Volume Licensing brief

Licensing Microsoft server products for use in virtual environments

April 2014

This brief applies to all Microsoft Volume Licensing programs.

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Summary

The purpose of this brief is to give an overview of Microsoft licensing models for the server operating system and server applications under 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 Volume 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 Volume Licensing agreement.

What's New in This Brief

This brief replaces the previous version of the brief that was published in November 2013. It has been updated to reflect SQL Server 2014.

Definitions

Assigning a license: To assign a license simply means that you designate that license for one device or user. This designation avoids sharing a license across more than one device or user simultaneously. For example, after you have assigned a software license to a server, you are permitted to run the software on that server. You can use whatever manual or technical method that works for you to ensure that you have the correct number of licenses to cover your software use.

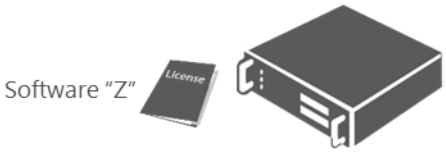


Figure 1: Assigning a license

Core factor: A numerical value associated with a specific physical processor for purposes of determining the number of licenses required to license all of the physical cores on a server. Refer to the SQL Server Core Factor Table for core factors for specific processors.

Datacenter: A building (or multiple buildings) that houses servers and ancillary equipment typically used in a corporate computing environment connected by a local area network (LAN).

Hardware thread: A hardware thread is either a physical core or a hyper-thread in a physical processor.

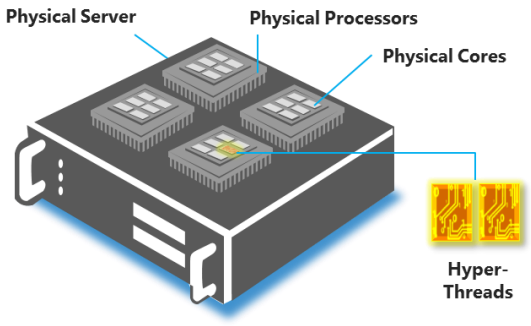


Figure 2: Physical server showing physical processors, physical cores, and hardware threads

High Performance Computing ("HPC") Workload: A workload where the server software is used to run a Cluster Node and is used in conjunction with other software as necessary to permit security, storage, performance enhancement and systems management on a Cluster Node for the purpose of supporting the Clustered HPC Application

Instance: An instance of software is the set of files that make up the software, stored in executable form and ready to run. You create an instance of software by executing the software's setup or install procedure, or by duplicating an existing instance. Instances of software can run on physical or virtual hardware systems.

Examples:

- An installed copy of the Windows Server 2012 R2 operating system on a hard disk is an instance of Windows Server 2012 R2.
- An installed copy of Microsoft Exchange Server 2013 within a virtual hard drive (VHD) (or other image format) file is an instance of Exchange Server 2013.

A VHD file with Exchange Server 2013 installed on top of Windows Server 2012 R22012 contains an instance of Windows Server 2012 R2 and an instance of Exchange Server 2013. Copying that VHD file creates another instance of Windows Server and another instance of Exchange Server. Deploying that VHD file to another server creates an instance of Windows Server and an instance of Exchange Server on that server.

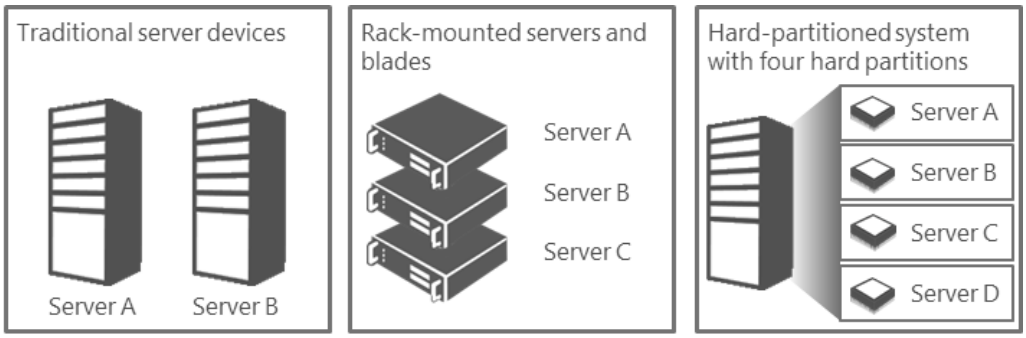


Figure 3: Different types of servers

Operating System Environment: Operating system environment (OSE) means all or part of an operating system instance, or all or part of a virtual (or otherwise emulated) operating system instance which enables separate machine identity (primary computer name or similar unique identifier) or separate administrative rights, and instances of

applications, if any, configured to run on the operating system instance or parts identified above. There are two types of OSEs, physical and virtual. A physical hardware system can have one physical OSE and/or one or more virtual OSEs.

Physical core: Each physical processor contains smaller processing units called *physical cores*. Some processors have two cores, some four, some six or eight, and so on.

Physical OSE: An OSE that is configured to run directly on a physical hardware system. The operating system instance used to run hardware virtualization software (for example, Microsoft Hyper-V Server or similar technologies) or to provide hardware virtualization services (for example, Microsoft virtualization technology or similar technologies) is considered part of the physical OSE.

Physical processor: A processor in a physical hardware system. Physical OSEs (see Operating System Environment) use physical processors.

Run an Instance: You run an instance of software by loading it into memory and executing one or more of its instructions. Once this has occurred, an instance is considered to be running (whether or not its instructions continue to execute) until it is removed from memory.

Server: A server is a physical hardware system capable of running server software. A hardware partition or blade is considered to be a separate physical hardware system, and, therefore, a separate server.

Server farm: A server farm consists of up to two datacenters each physically located in the following areas:

- In a time zone that is within four hours of the local time zone of the other (Coordinated Universal Time [UTC] and not Daylight Saving Time [DST]), and/or
- Within the European Union (EU) and/or European Free Trade Association (EFTA)

Each datacenter can be part of only one server farm. You can reassign a datacenter from one server farm to another, but not on a short-term basis (that is, not within 90 days of the last assignment).

Service provider: A service provider is an organization that provides services, such as software or hosting services, to other organizations.

Virtual core: The unit of processing power in a virtual (or otherwise emulated) hardware system. A virtual core is the virtual representation of one or more hardware threads. Virtual OSEs use one or more virtual cores.

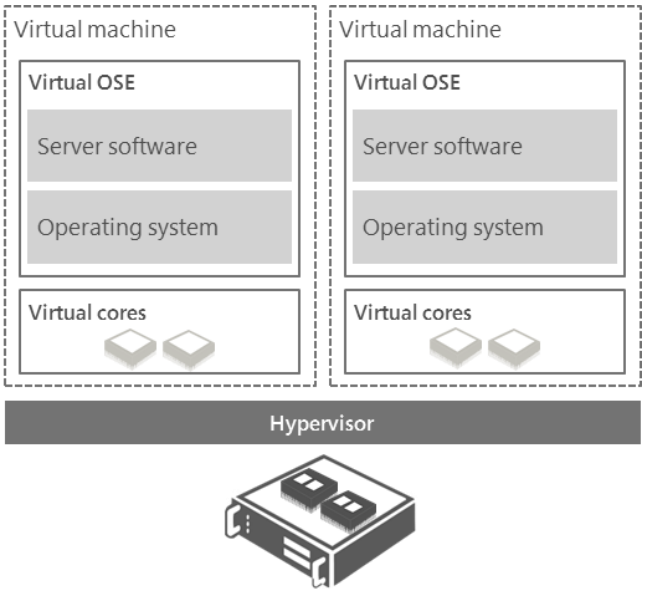


Figure 4: Virtual machine using virtual cores

Licensing Microsoft server products for use in virtual environments

Virtual OSE: An OSE that is configured to run on a virtual (or otherwise emulated) hardware system.

Virtual processor: A virtual processor is a processor in a virtual (or otherwise emulated) hardware system. Virtual OSEs use virtual processors. For licensing purposes, a virtual processor is considered to have the same number of threads and cores as each physical processor on the underlying physical hardware system.

Web Workloads: Also referred to as "Internet Web Solutions", Web Workloads are publicly accessible and consist solely of webpages, websites, web applications, web services, and/or POP3 mail serving. For clarity, access to content, information, and applications served by the software within an Internet Web Solution is not limited to your or your affiliates' employees.

Software in Internet Web Solutions is used to run:

- Web server software (for example, Microsoft Internet Information Services), and management or security agents (for example, the System Center Operations Manager agent).
- Database engine software (for example, Microsoft SQL Server) solely to support Internet Web Solutions.
- The Domain Name System (DNS) service to provide resolution of Internet names to IP addresses as long as that is not the sole function of that instance of the software.

