

Licensing Microsoft server products for use in virtual environments

This brief applies to all Microsoft Commercial Licensing programs.

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Summary

The purpose of this brief is to give an overview of use rights for Microsoft server products in virtual environments. It can help you understand how to use Microsoft server products with virtualization technologies, such as Microsoft Hyper-V technology, or third-party virtualization solutions provided by VMware and Parallels.

Although much of the information in this paper also applies to licenses purchased from channels other than Microsoft Commercial Licensing, some differences exist. As a result, we recommend that you review the license terms that accompanied your software if you acquired licenses through a means other than a Microsoft Commercial Licensing agreement.

What's new in this brief

This brief replaces the previous version that was published in June 2016. It has been updated to reflect Windows Server 2016, System Center 2016, and SQL Server 2017.

Additionally, the brief has been streamlined to ensure the content is current and true to the topic. Where helpful, external links have been added for additional information on specific Microsoft server products.

Overview of licensing models and associated virtualization rights

The following summarizes the licensing models and how virtualization affects them. Review of this guidance should not be a substitute for careful review and understanding of your rights and obligations as described in your Microsoft Commercial Licensing agreement and the Product Terms. We have provided links to additional resources for more information where applicable.

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.

Products	Licensing
All products in each of the Microsoft server licensing models in the Volume Licensing Product Terms , for example: Windows Server 2016 Exchange Server 2016 SQL Server 2017	<p>To help you understand how Microsoft's licensing models support use of software we need to introduce you to some of the terminology we use. For example, use terms for software licenses¹ specify the number of <i>instances</i> of software that a customer can <i>run</i> on a specific server at a time, rather than the number of <i>copies</i> that customer can <i>install and use</i> on that server. Getting away from the notion of <i>installing and using copies</i> on a physical server allows us to address use rights in the context of virtual machines and workload mobility.</p> <p>We also speak in terms of <i>creating and storing instances</i>. Software licenses allow customers to create and store instances of the software on their servers or storage media. Stored instances do not tie up licenses, as customers are not required to allocate licenses until they <i>run</i> the software.</p> <p>Before a customer <i>runs</i> an instance of server software, it must <i>assign</i> (or allocate) one or more licenses to a server. The number of licenses required depends on the license model and the use case. Also, keep in mind that each hardware partition or blade is a separate physical hardware system, and, therefore, a separate server for purposes of licensing. The servers to which licenses are assigned are called <i>licensed servers</i>.</p> <p>If a customer has multiple <i>licensed servers</i>, it has some flexibility to move its workloads across them, as long as each server is adequately licensed for the workloads it is running. If moving workloads requires moving licenses, customers should remember that in general, they can reassign software licenses for server products, but not on a short-term basis (that is, not within 90 days of the last assignment). (Note: Customers can always reassign licenses sooner if they retire a server due to permanent hardware failure.) For greater flexibility and more frequent reallocation of licenses, we offer <i>License Mobility</i> rights. <i>License Mobility</i> rights are provided with Software Assurance. <i>License Mobility across Server Farms</i> are a subset of License Mobility rights that allow customers to move licenses between servers within a <i>Server Farm</i>. A <i>Server Farm</i> generally can include up to two data centers in time zones that are not more than four hours apart. This supports workload mobility within a customer's own data centers. These rights are documented in the Software Assurance Appendix of the Product Terms. You can refer to the Software Assurance section of the</p>

¹ Software licenses refer to the license for the software bits. To license a product appropriately, a customer might also need additional licenses (for example, Client Access Licenses, external connector licenses, and management licenses. Please refer to the [Product Terms](#) document for Volume Licensing.)

