

Licensing Microsoft Server Products with Virtual Machine Technologies

This licensing brief provides an overview of updates to Microsoft’s licensing models for the server operating system and server applications. It also clarifies existing licensing policies to help you deploy and use software under these updated models. These updates do not apply to the desktop operating system or desktop applications. The purpose of these updates and clarifications is to help you understand how to use Microsoft server products with virtual machine technologies such as Microsoft® Virtual Server 2005 R2. These updates and clarifications are less significant if you do not use virtual machine technology.

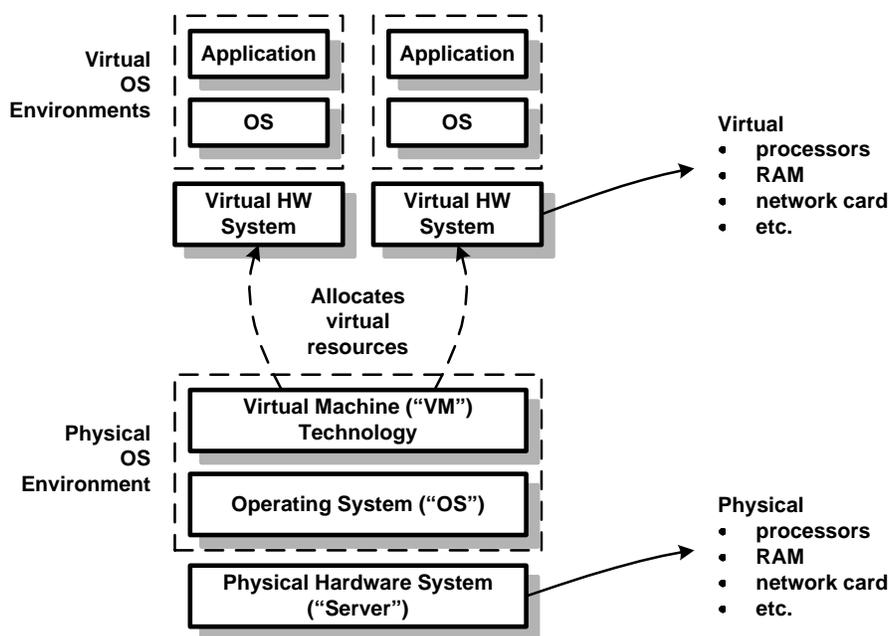
Many of the updates described in this licensing brief apply to licenses purchased from channels other than Microsoft Volume Licensing. However, there are some differences. Please review the license terms that accompany the software if you have acquired licenses through a means other than a Microsoft Volume Licensing agreement.

Definitions of certain terms are included at the end of this licensing brief. Please review those terms. They are helpful in understanding virtual machine technology and your use rights for Microsoft server products.

Virtual Machine Technology on x86 and x64 Hardware Platforms

Virtual machine (VM) technology allows you to run multiple *operating system environments (OS environments)* on a single physical hardware system (e.g., a server) (Figure 1). Before VM technology, you could run only one OS environment on a server at a time—the physical OS environment that runs directly on the server (Figure 2 – A).¹ Current technologies such as Microsoft Virtual Server 2005 R2 add a layer on top of the OS in the physical OS environment to enable you to run multiple OS environments on the same server (Figure 2 – B). VM technology works by allocating virtualized hardware resources to virtual hardware systems or virtual machines. Virtual OS environments run on virtual machines. Upcoming technologies from Microsoft and other vendors provide virtualization services directly in the OS and rely on a *hypervisor* to allocate resources to individual OS environments on a server (Figure 2 – C). Processors from Intel and Advanced Micro Devices (AMD) will include technology starting in 2006 to improve the performance of VM technologies on x86 and x64 hardware platforms.²