Overview of Licensing Models and Associated Virtualization Rights

The following summarizes the licensing models and how virtualization affects them. Your review of this white paper should not be a substitute for careful review and understanding of your rights and obligations as described in your Microsoft Volume Licensing agreement and the Product Use Rights.

Products	Licensing
All products in each of the Microsoft server licensing models in the Volume Licensing Product Use Rights (PUR), for example: Windows Server 2012 R2 Exchange Server 2013	Use terms for each software license[1] specify the number of instances of software that you can run on a particular server at a time, rather than the number of copies of the software that you can install and use on your server. Each software license allows you to create and store any number of instances of the software on any of your servers or storage media to make it easier for you to run those instances on any of your licensed servers. Before you use the software under a license for a server product, you must assign that license to a server. Each hardware partition or blade is a separate physical hardware system, and, therefore, a separate server. In general, you can reassign software licenses for server products, but not on a short-term basis (that is, not within 90 days of the last assignment). When reassigning a license, keep in mind that when you move the license from one server to another that your original server will still need to be appropriately licensed to cover all of the virtual OSEs that you may run on that server at any given time moving forward. If applicable, you can reassign licenses sooner if you retire the licensed server due to permanent hardware failure. In addition, for certain server software licenses, under certain conditions, license mobility is

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

Products	Licensing
	permitted within a server farm. 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 section of this brief. You cannot separate software to run it in more than one OSE under a single license, unless expressly permitted—even if the OSEs are on the same server.
Products in the Microsoft Processor/CAL and Microsoft Server/CAL licensing models of the PUR, for example: Windows Server 2012 R2 Exchange Server 2013 Microsoft SQL Server 2012 Standard	Each External Connector license allows any number of external users to access any number of instances of the server software on a particular server, even if those instances are run under multiple licenses for the software. Note that SQL Server and 2013 versions of the productivity servers (e.g., Exchange Server) do not have an External Connector. Each Client Access License (CAL) allows any number of OSEs on a particular device (for example, client device) to access licensed instances of the corresponding server software. You do not need a separate device CAL for each OSE on a device. For Windows Server 2012 R2, you do not need a CAL to access an instance of the server software running on the physical OSE if that instance is being used solely to do the following: • Run hardware virtualization software • Provide hardware virtualization services • Run software to manage and service OSEs on the licensed server You also do not need Windows Server CALs to access any instance of Windows Server 2012 R2 that is running a Web or an HPC Workload. Windows Server CALs are not required for access of Windows Server Essentials edition, as it has a 25 User Account limit. CALs and External Connectors permit access to your instances of earlier versions, but not later versions, of the server software, unless stated otherwise in the PUR. If you are accessing instances of an earlier version run pursuant to downgrade rights, you can use CALs and External Connectors that correspond to the version of the software you are running. In general, you can reassign an External Connector license, but not on a short-term basis (that is, not within 90 days of the last assignment). However, you can reassign an External Connector license sooner if you retire the server to which it was assigned due to permanent hardware failure. In addition, under certain conditions, External Connector license mobility is permitted within a server farm. 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 section of this brief.
Products in the Management Servers licensing model of the PUR, for example: System Center 2012 R2 Datacenter	Each device or operating system environment (OSE) that will be managed requires a Management License (ML). Included with the ML are the rights to run the corresponding management server software. Separate management server software licenses are NOT required. System Center 2012 R2 server management licensing maximizes your private cloud value while simplifying purchasing. All server MLs include the same

Products	Licensing
System Center 2012 R2 Standard	components and the ability to manage any workload. System Center 2012 R2 server MLs are available in two editions differentiated by virtualization rights only: **Standard:** Each license permits management of up to two virtual OSEs **Datacenter:** When properly licensed, permits management of unlimited virtual OSEs

Microsoft also provides expanded use rights for certain editions of Windows Server 2012 R2 and SQL Server 2014. These expanded use rights are summarized in the following table. They apply only to the specific editions described.

Products Impacted	Use Rights
Windows Server 2012 R2 Essentials	Each license covers a single two-processor server. You may run the server software in one physical OSE and in one virtual OSE. This virtual OSE can only be for Windows Server 2012 R2 Essentials, not any other OSE. If you run all the permitted instances, the instance in the physical OSE can only be used to manage the virtual OSEs for Windows Server Essentials 2012 R2.
Windows Server 2012 R2 Standard	All physical processors need to be licensed. Each license covers up to two physical processors. You may run the server software in one physical OSE and in up to two virtual OSEs for each license you assign. If you run all of the permitted instances the instance in the physical OSE can only be used to manage the virtual OSEs. **Note:** Windows Server 2012 R2 Standard and Datacenter editions have the same Windows Server product features.
Windows Server 2012 R2 Datacenter	All physical processors need to be licensed. Each license covers up to two physical processors. You may run the server software in any number of OSEs, both physical and virtual. **Note:** Windows Server 2012 R2 Standard and Datacenter editions have the same Windows Server product features.
SQL Server 2014 Business Intelligence and Standard (licensed Server/CAL)	Each software license allows you to run any number of instances of the server software in one physical or virtual OSE on a particular server at a time.
SQL Server 2014 Standard (licensed per core)	Each virtual core assigned to the virtual OSE requires a core license, with a minimum of four core licenses per virtual OSE. This allows you to run any number of instances of the server software in the licensed virtual OSE.
SQL Server 2014 Enterprise (licensed per core)	To license individual virtual machines, each virtual core assigned to the virtual OSE requires a core license, with a minimum of four core licenses per virtual OSE. This allows you to run any number of instances of the server software in the licensed virtual OSE. Alternatively, when all physical cores on the server are licensed for SQL Server 2012 Enterprise you can run an unlimited number of instances of the software in a number of OSEs (physical and/or virtual) equal to the number of core licenses assigned to the server. For example, a four processor server with four cores per

	processor—fully licensed with sixteen core licenses—could run SQL Server software in up to sixteen virtual machines, regardless of the number of virtual cores allocated to each virtual machine. With the addition of Software Assurance Software Assurance coverage for all Enterprise Edition core licenses (when the server is fully licensed), your use rights are expanded, allowing you to run any number of instances of the software in any number of OSEs (physical or virtual). This enables you to deploy an unlimited number of virtual machines to handle dynamic workloads and fully utilize hardware computing capacity. **Note:** This benefit ends when Software Assurance coverage expires.

The following sections provide details and examples for server licensing models and clarify enhancements for specific products.

License by Running Instance

All products in the Microsoft Servers licensing models are licensed by running instance. Each license gives you the right to run a certain number of instances of the software on a specific server at a time.

The use rights specify that you must first "assign" an acquired software license to a specific server.[2] After the license has been assigned the following occurs:

- That server is the "licensed server" for that software license.
- You can run instances of the software on the licensed server as specified in the product use rights for the product.
- You can create and store any number of instances of the software on any of your servers or storage media.

For example, each license for Exchange Server grants you the right to run one instance of Exchange Server at a time. You can run that instance in a physical or virtual OSE, but only on the licensed server. However, you can create or store any number of instances of Exchange Server on any of your servers or storage media[3]. As Figure 5 below illustrates, if you assign an Exchange Server license to Server A, you can run one instance of Exchange Server in one physical OSE (Figure 5–A) or in one virtual OSE (Figure 5–B).

[2] Each hardware partition or blade is a separate physical hardware system, and, therefore, a separate server.

[3] You can create instances of the software only to exercise your right to run instances of the software. You do not have the right, for example, to create instances of the software to make them available for distribution outside your organization.

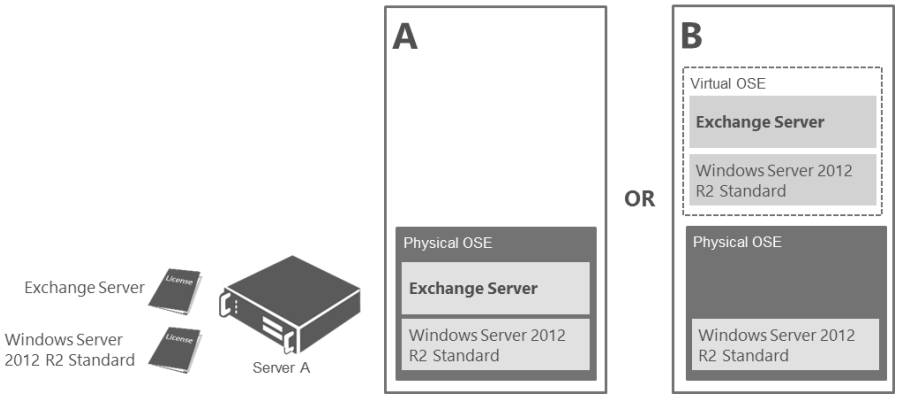


Figure 5: Running an instance of Exchange Server in a physical or virtual OSE

In Figure 6 below, the storage area network (SAN) contains six VHD files, each with an instance of Windows Server 2012 R2 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 eight licenses, you need assign only one license for Windows Server 2012 R2 Standard to Server A because a license covers two processors and allows for two instances of Windows Server.

