



# Hyper-V Hosting Guidance: Using and Licensing Microsoft® Server Products in Hyper-V Virtual Hosting Scenarios

**Microsoft Hosting Guidance**

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## LIST OF ACRONYMS

Acronym	Meaning
BYOL	Bring Your Own License
DC	Datacenter
DNS	Domain Name System
LOB	Line of Business
OEM	Original Equipment Manufacturer
OS	Operating System
OSE	Operating System Environment
SAL	Subscriber Access License
SCCM	Microsoft System Center Configuration Manager
SCDPM	Microsoft System Center Data Protection Manager
SCOM	Microsoft System Center Operations Manager
SKU	Stock Keeping Unit
SMSE	Microsoft System Center Server Management Suite Enterprise
SMSD	Microsoft System Center Server Management Suite Datacenter
SPLA	Services Provider License Agreement
SPUR	Services Provider Use Rights
SCVMM	Microsoft System Center Virtual Machine Manager
VDS	Virtual Dedicated Server
VM	Virtual Machine

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## HOSTING SCENARIOS AND LICENSING CONSIDERATIONS

The topics discussed in this document are applicable to all virtualization technologies such as Hyper-V, VMware, ESX, Xen and Virtuozzo. In specific, the document talks about common hosting scenarios enabled by using Windows Server® 2008 R2 Hyper-V™ virtualization technology and Microsoft SQL Server® database management software with the Microsoft Services Provider License Agreement (SPLA).

**Windows Server 2008 R2 Hyper-V**, the next-generation hypervisor-based server virtualization technology, is available as an integral feature of Windows Server 2008 R2, and customers can leverage the breadth of solutions from Microsoft partners, existing IT Pro skill sets, and comprehensive support from Microsoft. Hyper-V allows you to make the best use of your server hardware investments by consolidating multiple server roles as separate virtual machines (VMs) running on a single physical machine. Hyper-V provides a reliable virtualization platform that enables customers to virtualize their infrastructure and reduce costs. It has thin microkernelized hypervisor architecture with minimal attack surface and is available as a Server Core role. With Microsoft System Center integrated management tools, customers can use a single set of tools to manage both their physical and virtual resources. It easily plugs into customers' IT infrastructure, as they can leverage their existing patching, provisioning, management and support tools, and processes. You can get complete details on Hyper-V by visiting this link: <http://www.microsoft.com/windowsserver2008/en/us/hyperv-main.aspx>.

**SPLA** is the licensing vehicle that is commonly used in Service Provider scenarios. SPLA has two licensing models – Per Processor and Per Subscriber (via a Subscriber Access License, or SAL). Some products (like SQL Server and Windows Server) are available through both licensing models however most products are licensed either per processor or per SAL. In a virtual environment, there are no restrictions on the number of instances running under the SAL licensing model. However, the Per-Processor model includes some restrictions, which are outlined in this document.

In the context of Hyper-V, a physical server (called a **host**) can be used to create numerous virtual machines or virtual servers (called **guests**). Each guest runs its own operating system (OS), independent of other guests. Operating systems such as Windows Server 2008 R2 (Web, Standard, Enterprise and Datacenter) SUSE Linux Enterprise, and so forth, can run as a guest OS. However, the host OS must be Windows Server 2008 R2 (Standard, Enterprise, or Datacenter). For a list of supported virtual guests, please visit the following link: <http://www.microsoft.com/windowsserver2008/en/us/hyperv-supported-guest-os.aspx>

The primary focus of this document is how to license different editions of Windows Server 2008 R2 and SQL Server 2008 R2 in a virtualized hosting environment that is leveraging the SPLA model. We will outline the SPLA licensing implications for some common Hyper-V-based virtualized hosting scenarios. These scenarios include:

1. Unmanaged dedicated server with Hyper-V
2. Virtual dedicated server (VDS) for Web scenarios
3. Virtual dedicated server with line-of-business (LOB) scenarios Use of virtualization in shared hosting scenarios
4. Desktops as Hyper-V guests
5. End customers running Microsoft products using the customers own licenses on the guest OS

In addition to these common scenarios, we present how the Microsoft System Center family of products can be used to help manage the virtualized hosting environment and the associated licensing implications.

## LICENSING OF VARIOUS WINDOWS SERVER EDITIONS

Windows Server 2008 R2 is licensed on either a per user (SAL) or per-processor basis but for purposes of this licensing guidance document, we will be speaking mainly to the per processor model. When reviewing the table below, please keep in mind that a license for each physical processor is needed. While there is no technical limitation on the number of guests you can run on the Standard, Enterprise, or Datacenter editions, the number of licenses required as part of the host license vary by edition. The following table indicates the number of guest instances that can be run under each edition with the license of the host. If additional guests over the allowed limit are run on any edition, then additional licenses are required for each physical processor on the host.

Furthermore, the Active Directory® service is included with certain editions of Windows Server 2008 R2. This affects the licensing in specific hosting scenarios. The use of Active Directory for the Windows Server host and guest OS is allowed with the Web, Standard, Enterprise and Datacenter editions

The table below provides only a general licensing overview of Windows Server 2008 R2. Depending on the scenario and which edition of Windows Server 2008 R2 is installed on the host, numerous licensing scenarios exist. Most of these are described in the following sections.

Host Edition	Guests Included with Host SPLA	Allowed Guest Types
Windows Web Server 2008 R2	0	None
Windows Server 2008 R2 Standard	1	Windows Server 2008 R2 Standard*
Windows Server 2008 R2 Enterprise	Up to 4 per licensed server	Windows Server 2008 R2 Enterprise* Windows Server 2008 R2 Standard*
Windows Server® 2008 R2 Datacenter	Unlimited guests	Windows Server 2008 R2 Datacenter* Windows Server 2008 R2 Enterprise* Windows Server 2008 R2 Standard* Windows Web Server 2008 R2*

Table 1: \*Guest licenses and guest types for various Windows editions include rights to prior versions of same edition (ex Server Standard 2003 in place of Server Standard 2008 R2), other languages and platform version x86 vs. amd64.

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## **Edition Comparison by Server Role**

### **Windows Server 2008 R2 Enterprise**

As you can see in the above table (Table 1), if licensing a Windows Server R2 2008 Enterprise host, up to 4 guests are included with the initial license (one processor license is required for each physical processor on the server). If a fifth guest is added to the server, an additional processor license for each physical processor on the server will need to be reported. With the additional processor license for each physical processor on the server, up to 8 guests (in total) can be added. This process of purchasing additional licenses can be continued as more and more guests are added, up to the physical capacity of the host. When licensing Windows Server 2008 R2 Enterprise, an instance of Windows Server Standard can be run in place of Windows Server Enterprise in any of the virtual operating system environments.

### **Windows Server 2008 R2 Datacenter**

With Windows Server 2008 R2 Datacenter on the host Server, you may run unlimited guests (up to what the hardware will support). Windows Server Datacenter edition allows you to install and run a guest instance of Web, Standard or Enterprise in place of Datacenter in any operating system environment.

In most cases, for Hosting Providers, Windows Server 2008 R2 Datacenter edition provides the least costly alternative to run Hyper-V based virtual environments. In subsequent sections, this document outlines the various benefits of Datacenter edition.

### **Use of Other Non-Microsoft Virtualization Technologies**

This document applies equally well to other virtualization technologies such as VMware, Xen and Virtuozzo when using Windows Server as a host or guest OS. However, Microsoft does not make claims on how those technologies are licensed, and use of those technologies does not diminish, in any way, the number of licenses required for Microsoft products. Please consult the vendor of those virtualization technologies for their licensing requirements.