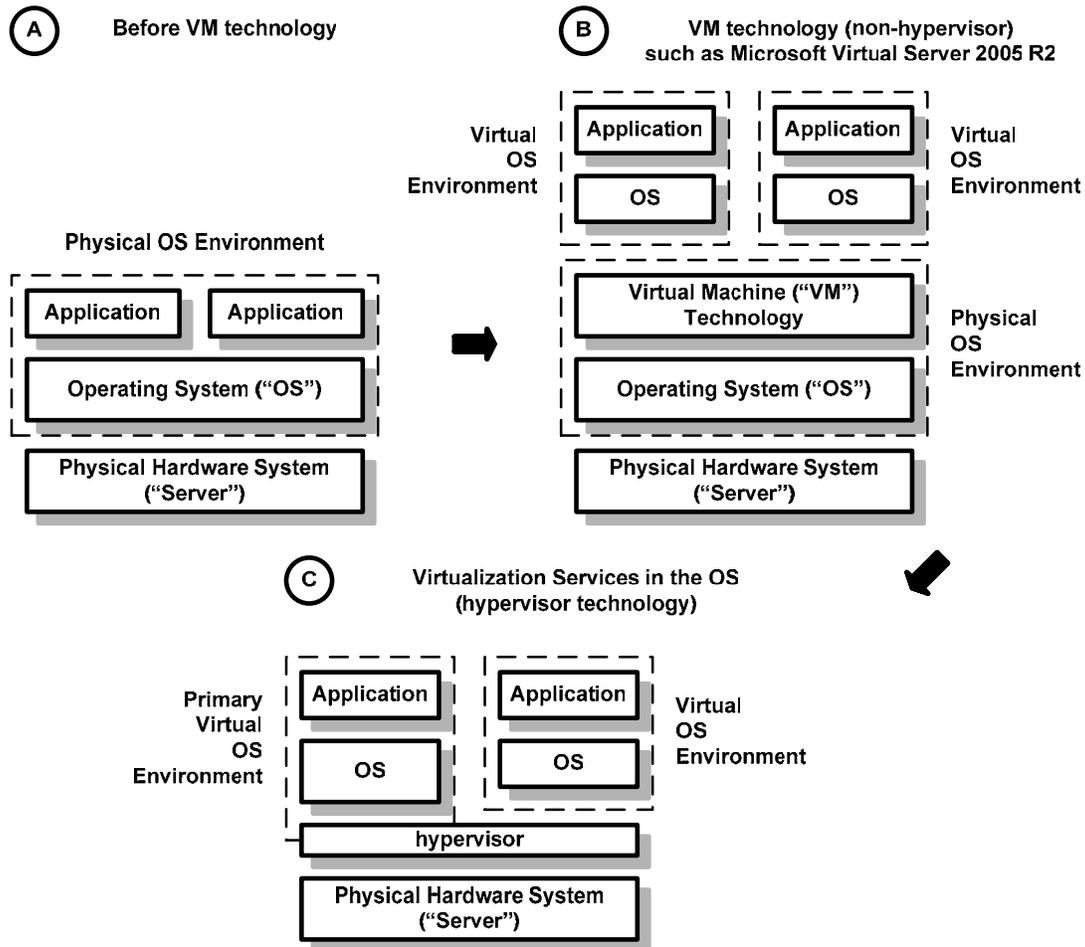
Figure 1 – Physical and virtual hardware and OS environments



¹ Hardware partitioning technology can also be used to run multiple OS environments on a physical hardware system. However, this technology is primarily available on high-end systems.

² Intel’s technology is called VT. AMD’s technology is called Pacifica.

Figure 2 – Physical and virtual OS environments



Benefits and Capabilities of VM Technology

Microsoft is committed to developing and investing in VM technology to deliver a number of benefits and capabilities. These include³:

Production server consolidation: Reduce TCO by maximizing hardware utilization and consolidating workloads

- **Legacy application re-hosting.** VM technology allows legacy applications that need an older OS to run on a VM with that older OS. The VM can run on a server with newer hardware and a newer OS. The technology enables greater application availability, without application upgrades or violating ISV support policies.
- **Server consolidation.** VM technology can be used to consolidate a variety of workloads, each running on its own instance of the OS, from many servers onto fewer servers. The technology allows instances of the same or different OS, or of the same OS with different patch levels, to run on a server.
- **Resource partitioning.** VM technology can be used to provide OS environments with specific resource limits. The technology can limit a given OS environment to using only a subset of the server's overall processing, memory and other resources.

Business continuity management: Eliminate scheduled and unscheduled downtime

- **Workload deployment and provisioning.** VM technology can package an instance of the OS, and the applications that are configured to run on it, into a *virtual hard disk (VHD)* file.⁴ The VHD file can be rapidly

³ For additional capabilities, benefits and scenarios that Microsoft Virtual Server R2 enables, please [click here](#) .