Similarly, instead of eight licenses, you need 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, you can also create any number of non-running instances of Windows Server 2012 R2 Standard and Exchange Server on any of your 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 assign more than one license to a server to have the right to run more instances. For example, in the following figure, one Windows Server 2012 R2 Standard license has been assigned to the server. Each license permits you to run two instances in a virtual OSE and an instance in a physical OSE. If you assign an additional license to the same server, you can run four instances in virtual OSEs simultaneously. With each additional Windows Server 2012 R2 Standard license you assign you can run an additional two instances of Windows Server. However, if you want to create a highly virtualized environment, then you should assign Windows Server 2012 R2 Datacenter edition licenses, which allows you to run an unlimited number of instances of Windows Server on the licensed server.

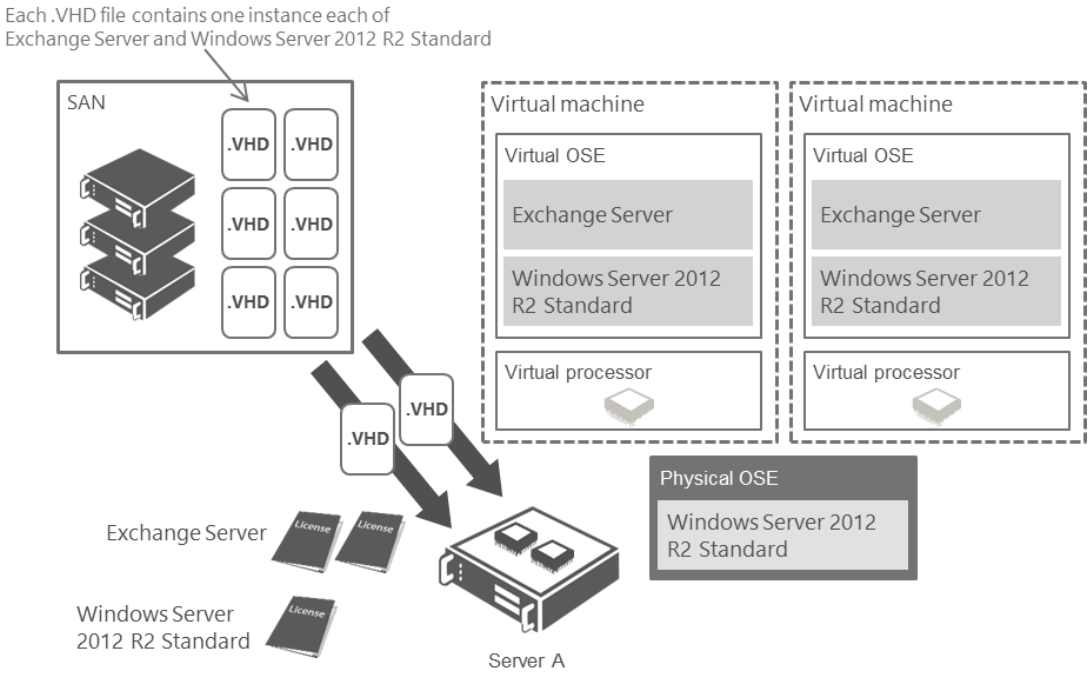


Figure 6: Applying the licensing model to a SAN scenario

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 7, the customer assigned Server A and Server B one license each for Windows Server 2012 R2 Standard and one license for Exchange Server 2013. Originally, one instance of Exchange Server is running on Server A. If Server A becomes overloaded, you 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 2012 R2 Standard and one instance of Exchange Server on Server A at a time. Similarly, you can run two instances of Windows Server 2012 R2 Standard and one instance of Exchange Server on Server B at a time.

In addition, for certain server software licenses, under certain conditions, license mobility is permitted within a server farm. 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 section of this brief.

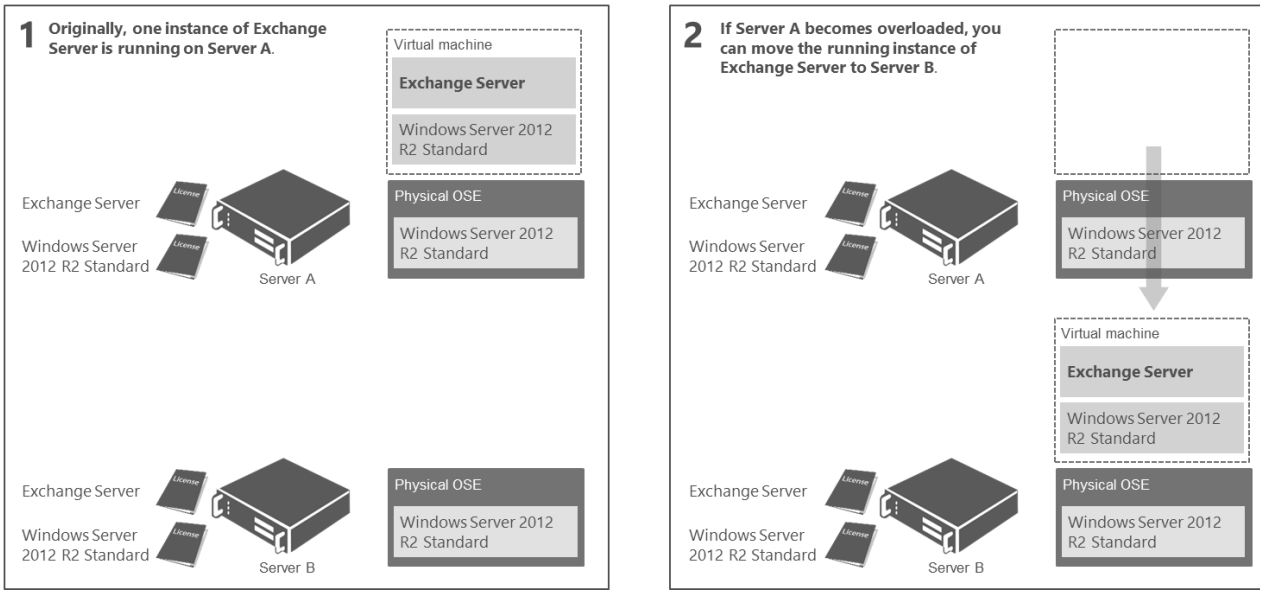


Figure 7: Moving instances of software from one server to another

Reassigning a Software License

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 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.

For example, in Figure 8, 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.[4]

[4] In Figure 8, servers A and B are probably running on virtualization technology. For clarity, the license count in this example and illustration does not show the instances of Windows Server 2012 R2 running in the physical OSE.

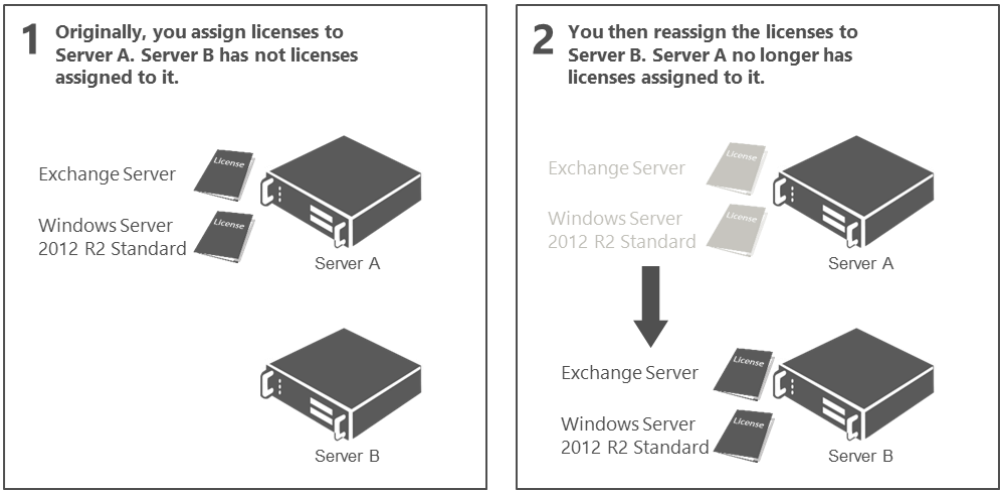


Figure 8: Reassigning a software license from one server to another

In general, as a Microsoft Volume Licensing customer, you can reassign software licenses for products in the Microsoft Servers licensing models, but not on a short-term basis. "Short-term basis" means more frequently than within 90 days of the last assignment (or reassignment). When reassigning a license, keep in mind that when you move the license from one server to another that your original server will still need to be appropriately licensed to cover all of the virtual OSEs that you may run on that server at any given time moving forward. If applicable, you can reassign software licenses sooner if you retire the server sooner due to permanent hardware failure. In Figure 8, for example, if Server A is retired due to permanent hardware failure, you can then reassign the licenses for Windows Server and Exchange Server to Server B.