Products	Licensing
<p>Products in the Microsoft Per Core/CAL licensing model of the Product Terms, for example:</p> <p>Windows Server 2016</p>	<p>individual product entries in the Product Terms to determine if these rights are available for a specific product.</p> <p>Windows Server operating system software under the Per Core/CAL license model is licensed by <i>physical core</i>.) In this brief, we address how use of Windows Server with virtualization technologies affects licensing. For more general information about Windows Server licensing, refer to the Window Server Licensing Guide. Customers have the choice of licensing a server for either Windows Server Standard or Windows Server Datacenter. In either case, all of the <i>physical cores</i> on the server must be licensed (subject to a minimum of 16 per server and eight per processor). Windows Server license terms permit customers to run up to two instances of Standard per Licensed Server (e.g., on the physical server and in one guest VM (referred to as “virtual operating system environments” or “virtual OSEs” in licensing), or in two guest VMs) and unlimited instances of Windows Server Datacenter per Licensed Server. Customers needing more than two VMs on a server licensed for Standard edition have the option of relicensing all of the physical cores on the server to permit two additional running instances. Additionally, if the Physical OSE is used only to support VM workloads, the same licenses permit use of Windows Server as the host operating system. If customers are moving workloads between Licensed Servers, each of those servers must be fully licensed to support the workloads. <i>License Mobility across Server Farms</i> is not available for Windows Server, so each server must be licensed for peak capacity at all times.</p> <p>As an alternative to running Windows Server in VMs on its own servers, customers have the option of running Windows Server in VMs on Azure under <i>Azure Hybrid Benefits</i>. Customers with Software Assurance coverage on their Windows Server licenses are eligible for <i>Azure Hybrid Benefits</i>. These benefits support use of up to two VMs per 16 qualifying Windows Server licenses. This means customers can allocate a set of 16 Windows Server core licenses to Azure and run one VM on a single Azure base instance with a number of virtual cores between one and 16. Or they can allocate a set of 16 core licenses and run two separate VMs, each with a number of virtual cores between one and eight. Customers can allocate additional sets of eight core licenses to run larger VMs or additional VMs. In all cases, customers will be required to pay for their Azure base instance, but savings can be substantial. For more information about this option, see Azure Hybrid Benefit. The terms and conditions governing <i>Azure Hybrid Benefits</i> are in the Microsoft Azure product entry in the Product Terms.</p> <p>In addition to server software licenses, customers need access licenses for their users and devices that access their licensed servers under the Per Core/CAL license model. Access Licenses under this model includes External Connector licenses and Client Access Licenses (CALs).</p> <p>Each External Connector license allows any number of external users to access any number of instances of the server software on a particular server, such as the case of a server running virtualized workloads. External Connectors, like server software licenses, must be assigned to a single server, and may not be reassigned on a short-term basis (other than if you retire the server due to permanent hardware failure). However, while there are no License Mobility rights for the corresponding Windows Server licenses, License Mobility rights</p>