⁴ Virtual Server uses the VHD format; technologies from other vendors might use a different format.

deployed onto a licensed server to run the workload it contains. Complex workloads that span multiple servers on a network can be quickly provisioned by deploying the associated VHD files together. A workload can also be easily duplicated by copying its associated VHD file. A particularly interesting use of this capability is to create a central library of workloads in preconfigured VHD files on centralized storage and deploy them on servers as necessary.

- **OS and application patching and rollback.** With VM and management technology, VHD files with preconfigured OS and application instances can be patched offline. These updated VHD files can be quickly swapped for production instances, dramatically shortening the time to deploy a patch to a critical system to just minutes—allowing time for offline testing, production testing and rapid rollback.
- **Batch jobs.** VM technology can be used with scripts and schedulers to automatically start and stop workloads on a server according to a pre-defined schedule.
- **Isolation/sandboxing.** VM technology can be used to provide secure, isolated OS environments for running untrusted applications. With the proper safeguards and security mechanisms, these OS environments can be sandboxed to protect other application and server instances from crashing. In addition, the technology can help prevent malicious code from affecting other OS environments on the same server or other servers in the network.
- **Increased performance and reliability on multi-core processor⁵ and multi-processor servers.** VM technology can continuously shift the execution of an OS environment to the optimal core or processor in the server. When a particular OS environment is configured to use only a subset of the server's overall processing resources, VM technology can provide these resources from cores on separate physical processors, if necessary.

Dynamic data center: Leverage the benefits of virtualization to create a more agile infrastructure

- **Workload mobility.** VM technology can be used to encapsulate the complete running state of an OS environment. With this capability, running workloads can be moved from one licensed server to another by pausing the OS environment momentarily, moving the associated VHD file, and continuing execution of the workload.

Development and testing: Maximize test hardware to reduce costs, improve lifecycle management and improve test coverage

- **Development and testing.** VM technology can be a great tool in software development, test and staging environments. The technology allows for detailed step-by-step debugging and performance monitoring of individual workloads. It can also be used to create arbitrary test scenarios to ensure proper operation in niche scenarios and hardware configurations. In addition, it can be used to simulate the operation of a workload running across a network of multiple servers—on a single physical hardware system.

⁵ For more information on multi-core processors and the Microsoft licensing policy for multi-core processors, please [click here](#).

Updates to Licensing Models for Microsoft Server Products

Microsoft is updating the licensing models for server products to enable you to take advantage of the benefits and capabilities of VM technology. We are also clarifying existing licensing policies to help you understand how to use our software under these updated models. If you do not use VM technology, these updates and clarifications do not significantly impact your use of Microsoft server products.

Overview

The following summary provides an overview of the updated licensing models and clarifications to existing licensing policies. For further detail and examples, please see the white paper at <http://www.microsoft.com/licensing/userights>. Your review of this licensing brief and white paper should not substitute for careful review and understanding of your rights and obligations as described in your Microsoft volume licensing agreement. The updates to the licensing models apply to new licenses for all server products covered by the December 1, 2005 Product Use Rights (PUR). For these products, you may also choose to apply the updates to licenses acquired prior to December 1st. However, if you apply any of these updates to any of your existing licenses, you must apply all the updates to all of your existing licenses. For example, these updates do not apply to a Microsoft SQL Server™ 2000 license because that product is not covered by the December 1st PUR. They may apply to an Exchange Server 2003 license acquired prior to December 1st because that product is covered by the December 1st PUR.

Products Impacted	Updates and Clarifications
<p>All products in the Microsoft Servers licensing model in the December 1st PUR</p> <ul style="list-style-type: none"> • Microsoft Windows Server™ 2003 • Exchange Server 2003 • Virtual Server 2005 R2 • Etc. 	<p><u>Updates</u></p> <ul style="list-style-type: none"> • Use terms for each software license⁶ specify the number of instances of software that you may run on a particular server at a time, rather than the number of copies of the software that you may 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. <p><u>Clarifications</u></p> <ul style="list-style-type: none"> • 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. • You may reassign software licenses for server products, but not on a short-term basis (i.e., not within 90 days of the last assignment). They may be reassigned sooner if you retire the licensed server due to permanent hardware failure. • You may not separate software to run it in more than one OS environment under a single license, unless expressly permitted—even if the OS environments are on the same server.

⁶ Software licenses refer to the license for the software bits. To license a product appropriately, you might also need additional licenses (e.g., client access licenses, external connector licenses, operations management licenses, and configuration management licenses.)