In addition, for certain server software licenses, under certain conditions, license mobility is permitted within a server farm. 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 section of this brief.

Introduction to Per Core Licensing

With the release of Microsoft SQL Server 2012, a new licensing model for licensing server software based on computing power was introduced. Successor version, SQL Server 2014, is licensed under this same model. In this computing-power–based license model, the measure of computing power shifts from physical processors to cores. Core-based licensing provides a more precise measure of computing power and a more consistent licensing metric, regardless of whether solutions are deployed on physical servers on-premises, or in virtual or cloud environments. This also applies now to BizTalk Server 2013.

Under the Per Core licensing model, each server running SQL Server software or any of its components (such as Reporting Services or Integration Services) must be assigned an appropriate number of SQL Server core licenses. The number of core licenses needed depends on whether you are licensing the physical server or individual virtual OSEs.

Unlike the Server+CAL licensing model, the Per Core model allows access for an unlimited number of users or devices to connect from either inside or outside an organization's firewall without the need for a CAL.

You have the following two options for licensing under the per core licensing model:

1. **Individual Virtual OSE.** You can license based on individual virtual OSEs within the server that are running the server software. If you choose this option, for each virtual OSE in which you run the server software, you need a number of licenses equal to the number of virtual cores in the virtual OSE, subject to a minimum requirement of four licenses per virtual OSE. In addition, if any of these virtual cores is at any time mapped

to more than one hardware thread, you need a license for each additional hardware thread mapped to that virtual core. Those licenses count toward the minimum requirement of four licenses per virtual OSE.

2. **Physical Cores on a Server.** You can license based on all of the physical cores on the server. If you choose this option, the number of licenses required equals the number of physical cores on the server multiplied by the applicable core factor located in the SQL Server Core Factor Table.

Licensing SQL Server 2014 in a Virtualized Environment

Microsoft SQL Server is increasingly being deployed in virtualized environments, which enable running instances of SQL Server concurrently in separate virtual OSEs, or virtual machines on a server or in a server farm.

As with SQL Server 2012, its successor version, 2014, offers expanded virtualization rights, options, and benefits relative to earlier versions to provide greater flexibility for you to deploy the software in virtual environments. When deploying SQL Server 2014 software in virtualized environments, you have the choice to license either individual virtual machines as needed, or to license for maximum virtualization in highly virtualized, private cloud, or dynamic environments. Maximum virtualization can be achieved by licensing the entire physical server with Enterprise Edition core licenses and covering those licenses with Software Assurance.

Licensing Individual Virtual Machines Using the Per Core Licensing Model

As you consolidate existing workloads and refresh hardware, you may find that a SQL Server instance uses only a fraction of the available system computing power. When deploying databases in virtual environments that require just a fraction of a physical server's compute capacity, substantial savings may be achieved by licensing individual virtual machines.

To license individual virtual machines using the Per Core model, you must purchase a core license for each virtual core allocated to the virtual machine, subject to a four core license minimum per virtual machine. For licensing purposes, a virtual core maps to a hardware thread. When licensing individual virtual machines, core factors do not apply.

Note: Licensing individual virtual machines is the only licensing option available for SQL Server 2014 Standard Edition when running the software in a virtualized environment under the Per Core model.

As with SQL Server 2012, Microsoft continues to offer support for license mobility as an exclusive Software Assurance (Software Assurance) benefit available for ***all*** SQL Server software editions of SQL Server 2014. For more information on licensing for application mobility, refer to the License Mobility section of this brief.

1. License the virtual cores in each virtual machine.
2. There is a minimum of four core licenses required for each virtual machine.

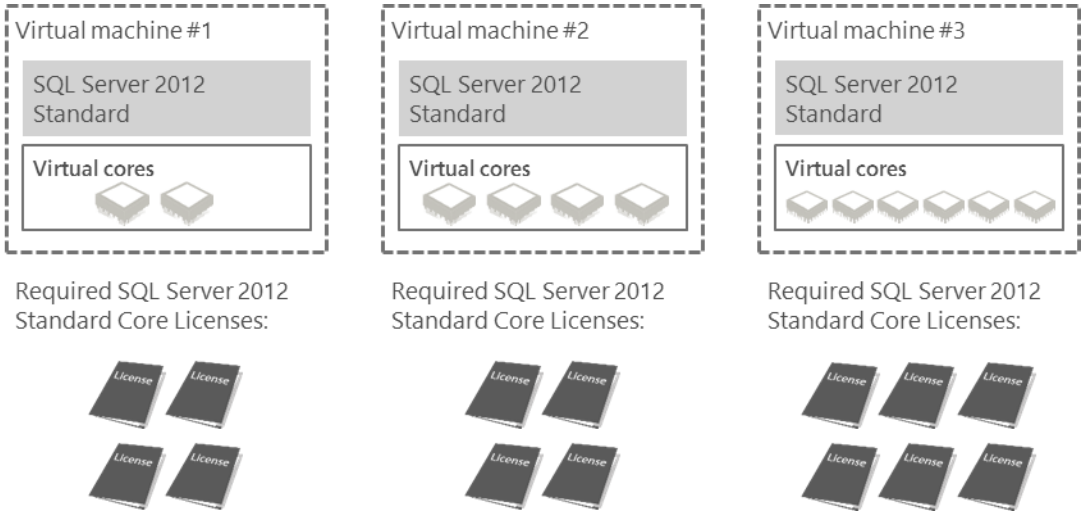


Figure 9: Licensing individual virtual machines for SQL Server 2012 under Per Core model

Additional licenses may be required if multiple hardware threads are supporting a single virtual core. (A core license allows a single virtual core supported by a single hardware thread.)

How to License Individual Virtual Machines Using the Server+CAL Licensing Model (SQL Server 2014 Standard & Business Intelligence)

To license individual virtual machines using the Server+CAL model (available for SQL Server 2014 Standard and Business Intelligence editions only) you simply purchase one server license for each virtual machine running SQL Server software, regardless of the number of virtual processors allocated to the virtual machine.

Note: Each user or device accessing SQL Server 2012 software, regardless of a virtual or physical deployment, requires a SQL Server 2014 CAL.

1. License each virtual machine with a server license.
2. License each user or device with a CAL.

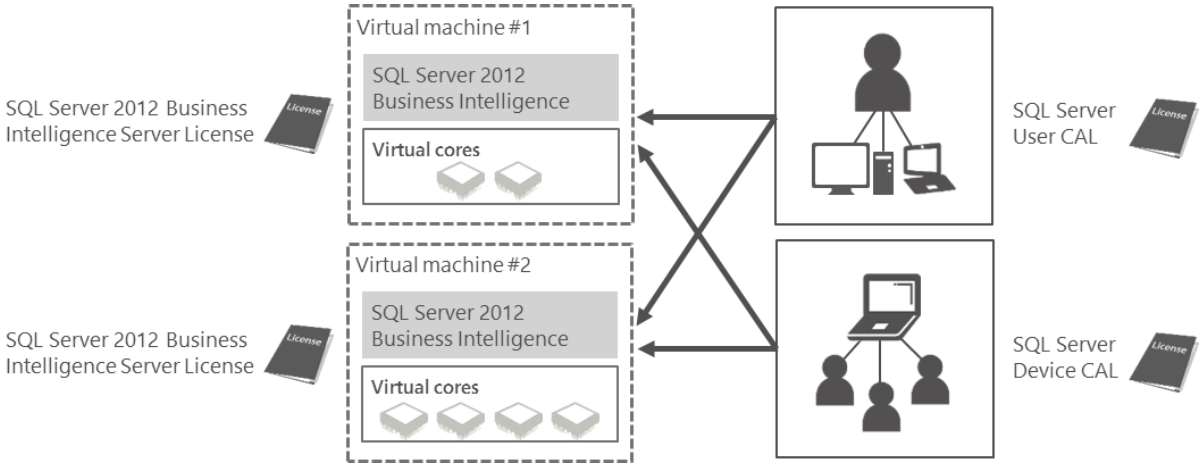


Figure 10: Licensing individual virtual machines for SQL Server 2012 under Server+CAL model

Licensing SQL Server 2014 Enterprise Under the Server/CAL Licensing Model

SQL Server 2014 Enterprise offers enhanced use rights compared to the other SQL editions in the same licensing model. For each license that you assign to a server you may run unlimited instances of the server software in up to four OSEs.

