



Create Supported SQL Server 2008 Virtual Machines

Rely on Server Virtualization to run SQL Server 2008



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Abstract

Virtualization is taking the market by storm even in these tough economic times. It makes sense—virtualize an application and it automatically becomes liberated from a particular physical machine. But, in order to properly virtualize technologies, you must be aware of the support policy from the product vendor. In the case of Microsoft SQL Server, the support team has published guidelines for virtualizing this database engine. Read this paper to learn how to move forward with the process and create supported SQL Server virtual machines (VMs) that can be hosted on Dell PowerEdge servers.

About the Authors

Nelson Ruest and Danielle Ruest are technology futurists focused on data center optimization and continuous service availability. They are authors of multiple books, notably two books published by McGraw-Hill Osborne: "[Windows Server 2008: The Complete Reference](#)" (2008) and "[Virtualization, A Beginner's Guide](#)" (2009). They are currently working on "[Training Kit 70-652: Configuring Windows Server Virtualization with Hyper-V](#)," published by Microsoft Press. In 2007 and 2008, they visited thousands of IT professionals in multiple cities across the United States to discuss the benefits of server virtualization.



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Introduction

Server virtualization is taking the market by storm even in these tough economic times. It makes sense—virtualize an application and it automatically becomes liberated from a particular physical machine, letting you run it on any host—internal or external. The fact that the application resides inside a virtual machine (VM), and that this VM can run pretty well anywhere, brings a whole new definition to the words “application availability.”

In the past, organizations have tried to ensure that their critical applications—applications such as database servers or e-mail servers—are always on. High-availability infrastructures, continuous data replication, disaster recovery strategies and multi-site data-distribution tactics are only a few examples of the methods organizations put in place to protect their most precious systems. But all of these methods are complex to implement and difficult to run. Some even require custom hardware or special software products, adding to the burden organizations already face to run their infrastructures.

Virtualization transforms the traditional operational paradigms and, because of this, introduces new ways to protect your organization’s most valuable assets. But, in order to properly virtualize technologies, you must be aware of the support policy from the product vendor. For example, in the case of Microsoft SQL Server, the Microsoft Customer Support Team has published guidelines for virtualizing this database engine. These guidelines are published in [Microsoft Knowledge Base article 956893](#).

You should take these guidelines into consideration before you virtualize in order to liberate your SQL servers from their physical constraints.

Server Virtualization Basics

When organizations virtualize their applications, databases tend to be saved for last. Organizations do this with reason: databases usually require high levels of Input/Output Operations Per Second. When organizations are unfamiliar with server virtualization technologies, they feel they must gain a certain level of confidence in the technology before moving their most precious applications onto the virtual infrastructure. Therefore, they rightly begin with non-critical applications such as file servers, Web servers, print servers and the like. Once they've gained confidence in the new operational model virtualization brings, they move their most precious and demanding systems onto the new infrastructure.

However, when you move to a virtual infrastructure, you should always do so with application support in mind. While many vendors have been slow to adapt their application support policies to virtualization, this is not the case with Microsoft. In fact, Microsoft has updated most of its application support policies. A summary of the various applications Microsoft supports in virtual environments can be found in [KB article 957006](#).

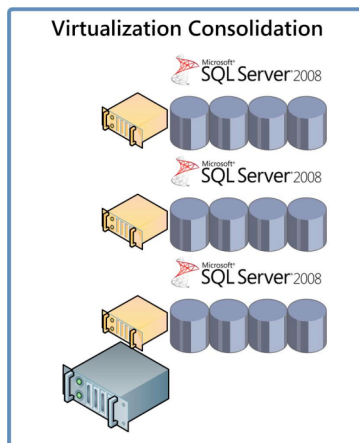
Microsoft supports virtualization of its applications on two types of virtual infrastructures. First, it supports server virtualization—the partitioning of the physical hardware into multiple containers called virtual machines (VMs)—on its own hypervisor, Hyper-V. Hyper-V offers hardware-assisted virtualization. Microsoft also supports server virtualization on validated, third-party hypervisors running in specific configurations. These configurations, and the supported third-party hypervisors, are documented under the Microsoft [Server Virtualization Validation Program](#).