Products Impacted	Updates and Clarifications
<p>Products in the Microsoft Server OS and Microsoft Server/CAL licensing models in the December 1st PUR</p> <ul style="list-style-type: none"> Windows Server 2003 Exchange Server 2003 SQL Server 2005 Etc. 	<p><u>Updates</u></p> <ul style="list-style-type: none"> Each external connector license (EC) 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. <p><u>Clarifications</u></p> <ul style="list-style-type: none"> Each client access license (CAL) allows any number of OS environments on a particular device (e.g., client device) to access the server software. You do not need a separate device CAL for each OS environment on a device.
<p>Products in the Management Servers licensing model in the December 1st PUR</p> <ul style="list-style-type: none"> Microsoft Operations Manager 2005 Systems Management Server 2003 Systems Center Data Protection Manager 2006 Etc. 	<p><u>Clarifications</u></p> <ul style="list-style-type: none"> Each management license (e.g., OML, CML) allows any number of OS environments on a particular device to be managed by the server software. You do not need a separate management license to manage each OS environment on a managed device.
<p>Products in the Per Processor licensing model in the December 1st PUR</p> <ul style="list-style-type: none"> Microsoft BizTalk® Server 2004 SQL Server 2005 ISA Server 2004 Etc. 	<p><u>Updates</u></p> <ul style="list-style-type: none"> Software run in a virtual OS environment is licensed based on the number of virtual processors used by that virtual OS environment, rather than all the physical processors in the server. <ul style="list-style-type: none"> If you run the software in virtual OS environments, you need a license for each virtual processor used by those virtual OS environments on a particular server—whether the total number of virtual processors is lesser or greater than the number of physical number of processors in that server. If you run the software in a physical OS environment, you need a license for each physical processor used by the physical OS environment.

In the December 2005 PUR, Microsoft is also introducing expanded use rights for licenses for Windows Server 2003 R2 Enterprise Edition and SQL Server 2005. These expanded use rights are summarized in the following table. They apply only to licenses for the specific editions described. They do not apply to licenses for previous versions of these products.⁷

Products Impacted	Expanded Use Rights
<p>Windows Server 2003 R2 Enterprise Edition</p>	<ul style="list-style-type: none"> Each software license allows you to run, at any one time, one instance of the server software in a physical OS environment and up to four instances of the server software in virtual OS environments on a particular server.

⁷ Microsoft volume licensing customers can also exercise their *downgrade rights* to run prior versions of the software in place of instances of the current version. For example, for any instance of Windows Server 2003 R2 that you can run on a server under a Windows Server 2003 R2 Enterprise Edition license, you can instead choose to run an instance of a prior version such as Windows Server 2003, Windows Server 2000, or Windows NT.

Products Impacted	Expanded Use Rights
SQL Server 2005 (licensed Server/CAL) Workgroup Edition, Standard Edition and Enterprise Edition	<ul style="list-style-type: none"> • Each software license allows you to run any number of instances of the server software in one physical or virtual OS environment on a particular server at a time.

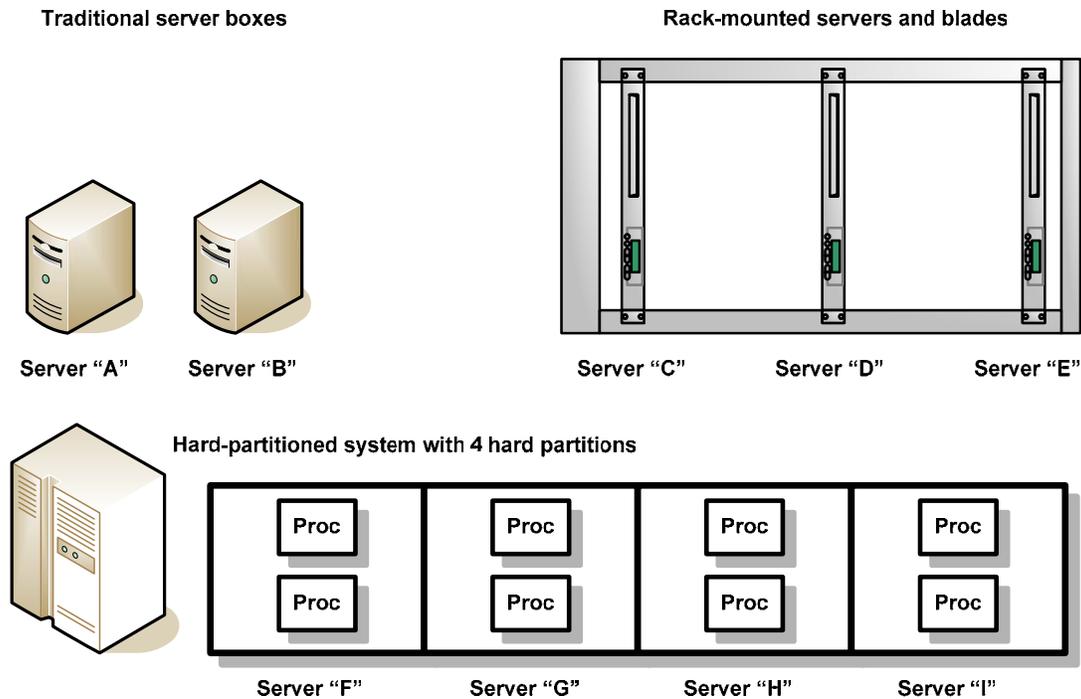
In the October 2006 PUR, Microsoft is introducing expanded use rights for Windows Server 2003 R2 Datacenter Edition. These expanded use rights are summarized in the following table. They apply only to the specific editions described. They do not apply to previous versions of these products.

