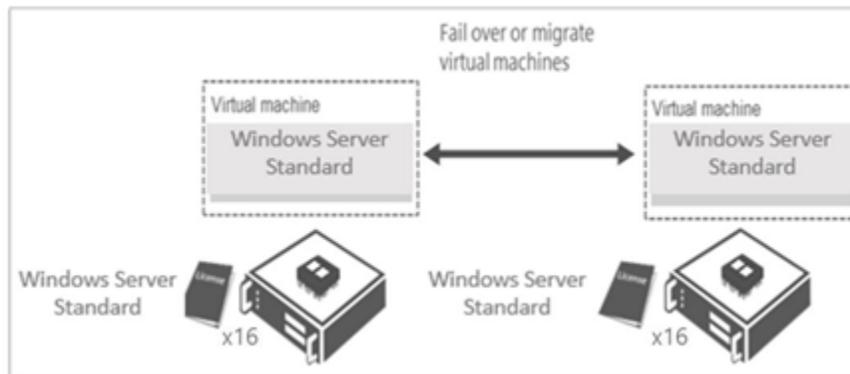


Figure 1D. Example: The first server is licensed with Windows Server by virtual machine. (The virtual machine has 16 virtual cores, so 16 licenses are assigned to the server.) The workload and licenses are moved from the first server to another server in the same server farm. (Windows Server license terms permit licenses allocated by the virtual machine to be moved at any time as needed between servers within the same server farm).

When licensing by virtual machine, a server running Windows Server Standard must have licenses equal to the number of virtual cores in the virtual machine (subject to a minimum of eight per VM and sixteen per customer). If you have a workload running in a virtual machine that moves frequently between two physical servers in the same Server Farm due to failure, load balancing, patching, planned downtime or

other reason, it is not necessary to license both servers at the same time (contrary to when servers are licensed based on physical cores). The licenses can move freely between the servers as long as the workload they support is never running on both servers at the same time. Licensing by virtual machine requires active Software Assurance or a subscription license.

Server Farm means a single data center or two data centers each physically located either in time zones not more than four hours apart, or within the EU or EFTA. A data center can be moved from one Server Farm to another, but not on a short-term basis. (EU is European Union; EFTA is European Free Trade Association).

Licensing Windows Server for use as a host or guest OS, or both

Servers running Windows Server as a host OS are licensed based on physical cores. Servers with workloads running in VMs may be licensed based on physical cores or by virtual machine. This is further explained below.

Licensing based on physical cores

Windows Server terms when licensed based on physical cores permits use of the software in both the physical OSE (e.g., as the host operating system (or OS) in the case of a virtualized server) and virtual machines (as guest OS's). If Windows Server is deployed on a server running a hypervisor on bare metal (directly on top of the server hardware), such as VMware's ESX/ESXi, then Windows Server will not be deployed as a host OS in the physical OSE. However, Windows Server deployed and running in virtual machines on the server (as guest OS's) still must be appropriately licensed. This means licenses must be assigned to the server based on physical cores (for Windows Server Standard, this is one full set of licenses for every two virtual machines running Windows Server). Licensing based on physical cores is subject to a minimum of eight licenses per processor and 16 per server. When licensing based on physical cores, Standard edition allows use of Windows Server in the physical OSE, in addition to two virtual machines, if the physical OSE is used solely to host and manage virtual machines. When licensed based on physical cores, Datacenter allows use of Windows Server in the physical OSE and an unlimited number of virtual machines on each fully licensed server. (The right to run an instance of Windows Server in the physical OSE is not relevant in the case of ESX/ESXi hosting the virtualization layer.)

Licensing by virtual machine

There is no option to use Windows Server in the physical OSE when you license by virtual machine. This licensing option permits use in virtual machines only. As noted above, the only way to license use in the physical OSE (as the host OS in the case of a virtualized server or to support workloads running directly in the physical OSE) is to license based on physical cores. When you license use of Windows Server by virtual machine, the assumption is that the host OS is separately licensed, or you are using a hypervisor such as VMware's ESX/ESXi. There is a scenario where you would still be running Windows Server as the host OS, and separately licensing individual virtual machines. For example, if you first license a server for Windows Server Standard based on physical cores, and you need one or more additional virtual machines, in lieu of relicensing the physical server, you could license additional virtual machines separately. If you have fully licensed a server for Windows Server Datacenter based on physical cores, you already have the right to add any number of virtual machines as needed.