Products	Licensing
	<p>do apply to Windows Server External Connector licenses with Software Assurance coverage. This means customer can support workload mobility as it relates to external user access to its on-premises servers.</p> <p>CALs are available per user and per device. Each CAL allows one user or device to access instances of the corresponding server software running on any of your licensed servers. Given this, virtualization of server workloads running on-premises does not impact how customers assign CALs. Note, however, that use of Windows Server running on Microsoft Azure under Azure Hybrid Benefits is governed by the Microsoft Azure terms and conditions in the Microsoft Online Services Terms, and accordingly does not require Windows Server base CALs for access.</p> <p>Also note, for Windows Server, you do not need a CAL to access an instance of the server software running in the physical operating system environment (OSE) if that instance is being used solely to host virtualization workloads.</p> <p>In addition to the Windows Server Licensing Guide, you can refer to the Introduction to Per Core Licensing and Basic Definitions Licensing Brief for more information about the Per Core licensing models.</p>
<p>Products in the Per Core licensing model of the Product Terms, for example:</p> <p>SQL Server 2017 Standard and SQL Server 2017 Enterprise Core</p>	<p>Server application software under the Per Core license model is licensed one of two ways: by virtual core or by physical core. VMs running Standard editions are licensed by virtual core only. VMs running Enterprise editions are licensed by virtual core or by physical core. In the case of virtual core licensing, each virtual core allocated to a VM requires a core license, with a minimum of four core licenses per VM. Customers may run any number of instances of the server software in each licensed VM. Alternatively, when all physical cores on the server are licensed for SQL Server Enterprise, customers can run an unlimited number of instances of the software in a number of VMs equal to the number of core licenses assigned to the server. Customer has the option to run SQL Server in the physical OSE in lieu of one of the permitted VMs. For example, a four-processor server with four cores per processor—fully licensed with 16 core licenses—could run SQL Server software in up to 16 VMs, regardless of the number of virtual cores allocated to each VM.</p> <p>With the addition of Software Assurance coverage for all Enterprise Edition core licenses (when the server is fully licensed), customers' use rights are expanded, allowing them to run any number of instances of the software in any number of VMs as well as in the physical OSE. This enables the handling of dynamic workloads and full utilization of hardware computing capacity. Note: This benefit ends when Software Assurance coverage expires.</p> <p>Customers who need to support workload mobility can also use License Mobility across Server Farm rights for Per Core products that grant License Mobility rights. This can be determined by looking at the Software Assurance section of the product entries in the Product Terms. Additionally, some Per Core products grant <i>License Mobility through Software Assurance</i> rights. These rights permit customers to run VMs on Microsoft Azure or on shared servers of authorized mobility partners. The license terms for using server software under <i>License Mobility through Software Assurance</i> are found in the Software</p>

Products	Licensing
<p>Products in the Server/CAL licensing model of the Product Terms, for example:</p> <p>Exchange Server 2016 and SQL Server 2017</p>	<p>Assurance Appendix to the Product Terms. For additional guidance regarding this subject, you can also refer to the License Mobility Overview.</p> <p>Server application software under the Server/CAL license model is licensed by running instance. Customers running multiple VMs on a server need one license for each instance they run. SQL Server requires one license per VM, but as an exception to the Server/CAL licensing model, customers can run multiple instances of SQL Server within that VM. Customers who need to support workload mobility can also use License Mobility across Server Farm rights for Server/CAL products that grant License Mobility rights. This can be determined by looking at the Software Assurance section of the product entries in the Product Terms. Additionally, some Server/CAL products grant <i>License Mobility through Software Assurance</i> rights. These rights permit customers to run their servers on Microsoft Azure or on shared servers of authorized mobility partners. The license terms for using server software under <i>License Mobility through Software Assurance</i> are found in the Software Assurance Appendix to the Product Terms. For additional guidance regarding this subject, you can also refer to the License Mobility Overview.</p> <p>As with Per Core/CAL products, in addition to server software licenses, customers need access licenses for their users and devices that access their licensed servers under the Server/CAL license model. Access Licenses under this model include Client Access Licenses (CALs). CALs are available per user and per device. All accessing users and devices require CALs for SQL Server; unlike Windows Server, there is no External Connector option for external users. Unlike SQL Server and Windows Server, external user access rights for productivity servers released since 2013 are included with the server license. For users and devices requiring CALs, each CAL allows one user or device to access instances of the corresponding server software across a customer's licensed servers. Given this, virtualization of server workloads running on-premises does not impact how customers assign CALs. Note, however, customers who move virtualized workloads from their own data centers to the public cloud using <i>License Mobility through Software Assurance</i> must comply with the terms associated with that offering, including ensuring that they maintain Software Assurance on CALs.</p>
<p>Products in the Management Servers licensing model of the Product Terms, for example:</p> <p>System Center 2016 Datacenter</p> <p>System Center 2016 Standard</p>	<p>Server management using System Center under the Management Servers license model is licensed by physical core. Customers have the choice of licensing a server for either System Center Standard or System Center Datacenter. In either case, all of the <i>physical cores</i> on the server must be licensed (subject to a minimum of 16 per server and eight per processor). System Center license terms permit customers to manage up to two operating system environments per Licensed Server using Standard (e.g., the physical operating system environment and one guest VM (referred to as "virtual operating system environments" or "virtual OSEs" in licensing), or two guest VMs) and the physical operating system environment and unlimited VMs per Licensed Server using Datacenter. Customers needing to manage more than two VMs on a server licensed for Standard edition have the option of relicensing all of the physical cores on the server to permit management of two</p>