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## HOSTING SCENARIOS

### Scenario 1: Unmanaged Dedicated Server as Host with One or More Guests

In this scenario, a hosting provider offers a physical server as a host enabled with Hyper-V. The end customer purchases a dedicated server offering and can create any number of guests using Hyper-V Server Manager. The administration of the physical server and virtual instances is performed by the end customer.

If the Hosting Providers use Microsoft System Center Virtual Machine Manager (VMM), through delegation they could provide the ability for end customers to manage guests through the VMM Self-Service Portal. Note that the VMM Self-Service Portal requires Active Directory. Alternatively, a service provider can provide a control panel to control the guests residing on the physical server.

The “Hyper-V Host” in Figure 1 typically depicts an example of an “unmanaged” Hyper-V configuration where all management and administration of the hosts and virtual guests is performed locally on the server. The hosting provider is just providing a dedicated Hyper-V-enabled server and allowing the customer to directly access the host (typically via Terminal Services).

As depicted in Figure 1 below, if the Hosting Providers wants to create a “Managed” offer, they may wish to install and expose System Center Virtual Machine Manager and other System Center management products to allow customers to manage their virtual guests. Please see “Microsoft System Center Products in a Hosting Environment” in this document for information on minimal deployments of VMM in a hosting environment.

The edition of Windows Server 2008 R2 dictates the number of guests that are allowed (as in Table 1 above). If more than 4 guests are needed, Windows Server 2008 R2, Datacenter SKU is required. If SQL Server is needed to be installed on this server, then, it needs to be individually licensed. The right SKU for SQL server is discussed in the SQL Licensing section of this document.

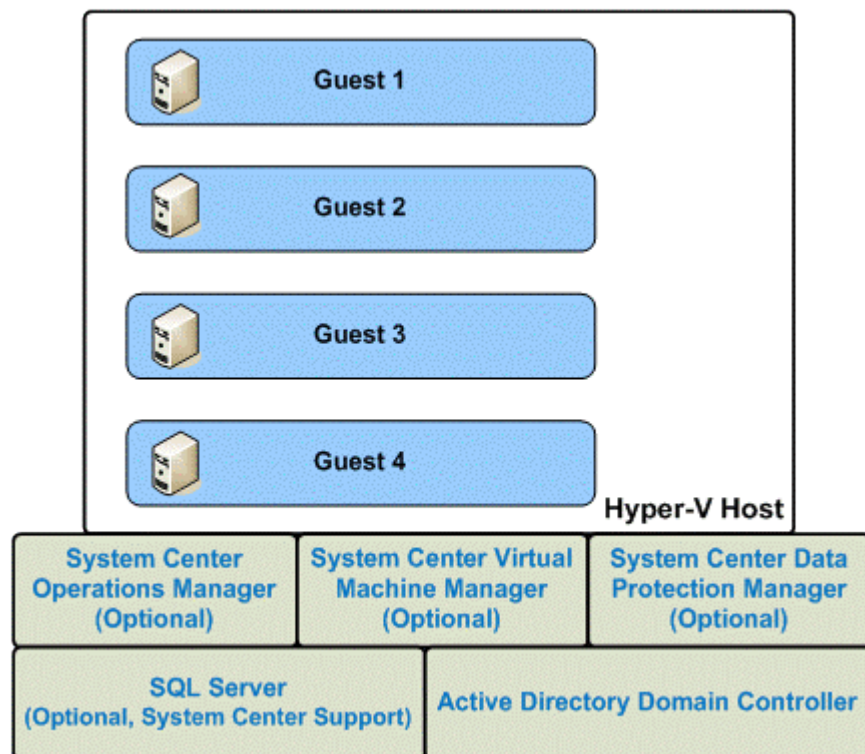


Figure 1: Unmanaged Hyper-V

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## Scenario 2: Virtual Dedicated Server (VDS)

In a VDS scenario, a hosting provider uses a Windows Server 2008 R2–based server with Hyper-V as a host for one or more guests. These guests can run Windows Server or Linux operating systems. Each guest is offered as a virtual dedicated server to end customers. Each guest has a guaranteed set of resources, which can be specified when it is created. The allocation of resources to guest has no impact on Windows Server licensing. Additionally, after creation, the resources may vary and will not have any licensing impact on Windows Server.

The end customer has complete control of the guest and its OS. The VDS can be accessed via Terminal Services or Remote Desktop Services. The hosting provider or the end customer also can install a control panel on the guest to manage the hosting environment on the VDS. From an end-customer perspective, a VDS looks and feels like a dedicated server, where patching, software loading, and so forth do not affect other guests on the server.

In order to improve the manageability of these servers, Microsoft offers System Center Server Management Suite Enterprise (SMSE) and System Center Server Management Suite Datacenter (SMSD), which may be leveraged to offer the same managed services to the hosting provider's customers. For example, when provisioning, System Center Virtual Machine Manager (SCVMM) may be used for provisioning either the managed or un-managed server.

System Center Server Management Suite Enterprise includes the following products that can simplify the management of hosted guests and provide value-added services to the hosting provider:

- System Center Virtual Machine Manager (SCVMM)
- System Center Operations Manager (SCOM)
- System Center Data Protection Manager (SCDPM)
- System Center Configuration Manager (SCCM)
- System Center Service Manager (SCSM)
- System Center Orchestrator (formerly known as Opalis)

As depicted in Figure 2, Hosting Providers may wish to install and expose System Center Virtual Machine Manager to allow customers to manage their virtual guests. Please see “Microsoft System Center Products in a Hosting Environment” in this document for information on minimal deployments of VMM in a hosting environment.

### Scenario 2a: VDS – Unmanaged

In this scenario, the hosting provider allows the end customer to have full management of the guest operating system. Loading software, patching, backups, and such would be handled by the customer. This option is similar to one discussed in Section 1/Figure 1.

### Scenario 2b: VDS – Managed

In a managed scenario, the hosting provider may offer one or more value-added services related to the management of the guest to its customers. These value-added services may either be included in the base pricing of the hosted offer or included as an additional charge. One benefit for Hosting Providers is that these servers can be centrally managed by another server running virtual machine management software such as Microsoft System Center Virtual Machine Manager. Value-added services may include:

- Managed services – such as SQL Server administration
- Guest server software – patching, security updates, installs
- Utilities – disk and storage management
  - Backup/Restore

- Domain Name Services (DNS)

**Note:** There are two editions for most System Center products: one *with* SQL and one *without* SQL. If the hosting provider is deploying and licensing the System Center with SQL product, then a separate license for SQL is not required. Refer to the Services Provider Use Rights (SPUR) for details.