Note: Each user or device accessing SQL Server 2014 software, regardless of a virtual or physical deployment, requires a SQL Server 2012 CAL.

Licensing for Maximum Virtualization

With the SQL Server 2014 Enterprise Edition, when you have licensed all physical cores on the server, you can run an unlimited number of instances of the software in a number of OSEs (physical and/or virtual) equal to the number of core licenses assigned to the server. For example, a two-processor server with two cores per processor—fully licensed with eight core licenses (assuming a core factor of 2 in the SQL Server Core Factor Table)—could run SQL Server software in up to eight virtual machines, regardless of the number of virtual cores allocated to each virtual machine.

With the addition of Software Assurance (Software Assurance) coverage for all Enterprise Edition core licenses (when the server is fully licensed), your use rights are expanded, allowing you to run any number of instances of the software in any number of OSEs (physical or virtual). This enables you to deploy an unlimited number of virtual machines to handle dynamic workloads and fully utilize hardware computing capacity. **Note**: This benefit ends when Software Assurance coverage expires.

Licensing for maximum virtualization can be an ideal solution when:

- Deploying SQL Server private cloud scenarios with high virtual machine density.
- Hyper-threading is being used.
- Using dynamic provisioning and de-provisioning of virtual machine resources.

Shown is an example of licensing for unlimited virtual machines with Enterprise Edition core licenses and Software Assurance (assuming a core factor of 2).

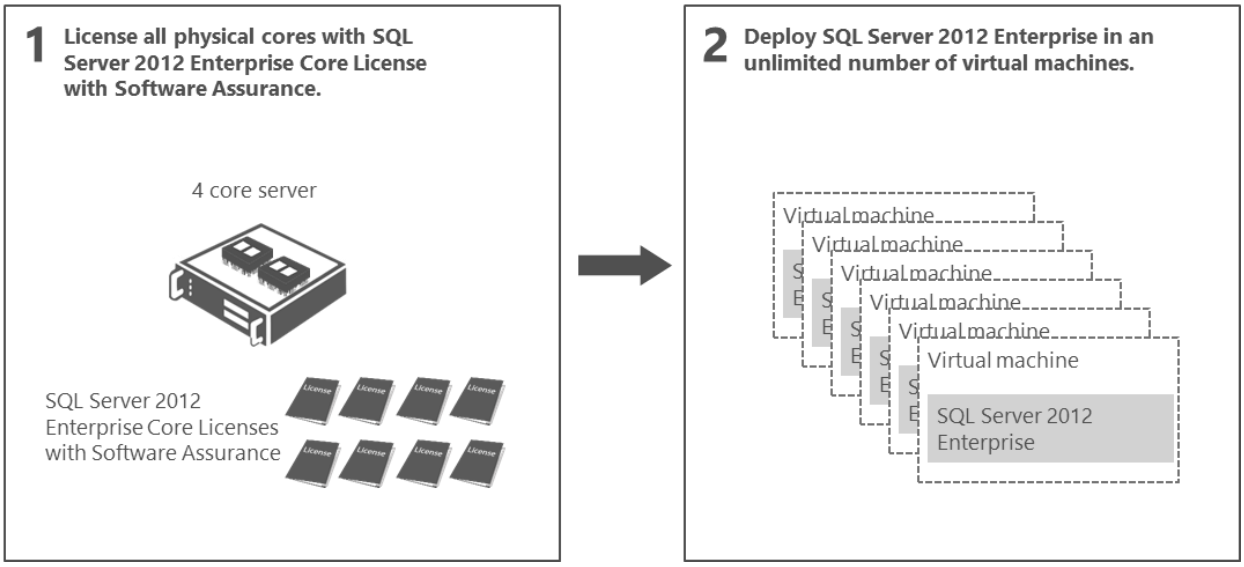


Figure 11: Licensing for SQL Server 2012 for maximum virtualization

External Connector Licenses Licensed Per Server, Not Per Instance or OSE

For products in the Processor/CAL licensing model, each External Connector assigned to a server allows any number of external users to access any number of licensed instances of the server software on that server.[5] You do not need a separate External Connector for each instance of the software, or for each OSE on that server. As demonstrated in Figure 12, even if Server A is running multiple instances of Windows Server 2012 R2, you need only one External Connector for any number of external users to access Windows Server 2012 R2 on Server A. It does not matter whether those instances of Windows Server 2012 R2 are run under one or many licenses.

[5] Each hardware partition or blade is a separate physical hardware system, and, therefore, a separate server.

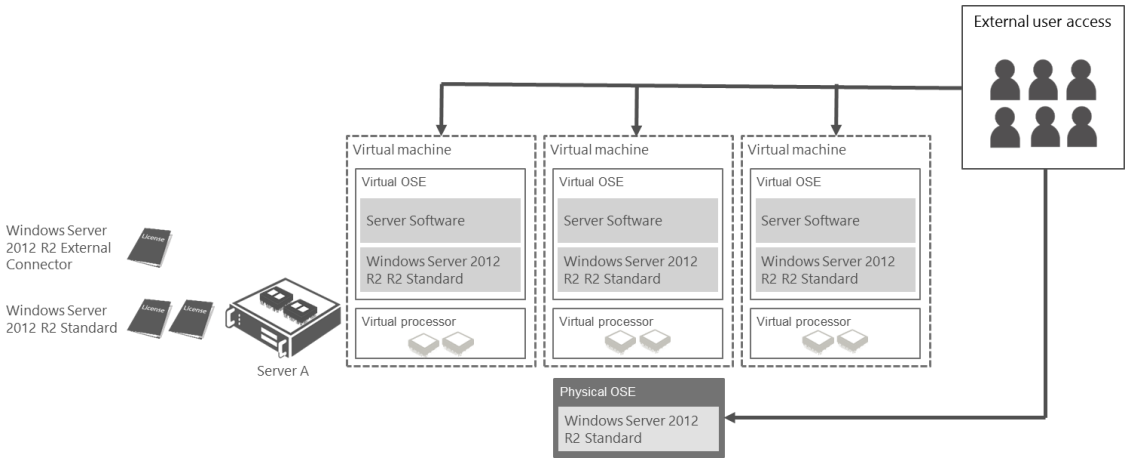


Figure 12: External Connectors licensed per server, not per instance or OSE

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

Reassignment of External Connector Licenses

In general, you can reassign an External Connector license, but not on a short-term basis (that is, not within 90 days of the last assignment). However, you can reassign an External Connector license sooner if you retire the server to which it was assigned due to permanent hardware failure.

In addition, under certain conditions, license mobility is permitted within a server farm. 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 section of this brief.

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 OSEs on the device.[6] As demonstrated in Figure 10 below, even if the desktop PC has multiple OSEs[7], and each of those OSEs is separately accessing Windows Server 2012 R2 on servers A and B, you need only one CAL for the desktop PC.[8]

[6] Each hardware partition or blade is a separate physical hardware system, and, therefore, a separate server.

[7] In Figure 13, 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 8 Enterprise are not shown.

[8] The multiplexing rule applies to CALs, even with virtualization technology. In Figure 13, 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 PUR.

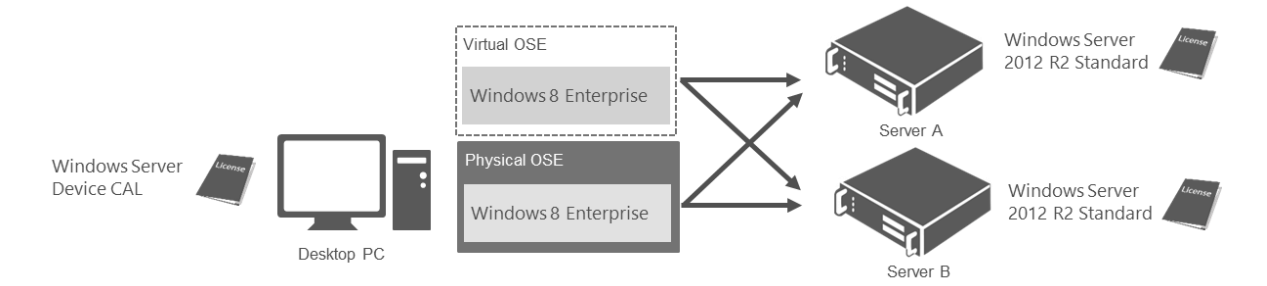


Figure 13: Device CALs are licensed per device, not per OSE on that device.