Products	Licensing
	<p>additional VMs. Additionally, if the Physical OSE is used only to support VM workloads, the same licenses permit use of System Center to manage two VMs plus the host operating system. If customers are moving workloads between Licensed Servers, each of those servers must be fully licensed to support management of the VMs running those workloads. Customers who need to support workload mobility can also use License Mobility across Server Farm rights for Management products that grant License Mobility rights. This can be determined by looking at the Software Assurance section of the product entries in the Product Terms. Additionally, some Management products grant <i>License Mobility through Software Assurance</i> rights. These rights permit customers to manage VMs running on Microsoft Azure or on shared servers of authorized mobility partners. The license terms for using server software under <i>License Mobility through Software Assurance</i> are found in the Software Assurance Appendix to the Product Terms. For additional guidance regarding this subject, you can also refer to the License Mobility Overview.</p> <p>Note: Separate licenses are not required to run the management console on the server used to manage your licensed servers.</p> <p>For additional information on server management licensing and System Center 2016, please visit the System Center product page.</p>

<p>Products in the Specialty Server licensing model of the Product Terms</p> <p>For example: Windows Server 2016 Essentials</p>	<p>The license terms for products in the Specialty Licensing model vary by product. We specifically address Windows Server Essentials in this brief. Each Essentials license covers a single server. Customers may run the server software in one physical OSE and in one VM. This VM can run only Windows Server Essentials. If you run both permitted instances, the instance in the physical OSE can only be used to manage the VM. You should refer to the Product Terms for virtualization rights for other products licensed in the Specialty Server licensing model.</p>
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The following sections provide examples for server licensing models and clarify enhancements for specific products.

License by running instance

Each license for Exchange Server grants customers the right to run one instance of Exchange Server on the server it is assigned to. Customers can run that instance in either the physical OSE or a VM. Customers can create and store any number of instances of Exchange Server on any of their servers or storage media². As Figure 1 below illustrates, if a customer assigns an Exchange Server license to Server A, it can run one instance of Exchange Server in the physical OSE or in a VM.