Products Impacted	Expanded Use Rights
Windows Server 2003 R2 Datacenter Edition (licensed based on the number of physical processors in the server)	<ul style="list-style-type: none"> • After the appropriate number of licenses are acquired and assigned, you may run <ul style="list-style-type: none"> ○ One instance of the server software in the physical OS environment, and ○ Any number of instances of the server software in virtual OS environments

Definitions

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.

Figure D1 – Different types of servers



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

Examples:

- An installed copy of Windows Server 2003 on a hard disk is an instance of Windows Server 2003.
- An installed copy of Exchange Server within a VHD (or other image format) file is an instance of Exchange Server.
- A VHD file with Exchange Server installed on top of Windows Server 2003 contains an instance of Windows Server 2003 and an instance of Exchange Server. Copying that VHD file will create another instance of Windows Server 2003 and another instance of Exchange Server. Deploying that VHD file to another server will create an instance of Windows Server 2003 and an instance of Exchange on that server.

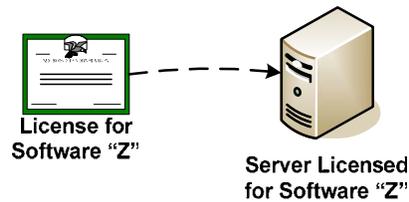
Run an instance: You *run an instance* of software by loading it into memory and executing one or more of its instructions. Once running, an instance is considered to be running (whether or not its instructions continue to execute) until it is removed from memory.

Examples:

- If you merely copy an existing instance, it is not considered to be running because no instruction from that instance has yet been executed.
- If you load an instance of Exchange Server into memory, and execute one of its instructions, you are running an instance of Exchange Server. If you pause execution of any instructions of that instance by shifting all execution resources to another application, you are still considered to be running that instance of Exchange Server because it is still loaded in memory. To stop running an instance, you must terminate execution of its instructions, and also completely remove it from memory.

Assigning a license: To *assign a license* means simply to designate that license to one device or user. The purpose of this designation is to avoid sharing a license across multiple devices or multiple users at the same time.

Figure D2 – Assigning a license



Operating system (OS) environment:

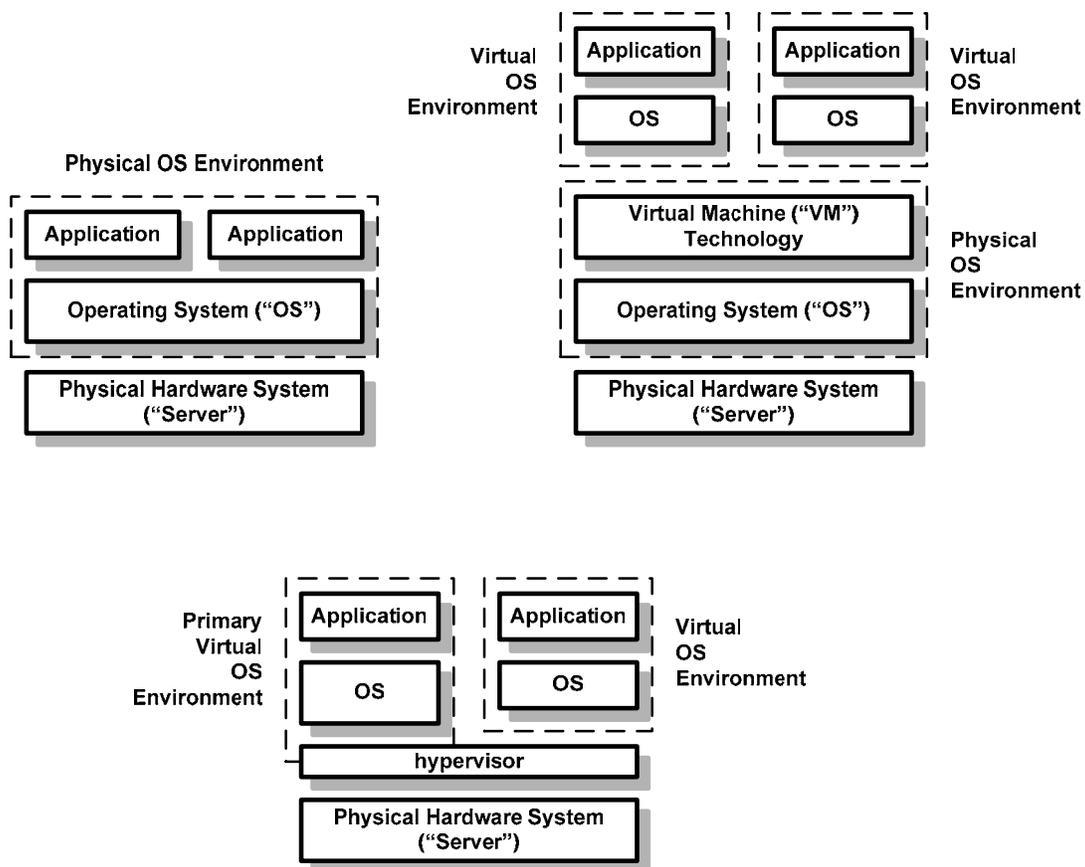
An “operating system environment” is

- i. 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
- ii. instances of applications, if any, configured to run on the operating system instance or parts identified above.

There are two types of operating system environments, physical and virtual. A physical operating system environment is configured to run directly on a physical hardware system. A virtual operating system environment is configured to run on a virtual (or otherwise emulated) hardware system. A physical hardware system can have either or both of the following:

- i. one physical operating system environment
- ii. one or more virtual operating system environments

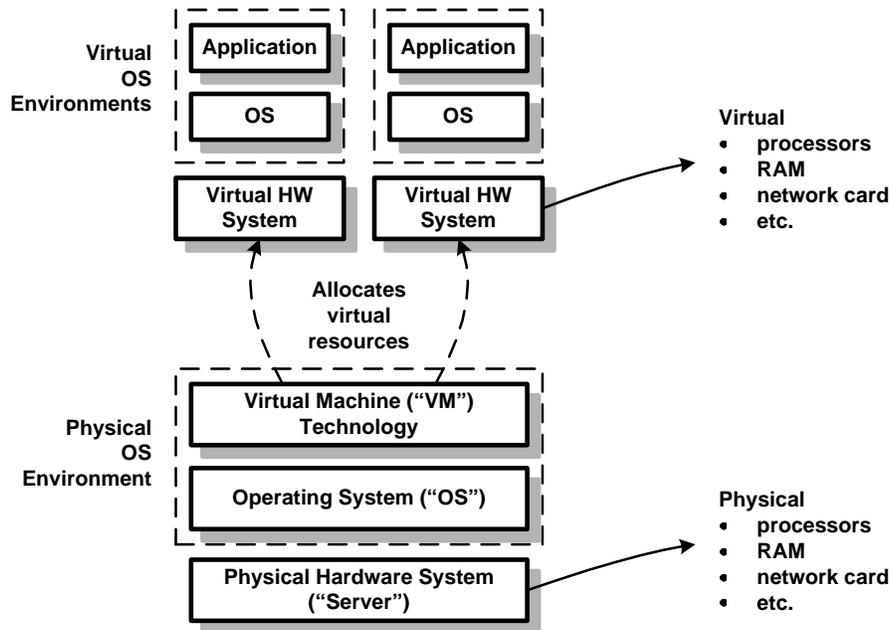
Figure D3 – Different types of OS environments on a server



Technologies that create virtual environments with either separate machine identities or separate administrative rights are creating virtual OS environments that require the appropriate licensing of the operating system and any applications configured to run in those virtual OS environments.