Whether you are adding virtual machines to a server fully licensed for Windows Server Standard, or you are deploying virtual machines on a server not using Windows Server as a host OS, licensing by virtual machine requires licenses for all the virtual cores in the virtual machine subject to a minimum of eight licenses per virtual machine and 16 per customer. The option to license Windows Server Datacenter by virtual machine is subject to the same minimums. Licensing by virtual machine requires active Software Assurance or a subscription license.

The Flexible Virtualization Benefit

For customers with active Software Assurance or subscription licenses, the ability to license Windows Server by virtual machine also provides a practical option for moving workloads to Authorized Outsourcers' servers (shared or dedicated) when combined with the Flexible Virtualization Benefit. The Flexible Virtualization Benefit expands customers' Outsourcing Software Management options for all software products (including Windows Server) to include Authorized Outsourcers' shared servers. The combination of the Flexible Virtualization Benefit, the option to license by virtual machine and the right to freely move licenses allocated by virtual machine between servers is ideal for moving virtualized workloads to the cloud. For more information about the Flexible Virtualization Benefit, refer to the [Product Terms](#).

An **Authorized Outsourcer** is generally any outsourcer that is not a Listed Provider or using a Listed Provider as a datacenter provider.

Listed Provider means entities identified by Microsoft at <http://aka.ms/listedproviders>.

Introducing containers from Microsoft

Introduced to Windows Server Standard and Datacenter editions with the launch of Windows Server 2016, and featured in later versions of Windows Server Standard and Datacenter editions, containers are the next evolution in virtualization and empower software developers to create the next generation of applications experiences. A container is an isolated, resource controlled, and portable operating environment where an application can run without affecting the rest of the system and without the system affecting the application. Other advantages of containers include speed, simplified DevOps, and increased flexibility in application development.

- Windows Server containers without Hyper-V isolation provide application isolation through process and namespace isolation technology. A Windows Server container shares a kernel with the container host and all containers running on the host.
- Windows Server containers with Hyper-V isolation expand on the isolation provided by Windows Server Containers by running each container in a highly optimized virtual machine. In this configuration, the kernel of the container host is not shared with the Windows Server with Hyper-V isolation containers.

Licensing based on physical cores

Windows Server Standard edition provides rights to use the software in two OSEs or two Windows Server containers with Hyper-V isolation and unlimited Windows Server Containers without Hyper-V isolation when all physical cores on the server are licensed (subject to a minimum of 8 core licenses per physical processor and a minimum of 16 core licenses per server). As mentioned above, Standard edition provides the right to use Windows Server as the Host OS (in addition to two guest OS's), if it is used solely to host and manage virtualized workloads (e.g. containers on the licensed server). Datacenter edition provides rights to use Windows Server in unlimited OSEs, and any number of Windows Server containers with or without Hyper-V isolation, when all cores on the server are licensed (subject to the same minimums).

Licensing by virtual machine

When licensing by virtual machine, customers may use one OSE or one Windows Server container with Hyper-V isolation, subject to a minimum of 8 core licenses per OSE and 16 per customer. Use of any number of Windows Server Containers without Hyper-V isolation are permitted within any properly licensed virtual machine. Licensing by virtual machine requires active Software Assurance or a subscription license.

Learn more about containers by visiting [Container services](#) or by reading about [Windows and Containers](#).

Licensing Windows Server for use with VMware vMotion and Microsoft System Center Virtual Machine Manager

The same licensing rules apply when using Windows Server with VMware vMotion and System Center Virtual Machine Manager.

Licensing based on physical cores

While VMware vMotion and System Center Virtual Machine Manager move virtual machines between physical servers, when allocated based on physical cores, the underlying Windows Server licenses generally remain with the physical server to which they were assigned. There is no option to reassign licenses on a short-term basis when licensing based on physical cores. Accordingly, when a virtual machine is moved from a server licensed for Windows Server based on physical cores to a new physical server, that new server must separately have the appropriate licenses assigned to it (see the [Clustering, failing over, and moving instances](#) section). One option would be to fully license the new server based on physical cores. In that case, the migrated virtual machine needs to be added within the permitted allowance (up to two virtual machines for each set of Windows Server Standard licenses assigned). If the new server is fully licensed for Windows Server Datacenter, there is no licensing limit to the number of virtual machines running Windows Server. As such, in multi-server installations with VMware vMotion or System Center Virtual Machine Manager, Windows Server Datacenter offers the greatest flexibility to move virtual machines between servers without having to worry about being under-licensed.

As noted, for Windows Server software, except in a few cases (including licensing by virtual machine), licenses may only be reassigned to new hardware after 90 days. This, however, does not restrict the dynamic movement of virtual machines between licensed servers. As long as the servers are licensed and use across OSEs does not exceed the licensed allowance, you are free to use VMware vMotion and System Center Virtual Machine Manager to move virtual machines between licensed servers at will.