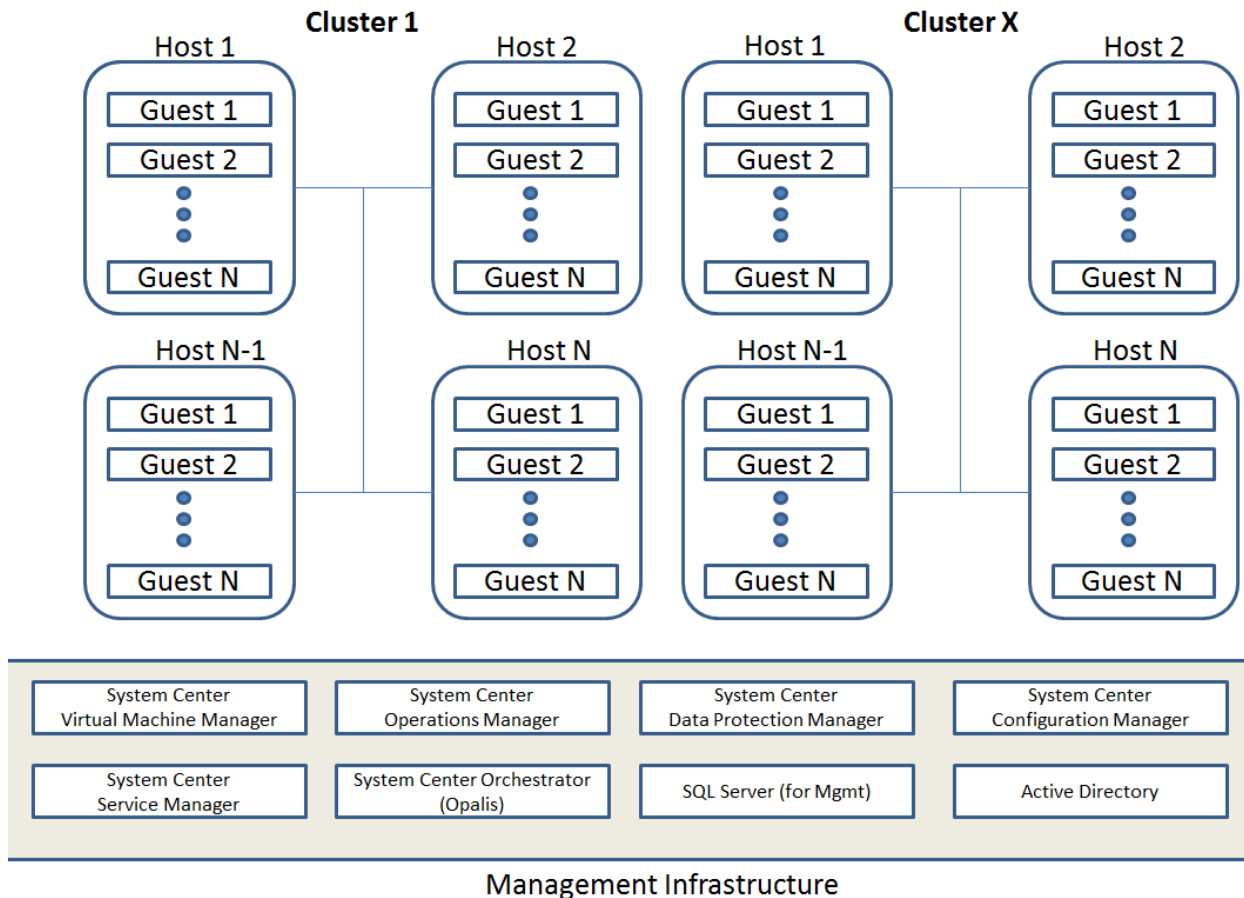


Figure 2: Managed Hyper-V Environment

System Center Virtual Machine Manager requires membership in Active Directory; however, VMM can manage non-Active Directory hosts and guests. For more information about configuring Active Directory, see “Windows Server System Reference Architecture” in the References section of this document.

System Center also requires a Microsoft SQL Server database for storage. Hosting Providers may choose to use an existing SQL Server installation or create a dedicated server, depending on their needs. As Hosting Providers increase the number of guests they manage, high-availability configurations of SQL Server, Active Directory, and System Center products may be utilized. See “Windows Server System Reference Architecture” and “System Planning and Design” in the References section of this document for more information.

Other than System Center Virtual Machine Manager, all other components are optional in creating a managed VDS offering. Each product offers a unique set of capabilities, such as SCOM which can be used to monitor the health of the host servers, domain controllers, and SQL Server software, as well as the guest systems. SMSD and SMSD offer the most economical licensing for System Center products as these product suites provide access to multiple System Center Products.

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## Scenario 3: Virtual Dedicated Servers

In scenarios where the guest system is used by the end customer's employees, the recommended host is Windows Server 2008 R2 Enterprise or Datacenter, which accommodates up to four Windows guest systems per fully licensed host or unlimited Windows guests, respectively. (More than four Windows guests can run on the Enterprise edition, but more licenses must be added and reported.)

Other configurations also may include hosting for Microsoft Exchange Server, Microsoft Office SharePoint® Server, or other applications that are operated for use by the employees or associates of the hosting customer.

Virtual Dedicated Servers can be managed using a shared management infrastructure as shown in Scenario 2.

## Scenario 4: Shared Hosting Configurations

In this scenario, the hosting provider is using a server as a host and creates one or more guests to host one or more Web sites for a shared hosting scenario. The end users are not exposed to virtualization. Some Hosting Providers are using virtualization in this manner to provide better isolation for Web sites. For example, if a server hosts 2,000 Web sites, a hosting provider can create four guest virtual machines, each with 500 sites. If the users are not employees, agents or representatives of the customer, Windows Server Enterprise or Datacenter edition may be used.

Servers used for Shared Hosting Configurations can be managed using a shared management infrastructure as shown in Scenario 2.

## Scenario 5: Running Desktop Systems as Hyper-V Guests

This scenario is currently not allowed under SPLA.

## Scenario 6: Using End-Customer Licenses on the Guest

Hosting Providers frequently ask if end-customer-owned licenses (such as Windows Small Business Server, SQL Server, Exchange Server, or other server applications acquired through Microsoft Select or Enterprise Agreements) can be relied upon for licensing the guest. Until recently, these scenarios were not allowed in SPLA for shared use in either the host or virtual environment. All licenses for the guest needed to be reported by the service provider using the SPLA. Beginning in July 2011 we introduced Licensing Mobility through Software Assurance. See "License Mobility through Software Assurance" on page 18 for more information.

Even without License Mobility through Software Assurances, end customer can bring in their own license if they have a physically dedicated hosted server.

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## RUNNING MICROSOFT SQL SERVER 2008 R2 WITH HYPER-V

Hosting Providers typically offer SQL Server to customers as part of their hosting offers. There are four different SQL Server 2008 editions recommended for hosting providers: Express, Web, Standard, and Enterprise. (See Table 1 to compare features.) In SPLA, SQL Server 2008 R2 is licensed either per processor or per user (SAL). Virtualization does not affect the number of SALs required. The number of operating system environments (OSEs) in which you may run instances of SQL Server 2008 R2 under the per-processor model depends upon the edition you license and whether or not you license all of the physical processors with a per-processor license (or choose to license a portion of the physical processors) as detailed below.

### Licensing SQL Server 2008 R2 for Virtualization Under the Per Processor Model

The number of operating system environments (OSEs) in which you may run instances of SQL Server 2008 R2 under the Per Processor model depends upon the edition you license and whether or not you license all of the physical processors with a Per Processor License.

#### Licensing All Physical Processors

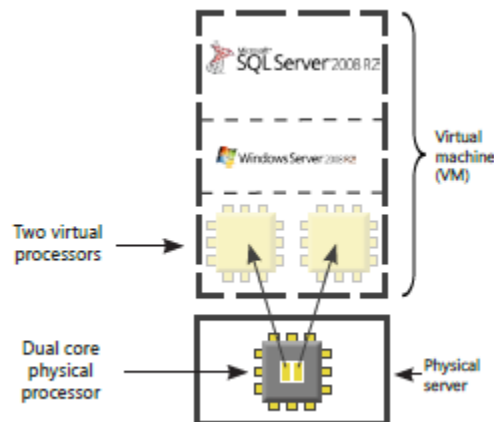
If you license all of the physical processors on the server (one license per physical processor), you may run unlimited instances of the SQL Server software in the following number of OSEs (either physical or virtual):

Edition	# of OSEs in Which You May Run SQL Server
SQL Server 2008 R2 Datacenter	Unlimited
SQL Server 2008 R2 Enterprise	Up to 4 per license

In the case of SQL Server 2008 R2 Standard and SQL Server 2008 R2 Web, if you license all of the physical processors you may run the software in the physical OSE only. In order to run the software in virtual OSEs, you will need to license each virtual processor individually as described below.