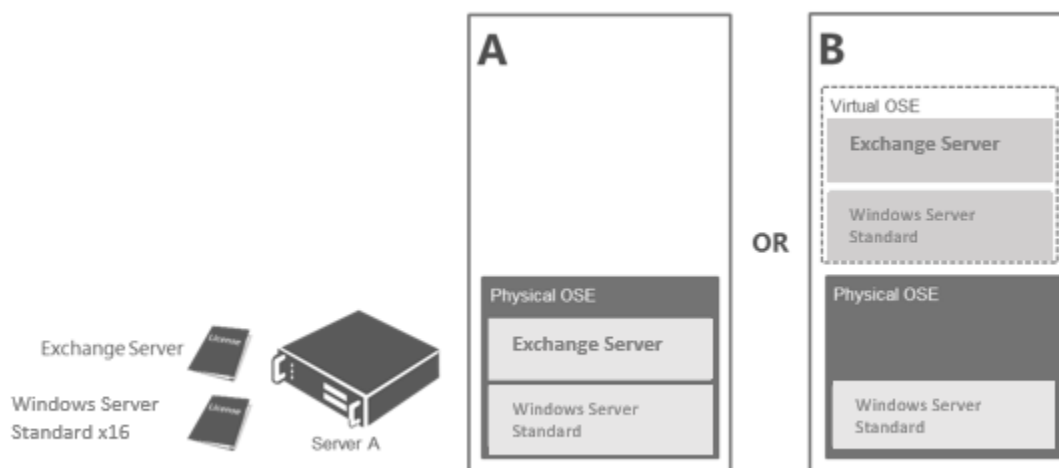


Figure 1: Running an instance of Exchange Server in a physical or virtual OSE

In Figure 2 below, the storage area network (SAN) contains six VHD files, each with an instance of Windows Server and an instance of Exchange Server. Two VHD files are deployed from the library onto the server simultaneously, depending on the domain that needs the support of additional instances. This SAN scenario illustrates the deployment flexibility enabled by the licensing model. Instead of 128 licenses (16/server), the customer needs to assign only 16 licenses for Windows Server Standard to Server A because each fully licensed server may run two instances of Windows Server.

Similarly, instead of eight licenses, the customer needs to assign only two licenses for Exchange Server because only two instances of Exchange Server are running at a time. By assigning those licenses to Server A, the customer can also create any number of non-running instances of Windows Server and Exchange Server on any of its servers or storage media, including a server's hard disk or the SAN.

It is worthwhile to underscore that customers wanting a lightly virtualized environment can fully re-license to a server to have the right to run more instances. For example, in the following figure, one Windows Server Standard license has been assigned to the server. That license permits two running instances in VMs and one in a physical OSE (used only to host and manage the VMs). If the customer fully re-licenses the same server, it can run up to two additional instances (up to four VMs simultaneously). If customers want to create a highly virtualized environment, then they should assign Windows Server Datacenter licenses, which allows them to run an unlimited number of instances of Windows Server on the licensed server.

² Customers can create instances of the software only to exercise their right to run instances of the software. They do not have the right, for example, to create instances of the software to make them available for distribution outside their organization.

Each .VHD file contains one instance each of Exchange Server and Windows Server Standard