Because hypervisors rely on hardware-assisted virtualization built into processors, you must be careful when selecting the hardware used to support server virtualization. Hardware-assisted virtualization is available in both Intel and AMD processors. Dell offers a selection of PowerEdge Servers running either processor type in certified configurations for the implementation of server virtualization platforms.

Database Virtualization Basics

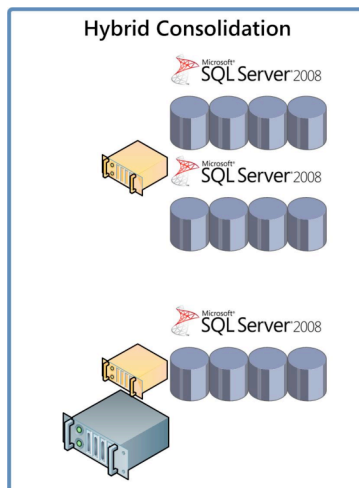
Because Microsoft now supports server virtualization for its most powerful applications, it has begun building virtualization-enabled integration components into both its server operating systems and its server applications. This is the case for both Windows Server 2008 and SQL Server 2008. Running the two together in a VM lets you take full advantage of the virtualization model without loss of performance, because both the OS and the application are aware of the fact that they're running in a VM.

One of the major advantages you gain by virtualizing your SQL Server installations is physical server consolidation. In fact, you can use two different consolidation models when you transform physical SQL Server installations into VMs.



Virtualization Consolidation This consolidation model relies on server virtualization to run each SQL Server installation inside segregated guest OSes. Each guest OS is completely isolated from the others. Hardware is virtualized and presented to guest OSes through synthetic devices. Device drivers are streamlined because each guest OS addresses the same synthetic devices.

Once the guest OS is installed, you can install SQL Server 2008 into the VM and use it to consolidate your databases. Each VM can run any number of databases. The advantages of virtualization are undeniable. Each hard disk drive for the VMs is contained within virtual hard drives—drives that are contained in files on the physical disk—which makes them very easy to back up, duplicate or replicate in order to protect them. In addition, virtualization consolidation will provide absolute isolation, which is required between all SQL Server instances because each VM is a machine in its own right.



Hybrid Consolidation The Hybrid consolidation model mixes consolidation models based on the features of SQL Server 2008, such as database and instance consolidation with virtualization consolidation. Because each guest OS has the same capabilities as a physically installed OS, you can rely on SQL Server features to either run multiple databases in a single SQL instance or run multiple SQL instances, each with its own policies, backup schedules and configuration settings.

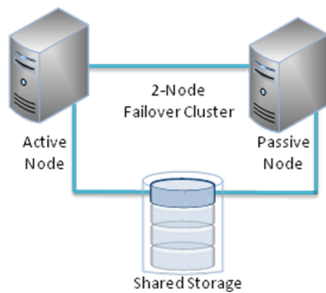
If you're using multiple instances and your VM needs more resources to run them, simply shut it down, add more virtual resources and power it back up. Or, if you're using the latest hypervisor technologies, you can simply hot-add the resources while the VM is running. Each VM can run up to 16 instances if you're using the Standard Edition of SQL Server. You can run up to 50 instances in a VM if you're using the Enterprise or Developer Edition.

By relying on these consolidation models, you can greatly reduce the physical footprint of your SQL Server installations. IT professionals in data centers everywhere are quickly discovering that the "one OS, one physical server" model delivers very poor utilization ratios. With a "multiple OS, one physical server" model, you can increase hardware-utilization ratios and transform them from 10 percent or 15 percent utilization to more than 70 percent utilization. When you consider that each physical server requires space, power and cooling, you can quickly see the allure of physical server consolidation through virtualization.