#### Licensing a Portion of the Physical Processors

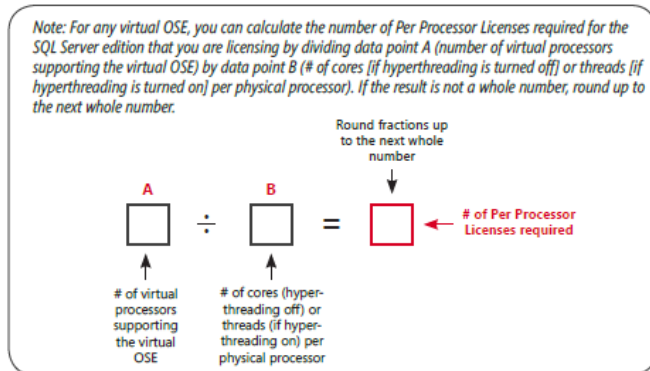
If you choose not to license all of the physical processors, you will need to know the number of virtual processors supporting each virtual OSE (data point A) and the number of cores per physical processor/socket (data point B). Typically, each virtual processor is the equivalent of one core:



With those numbers, you can refer to the table or formula below to determine how many Per Processors Licenses you need for each virtual OSE.

		# of Cores per Physical Processor/Socket				
		1	2	4	6	8
# of Virtual Processors supporting the virtual OSE	4	4	2	1	1	1
	3	3	2	1	1	1
	2	2	1	1	1	1
	1	1	1	1	1	1
		# of Per Processor Licenses Required for the virtual OSE				

Note: Use this table only as a reference for basic virtualization scenarios.



A Quick Reference Licensing Guide for SQL is available here: <http://www.microsoft.com/sqlserver/en/us/get-sql-server/how-to-buy.aspx>.

Edition	Datacenter	Enterprise	Standard	Web	Express
CPU	OS Max	8 CPU	4 CPU	4 CPU	1 CPU
Memory	OS Max	2TB	64GB	64GB	1GB
DB size	524PB	524PB	524PB	524PB	10GB
High Availability	Yes - Advance	Yes - Full	Yes - Partial	No	No
Usage restrictions	No	No	No	Yes	No
Analysis Services	Yes - Advance	Yes - Full	Yes - Partial	No	No
Reporting Services	Yes - Advance	Yes - Full	Yes - Partial	Yes - Very limited	Yes - Very limited
Integration Services	Yes - Advance	Yes - Full	Yes - Partial	Yes - Very limited	Yes - Very limited

Table 2: SQL Server 2008 features by edition.

## SQL Server 2008 R2 Express

SQL Server 2008 Express is a free, downloadable version that has most commonly used features but limitations on size of database (4 GB), number of CPUs (1), and amount of RAM it can leverage (1 GB). SQL Server 2008 R2 Express is a good option for starter Web sites and for development-related activities. There are no limitations or restrictions on the number of instances that can be run on any physical or virtual server.

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## SQL Server 2008 R2 Web

SQL Server 2008 R2 Web is specifically geared for the hosting industry. It may be used only to support public and Internet-accessible Web sites, pages, applications, and services.

SQL Server 2008 R2 Web is licensed on a per-processor basis only. If you license all of the physical processors you may run the software in the physical OSE only. In order to run the software in the virtual OSE, you will need to license each virtual processor individually. If you choose not to license all of the physical processors, you will need to know the number of virtual processors supporting each virtual OSE and the number of cores per physical processor/socket. See the previous section entitled “Licensing SQL Server for Virtualization” for more details.

## SQL Server 2008 R2 Standard Edition

SQL Server 2008 R2 Standard is licensed either on a per-processor or per user (SAL) basis. For per-processor licensing, if you license all of the physical processors you may run the software in the physical OSE only. In order to run the software in the virtual OSE, you will need to license each virtual processor individually. If you choose not to license all of the physical processors, you will need to know the number of virtual processors supporting each virtual OSE and the number of cores per physical processor/socket. See the previous section entitled “Licensing SQL Server for Virtualization” for more details.

## SQL Server 2008 R2 Enterprise Edition

SQL Server 2008 R2 Enterprise Edition can be installed on high-end servers with up to 128 processors. In a Hyper-V-based virtualized environment, if you license all of the physical processors on the server (one license per physical processor), you may run up to 4 instances of SQL Server 2008 R2 Enterprise in any OSE (physical or virtual). If you choose not to license all of the physical processors, you will need to know the number of virtual processors supporting each virtual OSE and the number of cores per physical processor/socket. See the previous section entitled “Licensing SQL Server for Virtualization” for more details.

## SQL Server 2008 R2 Datacenter Edition

In a Hyper-V-based virtualized environment, if you license all of the physical processors on the server (one license per physical processor), you may run unlimited instances of SQL Server 2008 R2 Datacenter Edition in any OSE (physical or virtual). If you choose not to license all of the physical processors, you will need to know the number of virtual processors supporting each virtual OSE and the number of cores per physical processor/socket. See the previous section entitled “Licensing SQL Server for Virtualization” for more details.

## SCENARIO-BASED LICENSING MATRIX

The following tables summarize the different permutations and combinations of Windows Server 2008 R2 and SQL Server 2008 R2 in a virtualized environment using Hyper-V. Each row lists the scenario in which the server is being used, and the columns list the editions. A “y” means yes, this combination of (row, column) is allowed; an “n” means no, this combination is not allowed. A number in a cell indicates the number of licenses allowed or included with the base license; “UL” implies unlimited licenses.

High Level Scenario Based View								
Scenario	Windows Server 2008 R2				SQL 2008 R2			
	Web	Std	Ent	DC	Web	Std	Ent	DC
Dedicated Physical Server (Host)	y*	y	y	y	y*	y	y	y
Virtual Server on Dedicated Host	y*	y	y	y	y*	y	y	y
Shared Physical Server (Host)	y	y	y	y	y*	y	y	y
Virtual Server on Shared Host	y	y	y	y	y*	y	y	y
SharePoint (WSS)	y	y	y	y	n	y	y	y
Exchange Server	n	y	y	n				
Dynamics - CRM Server	n	y	y	n				
Database - Web	y	y	y	n				
Database - Std	n	y	y	n				
Database - Ent	n	y	y	n				

Table 3: Hosting Scenarios \* Only for Web pages, Web sites, Web applications, Web services, POP3 mail serving.