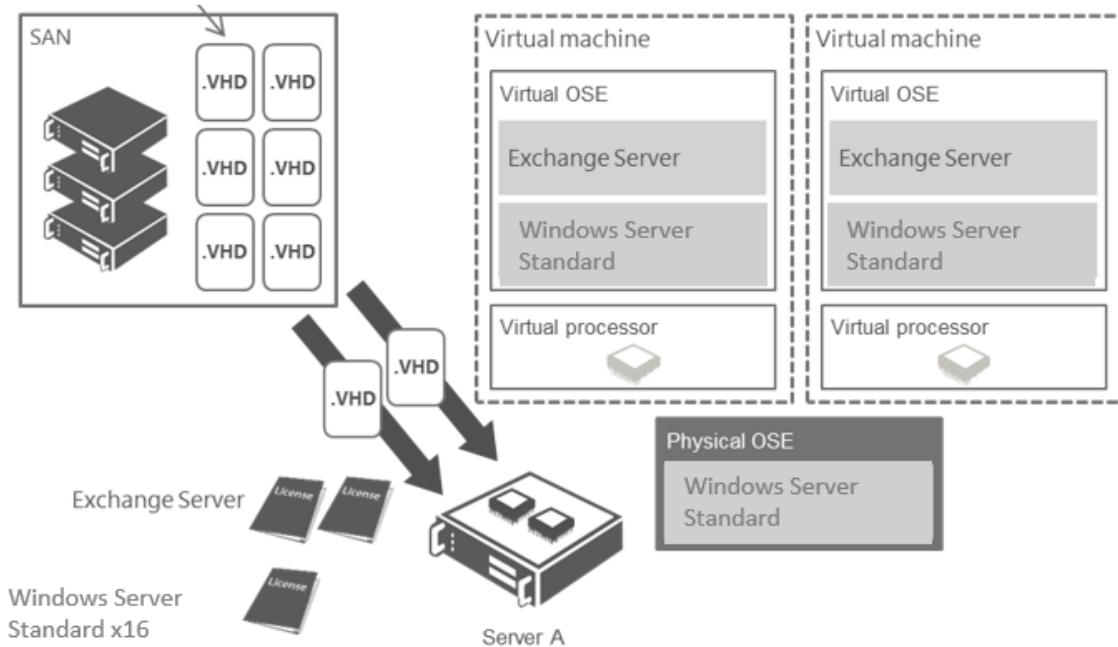


Figure 2: Applying the licensing model to a SAN scenario

Moving instances of software

The ability to move instances of the software is ideal for datacenters, where workloads move from one server to another. Regardless of whether a datacenter uses server blades, rack-mounted servers, or virtualization technology, it is easy to move an instance of software between licensed servers.

For example, in Figure 3, the customer assigned Server A and Server B one set of licenses each for Windows Server Standard and one license each for Exchange Server. Initially, one instance of Exchange Server is running on Server A. If Server A becomes overloaded, the customer can choose to move the running instance of Exchange Server to Server B, because Server B also has an Exchange Server license assigned to it. The customer is allowed to run up to two instances of Windows Server Standard and one instance of Exchange Server on Server A at a time. Similarly, the customer can run two instances of Windows Server Standard and one instance of Exchange Server on Server B at a time.

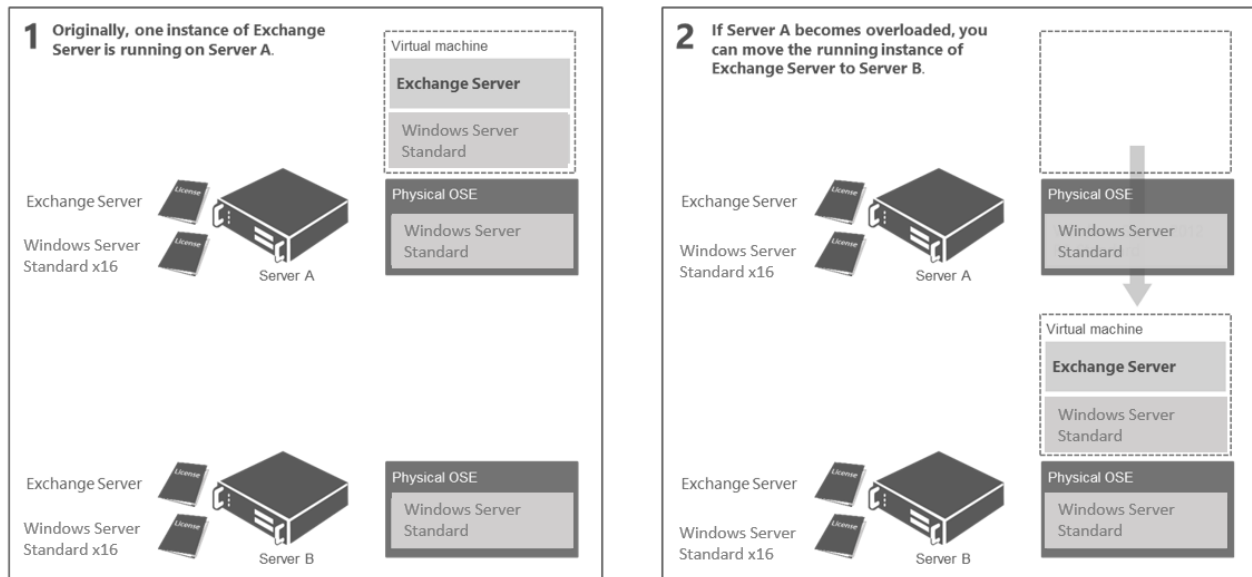


Figure 3: Moving instances of software from one server to another

Reassigning a software license

Software mobility supports workload balancing across virtualized servers, but the full benefit of mobility requires license mobility. Moving an instance of software from one server to another is not the same as reassigning a software license from one server to another. Moving an *instance* of software means to move the *software bits* from one licensed server to another. Reassigning a software *license* means to assign that *license* to another server so that it becomes the server licensed to run that software. License terms prohibit short-term license reassignment. This means licenses can be moved, but not more frequently than 90-day intervals.