Physical and virtual processors: A *physical processor* is a processor in a physical hardware system. Physical OS environments use physical processors. A *virtual processor* is a processor in a virtual (or otherwise emulated) hardware system. Virtual OS environments use virtual processors.

Figure D4 – Physical and virtual hardware systems and resources



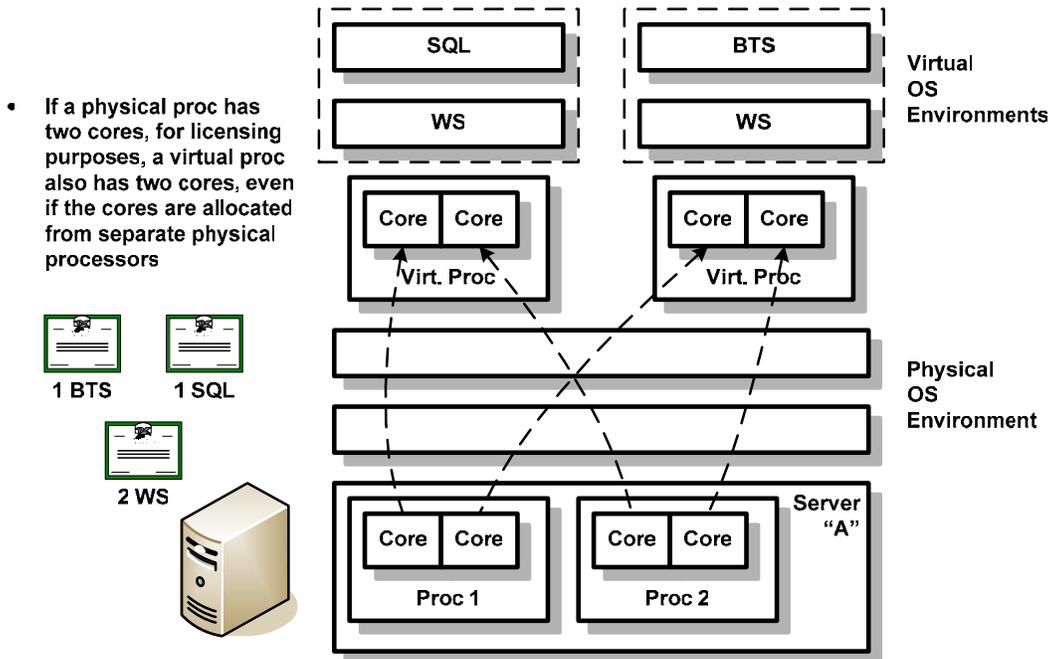
Virtual processors are considered to have the same number of threads and cores as each physical processor in the underlying physical hardware system. Microsoft is adopting this definition to enable customers to take advantage of the licensing policy we announced in 2004 for multi-core processors.⁸ For reliability and performance, VM technology can allocate resources from separate physical processors in the server to create a virtual processor for use by a particular OS environment.

If the physical processors in the server have two cores, for licensing purposes, each virtual processor also has two cores, even if the cores are allocated from separate physical processors. For example, in Figure D5 below, the virtual processor 1 is allocated a core from physical processor 1 and a core from physical processor 2. Although that virtual processor is using cores from different physical processors, it is considered to be only a single virtual processor because it has the same number of cores as the physical processors in the server.⁹

⁸ For more information on this policy, please see http://download.microsoft.com/download/f/1/e/f1ecd771-cf97-4d98-9a1b-b86e3f24e08f/multicore_hypercentos_brief.doc

⁹ For clarity, the license count in this example and illustration does not show the instances of Windows Server and Virtual Server running in the physical OS environment.

Figure D5 – The allocation of cores to virtual processors



Examples:

- Assume server B has dual-core processors. If you are running SQL Server (licensed Per Processor) in a virtual OS environment on server B, for licensing purposes, each virtual processor in each virtual OS environment can have up to two cores as well. It does not matter whether those cores are allocated from the same physical processor or not.
- Assume server C has four-core processors. If you are running BizTalk Server in a virtual OS environment on server C, for licensing purposes, each virtual processor in each virtual OS environment can have up to four cores as well. It does not matter whether those cores are allocated from the same physical processor or not.

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