Hardware-Centric View for Dedicated Non Virtualized Physical Servers				
Processors	Windows Server 2008 R2			
	Web	Std.	Ent.	DC
One	y	y	y	y
Two	y	y	y	y
Four	y	y	y	y
Eight or more	n	n	y	y

Table 4: Dedicated Host: Hardware View

Hardware-Centric View for Virtualized Physical Servers				
	Windows Server 2008 R2			
Processors	Web	Std.	Ent.	DC
One	n	y	y	y
Two	n	y	y	y
Four	n	n	y	y
Eight or more	n	n	n	y

Table 5: Hyper-V-Based Host: Hardware View

	Hyper-V Guest Windows Server 2008 R2			
Windows Server 2008 Based Host	Web	Std.	Ent.	DC
Web	n	n	n	n
Standard	n	y	n	n
Enterprise	y	y	y	n
Datacenter	y	y	y	y

Table 6: Hyper-V Guest:

	Hyper-V Guest – Licenses Windows Server 2008 R2			
Host	Web	Std.	Ent.	DC
Web	0	0	0	0
Standard	0	1	0	0
Enterprise	4	4	4	0
Datacenter	UL	UL	UL	UL

Table 7: Hyper-V Guest: Licenses Included with Host License

Note: UL means Unlimited

SQL Server 2008 R2 Editions	Logical Processors allowed for each Guest by SQL SKU		
	Web	Std.	Ent.
Web	1	0	0
Standard	1	1	0
Enterprise	1	1	4
Datacenter	UL	UL	UL

Table 8: Hyper-V Guest Database: Licenses Included with Host License

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# MICROSOFT SYSTEM CENTER PRODUCTS IN A HOSTING ENVIRONMENT

Microsoft System Center is a collection of multiple products that will help Hosting Providers manage their virtual as well as physical environment. In particular, the four products that are of interest to Hosting Providers are:

1. System Center Virtual Machine Manager 2008 R2 (SCVMM)
2. System Center Operations Manager 2007 R2 (SCOP)
3. System Center Data Protection Manager 2010 (SCDPM)
4. System Center Configuration Manager 2007 R3 (SCCM)
5. System Center Service Manager 2010 (SCCM)
6. System Center Orchestrator (Opalis)

All System Center products can be installed on Windows Server 2008 R2 Standard or Enterprise Edition software in a physical or virtual environment. The installations require the hosting provider to separately acquire a licensed copy of the Windows Server Operating System and SQL Server 2005 or SQL 2008 R2 as these are not included as part of the System Center license (except for those System Center with SQL Server Technology products that are available). Please note that SQL Server is only included with the System Center products that have “with SQL” included in the product name.

System Center Virtual Machine Manager is a product that is designed specifically to help manage Hyper-V installations. A brief overview of licensing requirements for SCVMM is described below.

## Microsoft System Center Virtual Machine Manager 2008 R2

Hosting Providers planning to do a large-scale virtual deployment will benefit from use of Microsoft System Center Virtual Machine Manager 2008 R2 (SCVMM). SCVMM can be deployed in multiple topologies. The simplest topology is to install all necessary components of VMM on a single server—or even on a guest virtual machine. Alternatively, to scale out, each SCVMM component can be installed individually on separate servers. The different server roles and components needed for a simple SCVMM topology are provided in Figure 3.

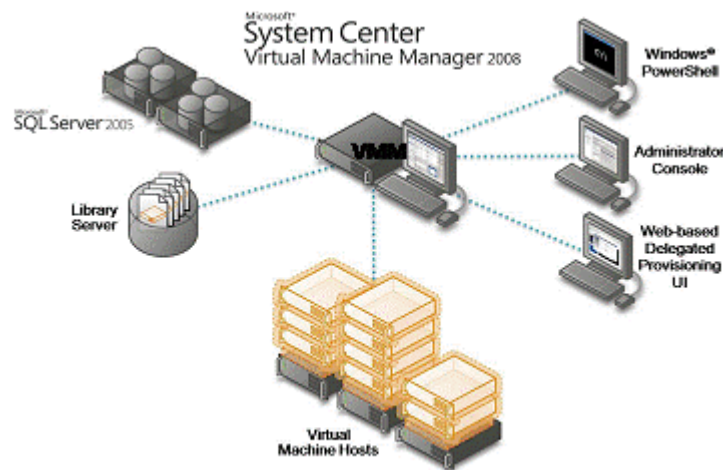


Figure 3: Server roles and components for a simple Virtual Machine Manager-based topology

Table 9 describes the topology from a software licensing perspective.

Server Role	Software Installed	Software License Needed
<b>Hyper-V Host</b>	Windows Server 2008 R2 Standard, Enterprise or Datacenter	Windows Server 2008 R2 Standard, Enterprise, or Datacenter
<b>Hyper-V Management Node</b> Data Storage Web-Based Provisioning Admin Console Library Server	Windows Server 2008 R2 Standard or Higher SQL Server 2008 R2 Standard or Workgroup Edition System Center Virtual Machine Manager	Windows Server 2008 R2 Standard or higher as may be deployed and SQL Server 2008 R2 Standard or Workgroup as may be deployed. Please note that SQL Server is only included with the System Center products that have "with SQL" included in the product descriptor.  System Center Server Management Suite Enterprise SAL (per managed device or host server) or System Center Server Management Suite Datacenter*
<b>Active Directory Domain Controller</b>	Windows Server 2008 R2 Standard	Windows Server 2008 R2 Standard Edition

Table 9: Required Licensing for Hyper-V Host, Per Server Role

\*A stand-alone version of SCVMM is also available, which can be acquired instead of the System Center Suite Enterprise or System Center Suite Datacenter. System Center Suite Enterprise (SMSE) permits the management of a maximum of 4 OSEs per licensed physical device. The System Center Suite Datacenter (SMSD) license permits the management of unlimited OSEs for the licensed device. The licensing for SMSE is based on the device; the licensing for SMSD is based on physical processors in the managed device.

Reference topologies are available for download in the Resources section of this document. The minimal single machine configuration for VMM is available in the following document:

[http://download.microsoft.com/download/4/5/a/45ab5519-26cd-4ea4-91a3-50ec391e7e18/HardwareReqs\\_Final.pdf](http://download.microsoft.com/download/4/5/a/45ab5519-26cd-4ea4-91a3-50ec391e7e18/HardwareReqs_Final.pdf)

## Using Other System Center Products to Manage the Hosting Environment

Microsoft System Center products such as System Center Operations Manager, System Center Configuration Manager, and System Center Data Protection Manager provide Hosting Providers with the ability to better manage the virtual as well as the dedicated environment. All of these products run on Windows Server 2008 R2 with a software update (that is, a Service Pack). Please check the installation instructions of each product for details.

Additionally, for larger deployments, you can have the following Roles in a virtualized environment.

Role	Software Installed	Software License needed
<b>Management Node</b>	Windows Server 2008 R2 Standard, Enterprise or Datacenter System Center Operations Manager System Center Configuration Manager System Center Data Protection Manager System Center Service Manager System Center Orchestrator (Opalis)	Windows Server 2008 R2 Standard, Enterprise or Datacenter  Note: SMSE SAL includes licenses for SCOM, SCCM, SCDPM and SCVMM.
<b>Data Storage</b>	Windows Server 2008 R2 Standard or Higher SQL Server 2008 R2	Windows Server Standard, Enterprise or Datacenter SQL Server 2008 R2 Standard

Table 10: Required Licensing for Hosting with System Center Management Products

In Figure 4 below, we illustrate one way in which different components within System Center can be installed to manage the virtual environment.