For example, in Figure 4, the instances of Windows Server and Exchange Server move from Server A to Server B and the licenses to run those instances are reassigned from Server A to Server B. If the licenses are not reassigned, Server B cannot *run* the instances. By reassigning the licenses, however, Server B is now the new server licensed to run the instances and Server A is no longer the licensed server. Licenses cannot be moved back to Server A for 90 days.

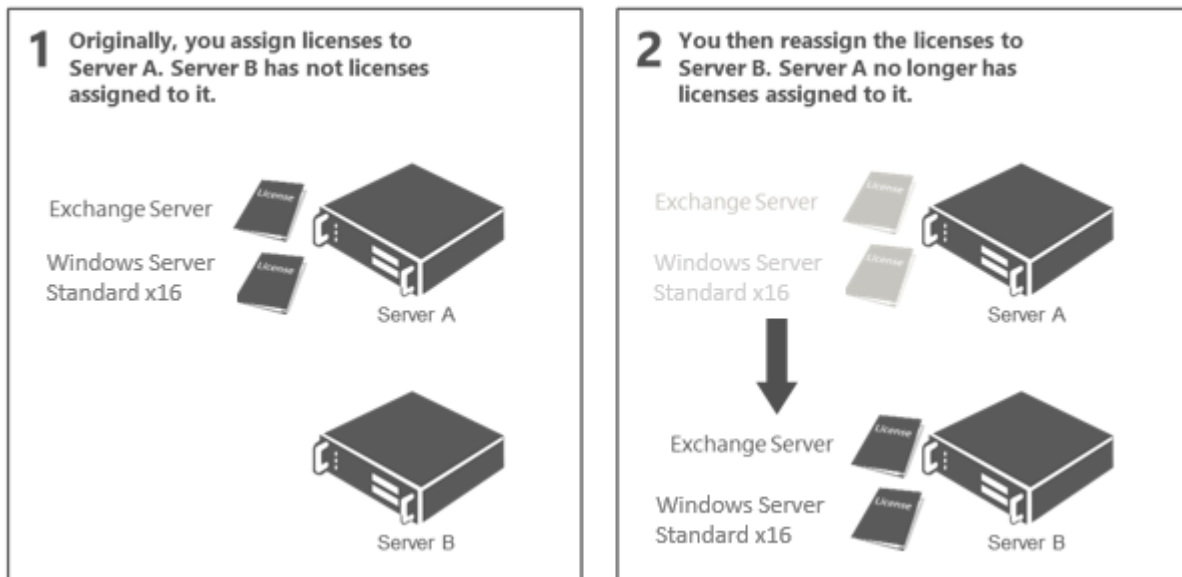


Figure 4: Reassigning a software license from one server to another

For certain server software licenses, Software Assurance adds the benefit of License Mobility within a server farm. This means licenses can be moved from server to server more often than 90-day intervals. For the server farm definition and more information about the server software license mobility rule, including the list of eligible server and External Connector licenses, please read the [License Mobility Overview](#).