Licensing by virtual machine

When VMware vMotion and System Center Virtual Machine Manager move individually licensed virtual machines between physical servers, the Windows Server licenses may freely move with those virtual machines. This is because the option to license Windows Server by virtual machine also conveys the right to reassign licenses from one physical server to another at any time. The exception to this is when the servers sit in separate Server Farms. In this case, the reassignment of Windows Server licenses from one physical server to another is not permitted more frequently than one time every 90 days.

Another way in which licensing by virtual machine could be useful is when moving virtual machines between physical servers fully licensed based on physical cores but already at capacity based on licensing. As an alternative to fully relicensing either server to permit spikes in the number of virtual machines used, you may temporarily allocate licenses based on the virtual machines' virtual cores (subject to the minimum of eight per virtual machine and 16 per customer). These licenses can be reallocated between physical servers at any time, provided they are used to license by virtual machine, and the servers are in the same Server Farm. Licensing by virtual machine requires active Software Assurance or a subscription license. Note: If a server is fully licensed for Windows Server Datacenter, there is no licensing limit to the number of virtual machines in which the customer may use Windows Server. As such, the option to license workload spikes by virtual machine is not relevant for servers fully licensed with Windows Server Datacenter.

Licensing Windows Server for use with Virtuozzo

Virtuozzo software creates running instances of Windows Server in virtual machines. This is another container technology. These virtual machines share the same kernel of the host Windows Server operating system, but have isolated registry settings, operating system libraries, operating system processes, and application software. These virtual machines also enable separate machine identity or administration rights.

As with use with other virtualization technologies, each physical and virtual running instance of Windows Server must be licensed. Because every instance shares the same kernel as the host operating system, Virtuozzo is technically unable to run more than one edition of Windows Server on the physical server. As a result, you must choose a single edition when using Virtuozzo.

The option to license Windows Server by virtual machine is relevant to use with Virtuozzo only when the physical server is first licensed based on physical cores. This is because you are using Windows Server for the host OS, and, the only way to license Windows Server in the physical OSE is to license based on physical cores. The option to license by virtual machine could provide cost savings over fully relicensing the server based on physical cores if there is a need to add virtual machines. If the physical server is fully licensed with Windows Server Datacenter, the added option to license additional virtual machines is not relevant, since terms permit any number of virtual machines.

Licensing Windows Server for use on Microsoft Azure

With subscription licenses or Software Assurance coverage for Windows Server Standard and/or Datacenter, you have the additional option of running Windows Server in virtual machines in Microsoft Azure under the Azure Hybrid Benefit for Windows Server. For every set of 16 Windows Server core subscription licenses or licenses with Software Assurance, you can run either of the following at the base compute rate:

- Up to two virtual machines with up to 8 virtual cores or
- One virtual machine with up to 16 virtual cores.

You can also run virtual machines with more than 16 virtual cores by stacking licenses. For example, for two 16-core license packs, you may run a virtual machine with up to 32 virtual cores.

When using the Azure Hybrid Benefit for Windows Server under Datacenter licenses, you have special use rights. First, under Dual Use Rights, you may deploy Windows Server Datacenter subscription licenses or licenses with active Software Assurance in Azure while running workloads under the same licenses simultaneously in your own data center. Second, under Unlimited Virtualization Rights, you can use any number of virtual machines on an Azure Dedicated Host or other dedicated physical host in Azure, provided you allocate Windows Server Datacenter subscription licenses or licenses with active Software Assurance for all of the physical cores available to you on that Azure server. Note: Dual Use Rights do not apply when licenses are allocated under Unlimited Virtualization Rights.

For Standard licenses, the licenses used under Azure Hybrid Benefit for Windows Server will be deemed "assigned" and may not be redeployed in your data center sooner than 90 days after the benefit is invoked on Azure servers.

For more information about Azure Hybrid Benefit for Windows Server, see the Product Terms and read about the [Azure Hybrid Benefit for Windows Server](#).

Additional resources

Licensing guides:

- [Windows Server Licensing Guide](#)
- [Licensing Guides](#)

[Windows Server Virtualization documentation](#)

Commercial Licensing briefs:

- [Licensing Microsoft server products in virtual environments](#)
- [Introduction to per core licensing and basic definitions](#)
- [Licensing Briefs](#)

[Product Terms site](#)

[Windows Server Product Page](#)

[Microsoft License Advisor](#)

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