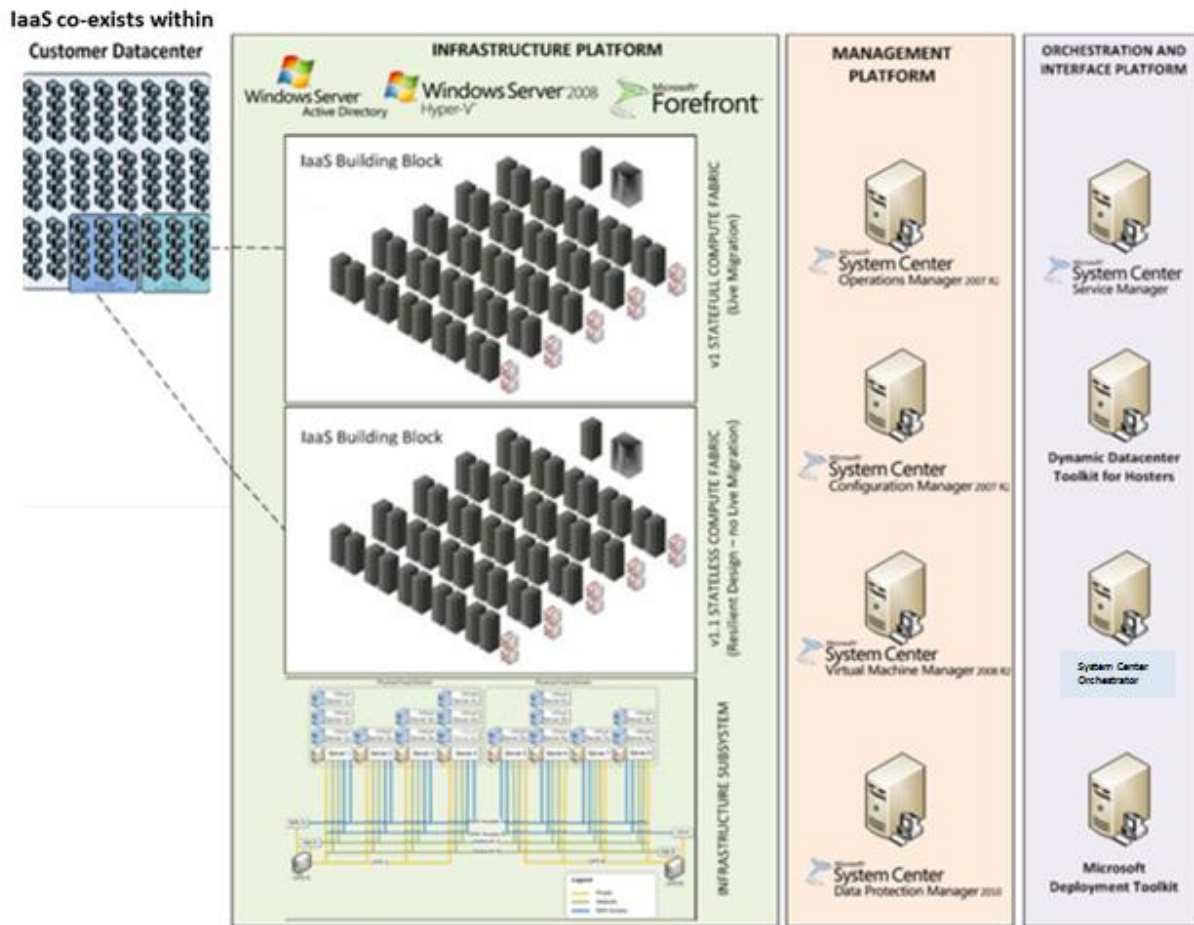


Figure 4: A Typical System Center Deployment to build an IaaS offer using DDTK-H

As mentioned in Section 2b, multiple System Center products are included in SMSD. System Center Orchestrator (Opalis) is a recent acquisition and is not included in SMSD. Please see the following section for licensing requirements for System Center Orchestrator (Opalis).

## System Center Orchestrator (Opalis)

System Center Orchestrator (Opalis) delivers IT process automation capabilities, including task orchestration across systems, standardization of processes, and automation of repetitive tasks, and System Center Orchestrator (Opalis) integrates with System Center and many third-party tools. System Center Orchestrator (Opalis) workflow processes orchestrate System Center products and integrate them with non-Microsoft systems to enable interoperability across the entire Datacenter. System Center Orchestrator (Opalis) reduces the cost of delivery and of managing Datacenter services by:

- Defining and orchestrating processes across System Center products
- Integrating and orchestrating non-Microsoft tools as part of the complete workflow
- Engaging with Service Manager to automate the human workflow elements

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Managed Service Providers can deliver IT services to customers faster and at lower cost with System Center Orchestrator (Opalis). New business opportunities are available to service providers because with System Center Orchestrator (Opalis) they can integrate system to system and capture user-logic, making customer-specific problems as simple to automate as standard service offerings.

System Center Orchestrator (Opalis) is a recent acquisition made by Microsoft. The System Center Orchestrator (Opalis) software is currently owned and licensed by the Opalis subsidiary (a wholly-owned subsidiary of Microsoft). System Center Orchestrator (Opalis) is only offered in conjunction with **System Center Server Management Suite Enterprise (SMSE)** or **System Center Server Management Suite Datacenter (SMSD)**. System Center Orchestrator (Opalis) requires a separate license grant from the System Center Orchestrator (Opalis) subsidiary. SPLA partners who wish to license System Center Orchestrator (Opalis) need to sign a separate license agreement with the System Center Orchestrator (Opalis) subsidiary in order to receive a license grant for the System Center Orchestrator (Opalis) software. This agreement is called the “System Center Orchestrator (Opalis) Services Provider License Agreement”.

SPLA partners interested in obtaining the System Center Orchestrator (Opalis) Services Provider License should contact [opalissp@microsoft.com](mailto:opalissp@microsoft.com).

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## LICENSE MOBILITY THROUGH SOFTWARE ASSURANCE

License Mobility through Software Assurance is introduced from July 1<sup>st</sup>, 2011. The following section answers some of the most frequently asked questions about License Mobility through Software Assurance.

### **What is License Mobility through Software Assurance?**

With increasing adoption of Infrastructure as a Service (IaaS), customers want to move workloads and applications to the cloud without having to acquire additional licenses. For select Microsoft server products, customers can assign certain licenses to a cloud infrastructure for that customer's use by employing the License Mobility through Software Assurance construct.

Using the License Mobility through Software Assurance option, Microsoft Volume Licensing customers with Software Assurance can deploy certain application servers in a service provider's shared hardware environment. A partner providing the shared environment can leverage a single delivery platform to host multiple end customers, leveraging the benefits of License Mobility through Software Assurance for their dedicated application server instances.

### **How does License Mobility through Software Assurance work?**

A customer's application server licenses can be assigned to run server instances on shared hardware in a service provider's data center. However, despite sharing hardware, such server instances must be dedicated to a single customer, and cannot be shared with other customers.

### **Who can use License Mobility through Software Assurance?**

Any Microsoft Volume License customer who has eligible application server licenses that are covered by active Software Assurance may elect to leverage License Mobility through Software Assurance. These include Enterprise Agreement and Open Value, where Software Assurance is included, and other Volume Licensing programs where Software Assurance is an option, such as Select Plus. More information is available on the [Microsoft Volume Licensing Software Assurance](#) page.

### **How do I get access to Windows Server as part of a License Mobility through Software Assurance scenario?**

Windows Server® is provided as a part of the infrastructure software tier by the service provider; it is not covered by License Mobility through Software Assurance.

### **What are the benefits of License Mobility through Software Assurance for service providers?**

For service providers, License Mobility through Software Assurance enhances business opportunities by granting deployment flexibility to the large installed base of Microsoft Volume Licensing customers with Software Assurance.

With License Mobility through Software Assurance, service providers can serve multiple business models on a single infrastructure and license this infrastructure through a single licensing model. The shared infrastructure licensed via the SPLA can run their software services as well as the virtual machines (VMs) for customers' deployed workloads through License Mobility through Software Assurance.