Licensing client devices with multiple OSEs

You only need one device CAL for each device that accesses the server software, regardless of the number of VMs on the device. As demonstrated in Figure 10 below, even if the desktop PC has multiple VMs³, and each of those OSEs is separately accessing Windows Server on servers A and B, you need only one CAL for the desktop PC.⁴

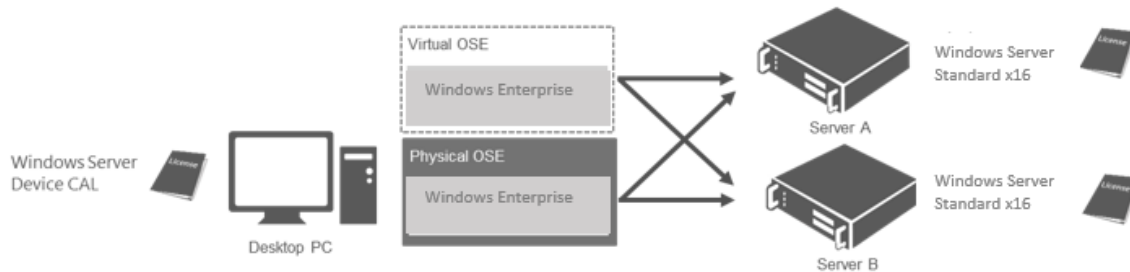


Figure 5: Device CALs are licensed per device, not per OSE on that device.

CALs permit access to your instances of earlier versions, but not later versions, of the server software, unless stated otherwise in the Product Terms. If you are accessing instances of an earlier version run pursuant to downgrade rights, you can use CALs that correspond to the version of the software you are running.

Management licenses licensed per managed OSE or per user

To license your devices for management by Microsoft System Center, which is under the Management Servers licensing model, you must acquire and assign the appropriate Management License (ML) for the OSE or VM or the user of the VM that will be managed. Included with the ML are the rights to run the corresponding management server software and SQL Server technology.

Licenses required for non-servers (clients)

There are two types of client MLs: one for managed operating system environments (or OSEs) and one for users. You can choose either type or a combination of both. For users with virtualized clients or multiple devices, the per user option may be a more economical choice.

OSE client MLs

Each OSE client ML permits customers to use the Management Server Software to manage one OSE. That OSE can be used by any number of users. Provided customers acquire and assign OSE client MLs to a device as described here, they can manage the OSEs on that device (one OSE per license). If the device has multiple VMs, the customer needs MLs for each VM and the host OSE.

User client MLs

Each user client ML permits customers to use the Management Server Software to manage one user's VMs. Those

³ In Figure 5, the desktop PC is running on virtualization technology. For clarity, since this is not the subject demonstrated in this illustration, the licenses necessary to allow for multiple instances of Windows Enterprise are not shown.

⁴ The multiplexing rule applies to CALs, even with virtualization technology. In Figure 5, if servers A and B are used to pool access for multiple devices or users, each of those end users and devices requires a CAL. Please see "Multiplexing" in the Universal License Terms of the [Product Terms](#).

VMs can be used on any number of devices. Provided customers acquire and assign a user client ML to a user as described here, they can manage all of the VMs used by that user. If customers have more than one user using an VM, and are not licensed by OSE, they must assign a user client ML to each of the users.

In some cases, a third type of client ML is available. The Enterprise CAL Suite and Core CAL Suite and their respective CAL Suite Bridges are device client MLs. A device client ML permits customers to use the Management Server Software to manage all of the OSEs (host and all VMs) on a device. Those OSEs can be used by any number of users. This can be a good choice for virtualized environments or shared environments. Provided customers acquire and assign a device client ML to their devices as described here, they can manage all of the VMs plus the host OSE on those devices. Please refer to the System Center Product Entry in the [Product Terms](#) for which suites permit management.

Additional resources

- ▶ Licensing guides:
 - [Volume Licensing reference guide](#)
 - [SQL Server 2016 licensing guide](#)
 - [Windows Server 2016 licensing guide](#)
- ▶ [Microsoft virtualization solutions](#)
- ▶ [License Mobility overview](#)
- ▶ Volume Licensing briefs:
 - [Licensing Windows Server for use with virtualization technologies](#)
 - [Introduction to Per Core licensing and basic definitions](#)
- ▶ Volume Licensing [Product Terms](#)
- ▶ [Microsoft License Advisor](#)

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