Create Supported SQL Server Installations

Server Model	CPU/ Cores	Form Factor
PowerEdge R710	2 x 4-core	2U
PowerEdge 2970	2 x 4-core	2U
PowerEdge R905	4 x 4-core	4U
PowerEdge 900	4 x 4-core	4U

Table 1. Dell PowerEdge Server models supporting SQL Server virtualization.



Host Failover Clustering supports the creation of highly available virtual machines



Database Mirroring within virtual machines is fully supported.

[KB article 956893](#) outlines several key factors for the creation of supported virtual installations of SQL Server 2008. While Microsoft will support running older versions of SQL Server and the Windows Server OS in VMs, you should really endeavor to upgrade and convert all of your SQL instances to SQL Server 2008 and run it on Windows Server 2008 to obtain optimum performance levels in VMs.

Article 956893 also outlines several other caveats:

1. All physical hardware must be certified for Windows Server 2008 whether you run Windows Server 2008 with Hyper-V or another supported hypervisor. Dell offers several PowerEdge configurations that include this certification. Table 1 outlines the best PowerEdge configurations that support SQL Server virtualization.
2. You can't create a Guest Failover Cluster. A Guest Failover Cluster is a cluster that's created at the VM layer between VMs. Guest clusters are often created to provide high availability for the application contained within the VMs. You can, however, create a Host Failover Cluster and run individual SQL Server VMs on top of the host cluster. This automatically provides high availability for the VM. **Note:** When a VM is made highly available through host server clustering, the application within the VM will not be aware of the high-availability feature.
3. You must pair the appropriate Windows Server OS with the version of SQL Server you intend to virtualize. As mentioned earlier, you should endeavor to run SQL Server 2008 on Windows Server 2008.
4. You must run a version of SQL Server that's supported under a current Microsoft Support Lifecycle policy. If you run SQL Server 2008, you'll fall under the current support lifecycle policy for this product.
5. You can also rely on SQL Server features, such as database mirroring, to provide protection for critical databases running in VMs. Database mirroring automatically duplicates all of the contents of a database into another SQL Server installation. It will also automatically fail over to the secondary database should the primary database no longer be available. An additional advantage of the mirrored database is that it can be used to provide additional functionality such as reporting services. You can also perform backups from the mirrored copy avoiding any performance impacts on the production database. **Note:** If you choose to run database mirroring in your VMs, you should not make the VMs highly available through host server clustering.

Using Dell PowerEdge Servers to run SQL Server VMs can be done on either Microsoft Hyper-V or on Server Virtualization Validation Program (SVVP) hypervisors such as VMware's ESX Server. In these economic times, everyone wants to reduce costs and increase server-utilization ratios. Combining the power of Dell PowerEdge Servers with virtualization through a hypervisor will significantly reduce the cost per instance for your SQL Server installations, and allow you to achieve top-level performance while reducing costs.



Additional Information

SQL Server 2008 Home Page

www.microsoft.com/sqlserver/2008/en/us/default.aspx

SQL Server on Dell PowerEdge Servers

www.dell.com/sql

Dell PowerEdge R900 Server

www.dell.com/content/products/productdetails.aspx/server-poweredge-r900?c=us&l=en&s=biz&cs=555

Dell PowerEdge R905 Server

www.dell.com/content/products/productdetails.aspx/pedge_r905?c=us&l=en&s=biz&cs=555

Dell PowerEdge R710 Server

<http://www.dell.com/content/products/productdetails.aspx/server-poweredge-r710?c=us&cs=555&l=en&s=biz>

Dell PowerEdge 2970 Server

www.dell.com/content/products/productdetails.aspx/pedge_2970_rack?c=us&cs=555&l=en&s=biz

Run SQL Server 2008 in VMs on Hyper-V with Dell Servers

www.dell.com/downloads/global/solutions/public/white_papers/Virtualization_Guide_for_SQL_Server_2008.pdf

Virtualizing SQL Server on Dell PowerEdge Servers

<http://content.dell.com/us/en/corp/d/business~solutions~power~en/Documents~ps4q08-20080334-muirhead.pdf.aspx>