License Mobility through Software Assurance helps service providers drive efficiency, economies of scale, and realize benefits of virtualization. It also will help capture new business opportunities as customers explore cloud services.

### **How do you become an authorized License Mobility through Software Assurance Partner?**

To host License Mobility through Software Assurance for Microsoft Volume Licensing customers, a SPLA partner must complete the authorization process and agree to the requirements.

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The key requirements that your organization must meet include the following:

- **Become an Authorized License Mobility Partner.** To become an authorized License Mobility partner you must sign an addendum to your SPLA. The authorization remains in effect until your SPLA expires. Contact your reseller or Microsoft account manager to obtain the addendum.
- **Provide educational materials to your customers.** During your sales process, you must provide educational materials to your customers about License Mobility through Software Assurance. Information you provide to your customers includes the following:
  - License Mobility through Software Assurance is available to your customers with existing eligible Microsoft licenses with Software Assurance.
  - License Mobility through Software Assurance enables your customers to deploy dedicated instances of their application server software on shared hardware environments provided in your datacenter.
  - Specific use rights apply to License Mobility through Software Assurance, and your customer should reference the PUR at <http://www.microsoft.com/licensing/about-licensing/product-licensing.aspx> for details.
  - Provide your customers with the link to the Microsoft site containing license verification materials so that they can complete the verification process. Confirmation of your customer's verification status will be provided to you.
    - The Microsoft License Mobility through Software Assurance web site: <http://www.microsoft.com/licensing/software-assurance/license-mobility.aspx>
- **License Windows Server through SPLA.** You are responsible for licensing the Windows Server instances for your datacenter through your SPLA. Dedicated application server licenses provided by your customer through License Mobility through Software Assurance are licensed by your customer and do not need to be reported by you through your SPLA.
- **Agree to assist with compliance.** You may be asked to cooperate in good faith with Microsoft to investigate non-compliance as it relates to License Mobility through Software Assurance in your datacenter.

### **What is the license eligibility?**

During the verification process, Microsoft will confirm a customer has licenses that meet the eligibility criteria for License Mobility through Software Assurance. Those criteria are described for the customer in the PUR, where eligible products, use rights and additional requirements can be found in Appendix 1, Software Assurance Benefits. The PUR can be found at <http://www.microsoft.com/licensing/about-licensing/product-licensing-overview.aspx>.

#### Eligibility at a glance

- At a minimum, all products that are currently eligible for “License Mobility within Server Farms” are included; see the PUR for the full list of eligible products.
- Windows Server, the Microsoft Windows Client operating system, and Desktop Application products are not included.
- Active Software Assurance required on both the server and necessary access licenses (CALs, for example).
- The customer is responsible for having active Software Assurance on licenses they choose to use through License Mobility through Software Assurance.

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## LICENSING FAQs

### **Can Windows Web Server 2008 R2 be used as a host OS on a Hyper-V-based server?**

No. Windows Web Server 2008 R2 does not have a Hyper-V role. It can be used only as a guest. Only the Datacenter, Enterprise, and Standard editions of Windows Server 2008 R2 with the Hyper-V option can be used as a Hyper-V host OS.

### **For Windows Server 2008 R2 Standard (or any other edition), can the “included” licensed guest be any version of Windows Server?**

Not necessarily. For each edition of Windows Server on the host, the following guest restrictions apply:

- Windows Server Standard: Included guest can only be Windows Server Standard.
- Windows Server Enterprise: Included guests can only be Windows Server Enterprise or Standard. However, deploying a different product in the guest than the host requires an additional license.
- Windows Server Datacenter: Included guests can be Windows Server Datacenter, Enterprise, Standard, or Web.

### **Is the software for Windows Server Datacenter available only from an OEM?**

Windows Server Datacenter fulfillment media is currently available on SPLA price lists. With the down edition rights for Windows Server DataCenter as specified in the SPUR, Hosting Providers may deploy Windows Server Enterprise, Standard, or Web, and report Windows Server Datacenter under their SPLA.

### **Is there a limit on how many guests I can run when I license Windows Server Enterprise? What if I run all Linux guests?**

The Windows Server Enterprise license includes up to 4 guests; additional licenses are required if you have more than four Windows Server guests. If you are running Linux, you need to determine the licensing requirements for Linux from your Linux vendor. Microsoft does not place limitations on the number of Linux-based guests a hosting provider may run.

### **Does the use of Windows Server Datacenter as a platform for SQL Server change the number of licenses required for SQL Server as indicated in the SPUR? For example, if I have 50 SQL Server instances running on their own virtual machines (i.e., guests) in a Windows Server Datacenter cluster, how many SQL Server licenses do I report?**

This depends on the edition of SQL Server:

- The use of Windows Server Datacenter does not diminish the number of licenses required for SQL.
- With SQL Server Enterprise, if you license all of the physical processors on the server (one license per physical processor), you may run unlimited instances of SQL Server Enterprise in up to 4 OSEs per license. Or you can divide the number of virtual processors supporting the virtual OSEs by the number of cores (hyper threading off) or threads (if threading on) per physical processor to get the number of processor licenses to report.

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- For SQL Server Standard or Web to run instances in virtual operating system environments, divide the number of virtual processors supporting the virtual OSEs by the number of cores (hyper threading off) or threads (if threading on) per physical processor to get the number of processor licenses to report.

### **What is Core Infrastructure Server (CIS) Suite Datacenter?**

This suite of products is designed to make licensing the infrastructure at the Service Provider's data center easier and more affordable when using the complete Microsoft server stack. Products included in the Suite are Windows Server Datacenter Edition, System Center Server Management Suite Datacenter (SCCM, SCDPM, SCOP, SCSM, SCVMM), and Forefront Endpoint Protection.

### **What are the licensing implications of clustering? Do I pay for only the active nodes? Are passive nodes charged as well?**

For SQL Server in an active/passive configuration, passive nodes do not need to be reported.

For Windows Server cold disaster recovery, the cold VM does not need to be reported. In cold disaster recovery scenarios, the machines must be physically turned off or not running, except in some testing scenarios. In warm disaster recovery with failover, you need to license both Windows Server licenses.

Please note that the Passive nodes cannot have more processors than the active nodes.

### **What are the scenarios supported by SQL Server 2008 R2 Web Edition?**

The software may be used only to support public and Internet accessible

- Web pages
- Web sites
- Web applications
- Web services

It may not be used to support line of business applications (e.g., Customer Relationship Management, Enterprise Resource Management and other similar applications).

### **Can we allow remote desktop access to guest or host virtual machines? If so, how many sessions can be allowed?**

For all Windows Server 2008 R2 Editions, for testing, maintenance, and administration access purposes, each instance running in an operating system environment, you may also permit up to two (2) other users to use or access the server software to directly or indirectly host a graphical user interface (using the Windows Server 2008 Terminal Services functionality or other technology). This use is for the sole purpose of testing, maintenance, and administration of the licensed products. These users do not need Windows Server 2008 Remote Desktop Services SALs.

**If all virtual machines on a physical host are used by the same customer, can the physical host be licensed through SPLA and the virtual machines through the end user's Select (Plus) or Enterprise (Subscription) Agreement? Example: the Service Provider uses SPLA for Windows Server Enterprise and offers 4 virtual machines to a customer that has their own licenses for Exchange, SQL Server and Office SharePoint Server.**

If the physical server is only being used by one specific end-customer, we consider this server to be dedicated for that customer, regardless of how many virtual instances that customer is accessing on the server. Within a dedicated environment, an end-customer is allowed to use his own internal use licenses (Select, Open, EA, etc.).