CALs permit access to your instances of earlier versions, but not later versions, of the server software, unless stated otherwise in the PUR. 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 2012 R2, which is under the Management Servers licensing model, you must acquire and assign the appropriate Management License (ML) for the device or OSE 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 Managed Servers

There is one type of server ML: OSE. An OSE server ML permits you to use the management server software to manage the number of OSEs corresponding to its edition. All of the server MLs you assign to a server must be of the same edition.

Note: System Center 2012 R2 Standard and Datacenter editions provide the same management server software components.

Standard Edition Server MLs

The number of OSE server MLs you need depends on the number of physical processors there are on the server on which the managed OSEs will run and the number of OSEs you will manage on that server. You must calculate the licenses you need based on each, as described below, and acquire and assign to your server the greater number of licenses.

Counting licenses based on processors: Each license covers up to two physical processors, so you must count the number of physical processors on the server, divide that number by two, and then round up to the nearest whole number.

Counting licenses based on managed OSEs: Each license permits you to manage up to two OSEs, so you must count the number of OSEs you will manage on the server, divide that number by two, and round up to the nearest whole number. An exception to this rule is when the physical OSE on your server is being used solely to run hardware virtualization software, provide hardware virtualization services, and run software to manage and service OSEs on that device. In that case, you only count the number of virtual OSEs you will manage on the server, divide that number by two, and round up to the nearest whole number.

Datacenter Edition Server MLs

The number of OSE server MLs you need depends on the number of physical processors there are on the server on which your managed OSEs will run. Each license covers up to two physical processors, so you must count the number of physical processors on the server, divide that number by two, round up to the nearest whole number, and acquire and assign that number of licenses to your server.

Provided you acquire and assign to your server the required number of Datacenter Edition server MLs, as described previously, you can manage any number of OSEs on that server.

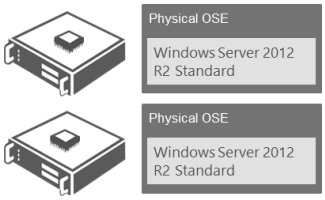
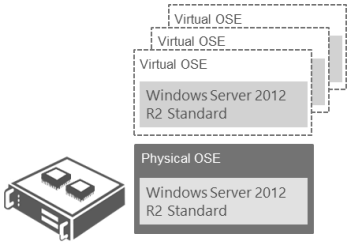
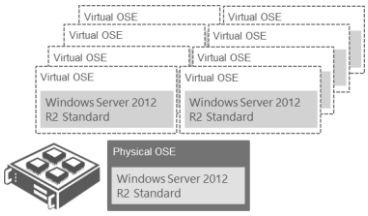
Server Configuration	Standard Server MLs Required	Datacenter Server MLs Required	Rationale
2 one-processor servers, non-virtualized 	2	2	A one-processor server requires at least one Server ML. A single Server ML cannot be used to license two one-processor servers.
1 four-processor server, non-virtualized 	2	2	Two licenses are required because each Server ML covers up to two physical processors.
1 two-processor server and three virtual OSEs 	2	1	Because one Standard Server ML supports two virtual OSEs, two licenses are needed to manage three virtual OSEs. Because one Datacenter Server ML supports unlimited OSEs, only one license is needed to run three virtual OSEs
1 four-processor server and eight virtual OSEs 	4	2	Because one Standard Server ML supports two virtual OSEs, four licenses are needed to manage eight virtual OSEs. Because one Datacenter Server ML supports unlimited virtual OSEs, two licenses are needed to cover four processors.

Figure 14: Examples of server ML requirements

Licenses Required for Non-Servers (Clients)

There are two types of client MLs: one for managed OSEs and one for users. You can choose either type or a combination of both.

OSE Client MLs

Each OSE client ML permits you to use the Management Server Software to manage one OSE. That OSE can be used by any number of users. Provided you acquire and assign OSE client MLs to your device as described here, you can manage the OSEs on that device (one OSE per license).

Figure 15: One OSE client ML permits management of an OSE used by any number of users.

User Client MLs

Each user client ML permits you to use the Management Server Software to manage one user's OSEs. Those OSEs can be used on any number of devices. Provided you acquire and assign a user client ML to your user as described here, you can manage all of the OSEs used by that user. If you have more than one user using an OSE, and you are not licensed by OSE, you must assign a user client ML to each of the users.

Figure 16: One user client ML permits management of any number of OSEs used by the licensed user

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 you to use the Management Server Software to manage the OSEs on a device. Those OSEs can be used by any number of users. Provided you acquire and assign a device client ML to your device as described here, you can manage all of the OSEs on that device. Please refer to the Product-Specific License Terms section in the PUR for which products permit management.

Run Multiple Instances of Windows Server 2012 R2 on a Server Under a Single License

If you want to have a lightly virtualized environment, you can choose to run multiple instances of Windows Server by licensing Windows Server 2012 R2 Standard edition. For both Windows Server 2012 R2 Standard and Datacenter editions, you need to license all the physical processors on the server. For each license for Windows Server 2012 R2 Standard that you assign to a server you may run, at any one time, two instances of the server software in up to two virtual OSEs on the server. If all two instances are running in virtual OSEs, you can also run an instance in the physical OSE solely to run hardware virtualization software, provide hardware virtualization services, or run software to manage and service OSEs on the licensed server. If you want to increase the number of Windows Server instances to four, you can assign a second Windows Server 2012 R2 Standard license to the same physical server (often referred to as stacking licenses). With each additional Windows Server 2012 R2 Standard edition license you assign to the server you will be able to run an additional two instances of Windows Server.

In addition to being able to run instances of Windows Server 2012 R2 Standard edition in these instances, you can also run Enterprise or Essentials as part of your downgrade rights (see the PUR and Product List for downgrade rights). For example, in Figure 17, Server A is running five separate instances of Windows Server in five separate OSEs. Server A's physical OSE is running an instance of Windows Server 2012 R2 Standard. Two of Server A's virtual OSEs are running instances of Windows Server 2012 R2 Standard, one is running an instance of Windows Server 2008 R2

Enterprise, and another one is running one instance of Windows Server 2008 R2 Standard. By assigning two Windows Server 2012 R2 Standard edition licenses to Server A, you can run all five instances on Server A. If you decide to run all five permitted instances under the two Windows Server 2012 R2 Standard edition licenses, the instance running in the physical OSE is restricted to running hardware virtualization software, providing hardware virtualization services, or running software to manage and service OSEs on the licensed server. In other words, in this situation, you can run any software in the physical OSE as long as it is used solely to manage or directly support the management of the virtual OSEs on the licensed server. When running all five instances simultaneously, you cannot run software in the physical OSE for any other purpose.

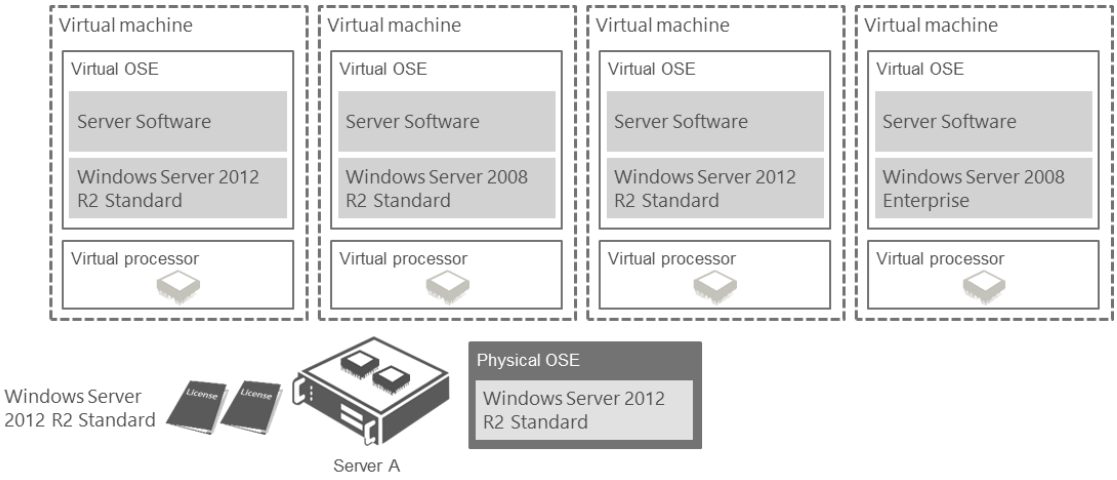


Figure 17: Windows Server 2012 R2 Standard lets you run up to five instances on a server

Finally, if you have a server running an instance of Windows Server 2012 R2 in a physical OSE, you need a Windows Server 2012 R2 CAL to access that instance, except in the case where that instance is being used solely to:

- Run hardware virtualization software
- Provide hardware virtualization services
- Run software to manage and service OSEs on the licensed server

However, note that you need appropriate CALs to access any virtual OSEs and Microsoft applications that are running on the server.