Using such internal use licenses is only allowed in a shared hosting environment (e.g. multiple end-customers accessing the same physical machine, regardless of whether or not those customers have their own dedicated virtual instances on that physical machine) pursuant to the rights granted as part of License Mobility through Software Assurance.

### What is the difference between a virtual processor and a physical processor?

Just as a physical server utilizes one or more physical processors, a virtual server or guest utilizes one or more virtual (or logical) processors. Hyper-V technology makes use of virtual processors in the guest operating system.

From a licensing perspective, certain products like Windows Server are licensed according to the number of physical processors (sockets). Hyper-V may mix and match the physical cores from different processors to create a virtual processor. An example is illustrated in Figure 5 below.

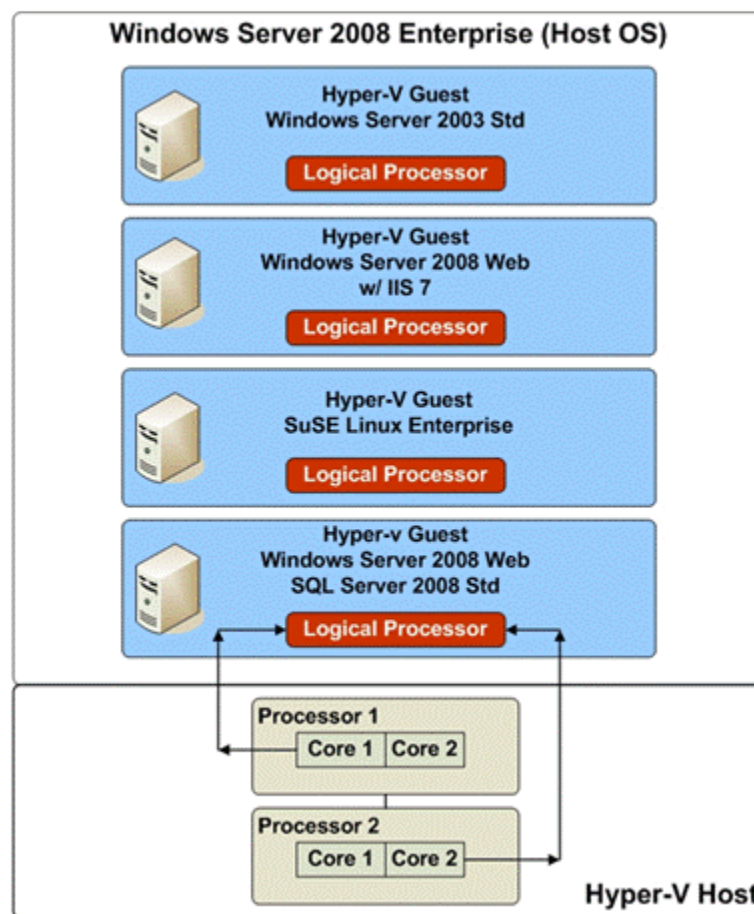


Figure 5: Construction of Logical (or Virtual) Processors

For reliability and performance, Hyper-V technology may allocate resources from separate physical processors in the server to create a virtual processor for use by a particular guest operating system environment. For licensing purposes, 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 Hosting Providers to take advantage of the licensing policy for multicore processors. Microsoft generally considers multicore and hyperthreaded processors to be a single processor, regardless of the number of cores and/or threads they contain.

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## What versions of SQL server are supported with System Center products?

Product	Software Requirements	Current SQL version supported*
System Center Operations Manager 2007 R2	<a href="http://technet.microsoft.com/en-us/library/bb309428.aspx">http://technet.microsoft.com/en-us/library/bb309428.aspx</a>	SQL 2005 - SQL 2008 R2*
System Center Virtual Machine Manager 2008 R2	<a href="http://technet.microsoft.com/en-us/library/cc764328.aspx">http://technet.microsoft.com/en-us/library/cc764328.aspx</a>	SQL 2005 SP2 - SQL 2008 R2
System Center Service Manager 2010 SP1	<a href="http://technet.microsoft.com/en-us/library/ff460997.aspx">http://technet.microsoft.com/en-us/library/ff460997.aspx</a>	SQL 2008 SP1
System Center Orchestrator (Opalis)	<a href="http://technet.microsoft.com/en-us/library/gg440750.aspx">http://technet.microsoft.com/en-us/library/gg440750.aspx</a>	SQL 2005 - SQL 2008
System Center Configuration Manager R3	<a href="http://msdn.microsoft.com/en-us/library/ff977062">http://msdn.microsoft.com/en-us/library/ff977062</a>	SQL 2005 SP2 - SQL 2008 R2
System Center Data Protection Manager	<a href="http://technet.microsoft.com/en-us/library/ff399021.aspx">http://technet.microsoft.com/en-us/library/ff399021.aspx</a>	SQL 2008 SP1

\* Use of SQL 2008 R2 may require special install steps.

Current as of Feb-22, 2010.

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## REFERENCES

### Virtualization with Hyper-V

- Product Details: <http://www.microsoft.com/windowsserver2008/en/us/hyperv-main.aspx>
- Supported Guest Operating Systems: <http://www.microsoft.com/windowsserver2008/en/us/hyperv-supported-guest-os.aspx>

### Windows Server System Reference Architecture

<http://www.microsoft.com/technet/solutionaccelerators/wssra/raguide/default.msp>

### Licensing Document: SPUR

<http://www.microsoftvolumelicensing.com/userights/DocumentSearch.aspx?Mode=3&DocumentTypeId=2>

### Infrastructure Planning and Design

[http://www.microsoft.com/downloads/details.aspx?FamilyId=AD3921FB-8224-4681-9064-075FDF042B0C&SAMI\\_Campaign\\_Name=IPD062708RTM\\_IPDDL&displaylang=en](http://www.microsoft.com/downloads/details.aspx?FamilyId=AD3921FB-8224-4681-9064-075FDF042B0C&SAMI_Campaign_Name=IPD062708RTM_IPDDL&displaylang=en)

- System Center Operations Manager 2007
- System Center Virtual Machine Manager 2008
- Internet Information Services 7.0
- Selecting the Right NAP Architecture
- Infrastructure Planning and Design Series Introduction
- Microsoft Application Virtualization
- Selecting the Right Virtualization Technology
- Windows Deployment Services
- Windows Server 2008 Active Directory Domain Services
- Windows Server 2008 Terminal Services
- Windows Server Virtualization (for Windows Server 2008 Hyper-V and Virtual Server 2005 R2 SP1)

### System Center Virtual Machine Manager 2008 Overview

[http://download.microsoft.com/download/6/f/8/6f8a7125-041a-46f9-a9ec-362b13fe0445/VMM2008\\_White\\_Paper\\_Draft3.6\\_FINAL.pdf](http://download.microsoft.com/download/6/f/8/6f8a7125-041a-46f9-a9ec-362b13fe0445/VMM2008_White_Paper_Draft3.6_FINAL.pdf)

### License Mobility through Software Assurance

<http://www.microsoft.com/licensing/software-assurance/license-mobility.aspx>

### Additional Key Links

- <http://www.microsoft.com/hosting>
- <http://www.microsoft.com/virtualization>
- <http://www.microsoft.com/cloudpower>
- <http://www.microsoft.com/dynamicdatacenter>
- <http://archive.msdn.microsoft.com/ddc>