As a result in a situation where you are running Windows Server 2012 R2 in the physical OSE and Windows Server 2003 in virtual OSEs and you are using the physical OSE solely to run hardware virtualization software, provide hardware virtualization services, and/or run software to manage and service operating system environments on the licensed server, you do not need CALs to access the Windows Server 2012 R2 instance. You do need, however, Windows Server 2003 CALs to access any of the virtual OSEs.

Additionally you do not need Windows Server 2012 R2 CAL to access any Windows Server 2012 R2 instance (physical or virtual) that is running either a Web or an HPC Workload.

Run Any Number of Instances of Windows Server 2012 R2 Datacenter

If you want to have a highly virtualized environment you can choose to run Windows Server 2012 R2 Datacenter edition, which enables you to run any number of instances of the software on a server, as described below. You need

to license all the physical processors on the server (Virtual processors do not need to be licensed for Windows Server 2012 R2) Each license of Windows Server 2012 R2 Datacenter covers up to two physical processors on a single server. After you have determined the number of licenses required, you must assign those licenses to the server, at which point you can run the following simultaneously:

- One instance of the server software in the physical OSE, and
- Any number of instances of the server software in virtual OSEs

In addition, you can run instances of Windows Server Enterprise, Standard or Essentials editions in the virtual OSEs. As shown in Figure 18 below, Server A is running six separate instances of Windows Server in six separate OSEs. Server A's physical OSE is running an instance of Windows Server 2012 R2 Datacenter. One of Server A's virtual OSEs is running an instance of Windows Server 2012 R2 Standard, one is running an instance of Windows Server 2008 R2 Enterprise, one is running an instance of Windows Server 2003 R2 Standard edition, and one is running an instance of Windows Server 2008 R2 Datacenter.

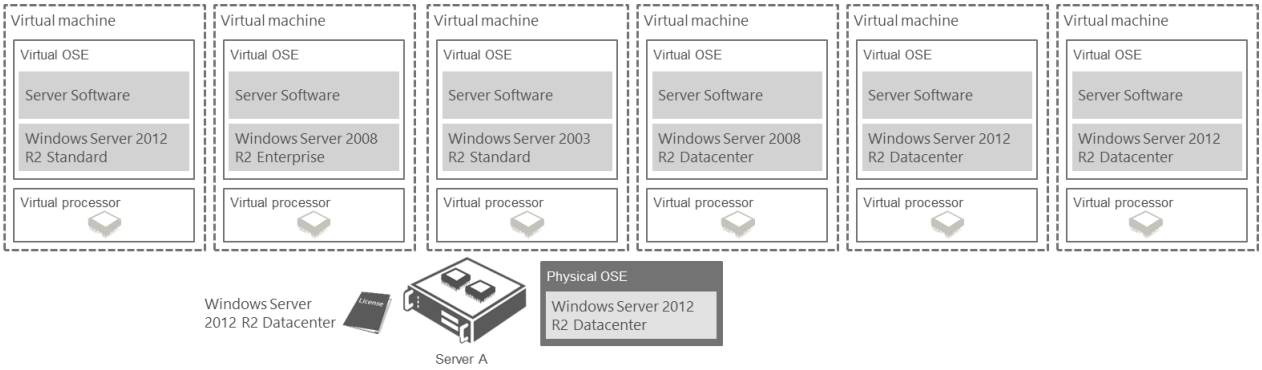


Figure 18: Windows Server 2012 R2 Datacenter lets you run any number of instances on a server

In general, it is much easier to consolidate on Windows Server 2012 R2 Datacenter than it is on Windows Server 2012 R2 Standard.

Although Windows Server 2012 R2 Datacenter is licensed by physical processor, CALs are still required for access.

License Mobility

Overview

To help you take advantage of virtualization and cloud technologies, Microsoft offers expanded use rights for certain server products and external connector (External Connector) licenses. These rights provide greater added flexibility for moving licenses within datacenters, server farms, and third-party shared servers. Specifically, for eligible products, these rights include the following:

- **License Mobility within Server Farms.** For eligible products, the 90- reassignment rule is waived, meaning you can reassign licenses from one server to another within your server farm as frequently as needed. Generally, products require Software Assurance for License Mobility within Server Farms. The exception is some prior versions of existing products and some products for which new versions have not been released.
- **License Mobility through Software Assurance.** For eligible products covered by active Software Assurance, you can deploy application servers in a service provider's shared hardware environment.

Each of these types of License Mobility is described in further detail below.

License Mobility Within Server Farms

Under the standard use rights for Microsoft server applications and external connector (External Connector) licenses, licenses must be assigned to a server for at least 90 days before you are allowed to reassign it to a different server. Under this rule, for example, if you want to move running instances of software from one server to another more frequently than every 90 days, you have to assign licenses to both servers. For certain server applications and External Connectors, Microsoft waives this 90-day reassignment rule, allowing you to reassign licenses from one server to another within a **server farm** as frequently as you require. This allows you to freely move both licenses and running instances within a server farm from one server to another. In the example above, so long as you are not running the software on both servers at one time, you can do this without having to assign licenses to both servers simultaneously. This potentially reduces the number of licenses needed to support your workloads. And it means that instead of counting instances or processors or cores and licensing **by server**, you can count instances or processors or cores and license **by server farm**, as you are allowed to reassign licenses freely across servers within a server farm.

Defining Your Server Farm

A server farm consists of up to two datacenters, each physically located either in a time zone that is within four hours of the local time zone of the other [Coordinated Universal Time (UTC) and not Daylight Standard Time (DST)], and/or within the European Union (EU) and/or European Free Trade Association (EFTA).

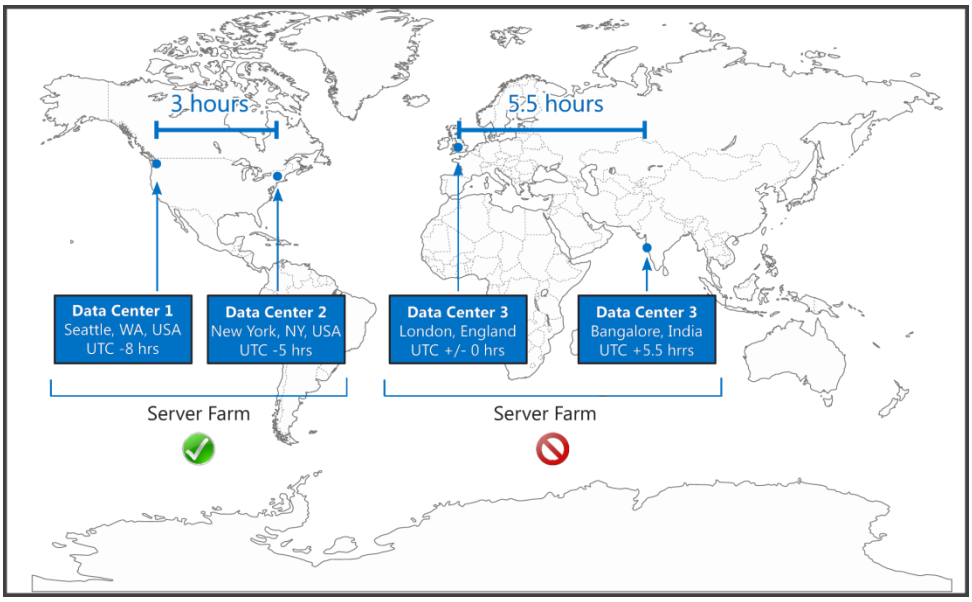


Figure 19: Examples of datacenters that can and cannot be in the same server farm based on UTC time zones.

The following are examples of when two datacenters can or cannot be part of the same server farm.

Location of Datacenter 1	Location of Datacenter 2	Allowed in Same Server Farm?
United States East Coast	United States West Coast	Yes
United States	EU	No
Portugal	Finland	Yes (both are in EU)
India	Japan	Yes
EU	India	No (based on UCT)

If You Have More Than Two Datacenters

If, for example, you have three datacenters, you have to define which two create your server farm (in this example, "server farm A"). You can reassign the licenses you assign to the servers in server farm A to other servers in server farm A as frequently as needed. Your third datacenter, the one that is not part of your server farm A, can form part of a separate "server farm B." You can reassign the licenses you assign to the servers in your server farm B to other servers in server farm B as frequently as you need to. However, you cannot reassign licenses from server farm A to server farm B within 90 days of the last assignment.

Determining Product Eligibility for License Mobility Within Server Farms

Microsoft application server products and External Connectors that are eligible for license mobility are designated as such in the PUR.

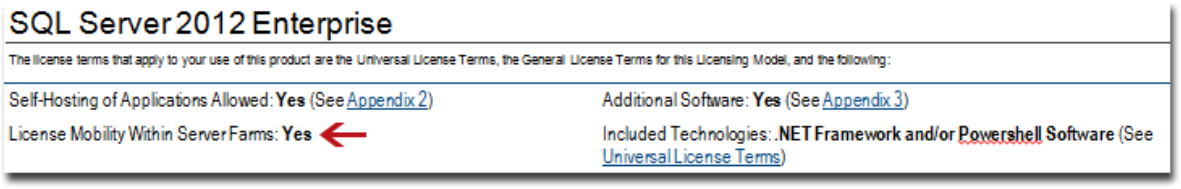


Figure 20: Confirming eligibility in the PUR

Notes:

- License Mobility with Server Farms rights apply to eligible licensed product versions available as of September 2008 and after.
- These rights do not apply to software licenses for the Windows Server operating system, CALs, User Subscription Licenses (USLs), Device Subscription Licenses (DSLs), Add-on Subscription Licenses (Add-on SLs), or MLs.
- These rights apply only to licenses acquired under a Microsoft Volume Licensing program.
- Windows Server 2012 R2, RDS 2012 and Active Directory RMS 2012 External Connectors and all SQL Server 2014 Editions are eligible for License Mobility within Server Farms. However, unlike Microsoft products that were historically eligible for License Mobility within Server Farms, these products require that you have active Microsoft Software Assurance to be eligible.

For Eligible Products Licensed Under the Per Core Licensing Model

Effectively you can use License Mobility within Server Farms to reassign licenses between servers in a server farm as often as you require. Every time you reassign licenses, you should ensure that the originating and destination servers are correctly licensed as per the PUR for any SQL Server instances that you are running.

For Eligible Products Licensed Under the Management Servers, Online Services, Server/CAL, and Specialty Server Licensing Models

For eligible products licensed under the Management Servers, Online Services, Server/CAL, and Specialty Server licensing models, you can run instances of the server software on any of the servers in your server farm, as long as the total number of running instances at any time does not exceed the total number of licenses assigned to the server farm. Since the 90-day reassignment rule is waived within a server farm, you can reassign a software license to any server in your server farm as frequently as you need to. As long as you have one software license for each instance of the server software that is running at any one time, you can move your running instances freely across the server farm.

For example, assume you run three instances of Microsoft SharePoint Server 2010 server software in three separate virtual OSEs simultaneously. You only need three SharePoint Server 2010 software licenses, and then you can run those three running instances anywhere in your server farm.

Note: If you are using load balancing software in your datacenter with products licensed under the Server/CAL model, you should ensure that for a given license all the running instances should be together on the same server. You should also ensure that the load balancing software does not move an OSE to one server and another OSE to another server. All the OSEs allowed for a given license should at all times be on the same server.

For All External Connector Licenses

For products for which External Connector licenses are available, you can move your External Connector licenses freely from server to server. Since the 90-day reassignment rule is waived within a server farm for External Connector licenses, you can reassign an External Connector license to any server in your server farm as frequently as you require. The number of servers in the server farm that external users without CALs access at any one time cannot exceed the number of External Connector licenses assigned to servers in the server farm. Additionally Windows Server 2012 R2, Windows Server 2012 RDS CALs, and Active Directory RMS 2012 External Connectors require that you have active Software Assurance in order to be eligible for license mobility within Server Farms.

License Mobility Through Software Assurance

With License Mobility through Software Assurance, as a Microsoft Volume Licensing customer with active Software Assurance, you can deploy certain application servers in a service provider's shared hardware environment. A service provider is an organization that provides services, such as software or hosting services, to other organizations.

With License Mobility through Software Assurance, you can do the following:

- Move your licensed software from your servers to a third party's shared servers
- Access your licensed software running on a third party's shared servers under the appropriate access licenses
- Run your software in virtual OSEs on the third party's shared servers

Note: For detailed information about License Mobility through Software Assurance, refer to the License Mobility through Software Assurance website.

Determining Product Eligibility for License Mobility Through Software Assurance

Any product designated in the PUR as eligible for License Mobility within Server Farms is also eligible for License Mobility through Software Assurance provided that the license is covered with active Software Assurance.

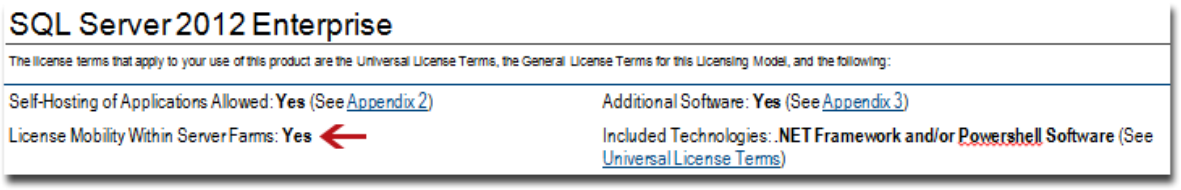


Figure 21: Confirming eligibility in the PUR

Additionally, when covered by active Software Assurance, System Center Server MLs are also eligible for License Mobility through Software Assurance.

To use License Mobility through Software Assurance, you must do the following:

- Maintain Software Assurance coverage for licenses under which you run software on shared third party servers
- Maintain Software Assurance coverage for all CALs, External Connector licenses and Server Management Licenses under which you access your licensed software running on shared third party servers and manage the OSEs in which that software runs
- Run your licensed software on third party shared servers solely for your use and benefit
- Deploy your licenses only with Windows Azure Platform Services or qualified License Mobility through Software Assurance Partners. For a list of qualified License Mobility through Software Assurance Partners, visit http://www.microsoft.com/licensing/software-assurance/license-mobility.aspx
- Complete and submit the License Mobility Validation form with each License Mobility through Software Assurance Partner who will run your licensed software on their shared servers. The License Mobility Validation form will be made available to you by the qualified License Mobility through Software Assurance Partner.

Your rights to run licensed software and manage OSEs on shared third-party servers expires with the expiration of the Software Assurance coverage on those licenses.

You may move your licensed software from a third party's shared servers back to your servers or to another third party's shared servers, but not within 90 days of the last assignment. You may also move instances run or OSEs managed under a particular license from a third party's shared servers in one server farm to its shared servers in another server farm, but not within 90 days of the last assignment. OSEs managed under the same license must be in the same server farm.

Notes:

- License Mobility through Software Assurance rights apply to eligible licensed product versions available as of July 2011 and after.
- These rights do not apply to software licenses for the Windows Server operating system.
- These rights apply only to licenses acquired under a Microsoft Volume Licensing program that offers Software Assurance.

Product-Specific Use Rights

Generally, your rights to use the software on third-party shared servers are the same as the use rights when you run the software on your servers. However, some products, as outlined below, have different use rights for shared third-party servers under License Mobility through Software Assurance:

Licensing Microsoft server products for use in virtual environments

Product Licensing Model	Product or Product Type	License	Permitted Number of OSEs per License/Permitted Number of Cores per License
Server/CAL	External Connector Licenses	Each External Connector license with active Software Assurance coverage	1 OSE per license
Server/CAL	SQL Server	Each Server license with active Software Assurance coverage	1 OSE per license
Per Processor	All eligible products	Each Processor license with active Software Assurance coverage	1 OSE with up to 4 virtual processors per license
Per Core	All eligible products	Each Core license with active Software Assurance coverage	One virtual core (subject to the Product Use Rights including the requirement of a minimum of 4 cores per OSE)
Management Servers	System Center Server Management Licenses (versions prior to System Center 2012 R2)	Each Server Management license with active Software Assurance coverage	1 Managed OSE per license
Management Servers	System Center Server Management Suites	Each SMSE or SMSD license with active Software Assurance coverage	4 Managed OSEs per License
Management Servers	System Center 2012 R2 Standard	Each System Center 2012 R2 Standard Server Management license with active Software Assurance coverage	2 Managed OSEs per license
Management Servers	System Center 2012 R2 Datacenter	Each System Center 2012 R2 Datacenter Server Management license with active Software Assurance coverage	8 Managed OSEs per license