



*Reduce Your Server Footprint  
with SQL Server 2008*

*– Rely on SQL Server 2008 to Consolidate Database Servers –*

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## Abstract

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Organizations today want to do more with less, especially in these tough economic times. This is where SQL Server 2008 can help. By improving the SQL Server engine in version 2008, Microsoft provides organizations with the opportunity to centralize data management services in a wide variety of ways. With its new unified management and auditing tools, SQL Server 2008 makes it easier to manage multiple instances on fewer servers. And by hosting these instances on Dell PowerEdge Servers powered by multi-core processors, you can guarantee the best levels of availability, as well as ensure the best possible performance. Keep in mind that each time you consolidate a database server into a larger instance, you reduce the physical server footprint in your data center, plus you reduce costs and administrative overhead. Take the time to assess SQL Server 2008's powerful new feature set and you will find that, together with the Dell PowerEdge Server, it delivers the best value for data maintenance and storage.

### About the Authors

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



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## Introduction

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Organizations today want to do more with less, especially in these tough economic times. This is true in all walks of life and it is no less true in IT departments. One of the very best ways to do more with less in IT is to consolidate—reduce the number of physical servers performing the same task within a single data center. Consolidation makes sense because it reduces the server footprint in the data center, it reduces costs and also reduces the administrative overhead required to manage these systems. There are several ways to consolidate and there are a number of methods that support the consolidation process.

One of the first places you should look to consolidate is with database servers. Databases services is one of the areas in the data center that is the most prone to proliferation. Why? Because databases can be so versatile and support so many different applications and services.

This is where SQL Server 2008 can help. By improving the SQL Server engine in version 2008, Microsoft provides organizations with the opportunity to centralize data management services in a wide variety of ways. With its new unified management and auditing tools, SQL Server 2008 makes it easier to control multiple instances on fewer servers. And by hosting these instances on Dell PowerEdge Servers powered by multi-core processors, you can guarantee the best levels of availability and ensure the best possible performance for consolidated database services.

When you take the time to assess SQL Server 2008's powerful new feature set, you will find that, together with the Dell PowerEdge Server, it delivers the best value for data maintenance and storage.



## Database Proliferation

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It's easy to proliferate databases in any data center. That's because databases, especially SQL Server databases, are used in support of so many other products. Organizations often find themselves running multiple editions of SQL Server as well as multiple versions of the product. With its new unified data management features, SQL Server 2008 finally offers the ability to consolidate all databases, all database instances and all database versions into one streamlined and standardized installation.

Organizations of all sizes can find up to seven different types of databases within their data centers:

**Operational Databases:** Many infrastructure applications—applications such as Microsoft System Center Operations Manager, System Center Virtual Machine Manager, System Center Essentials and many more—require an operational database to store the information they collect and manage about the systems they administer. In many cases, these databases are based on free versions of SQL Server.

**Informational Databases:** Many collaboration tools—Microsoft Office SharePoint Server or Microsoft Windows SharePoint Services, for example—rely on informational databases to store both structured and unstructured data and support the collaboration process.

**Financial Databases:** Organizations running tools such as enterprise resource planning (ERP) systems need to rely on financial databases to store the ERP system data.

**Organizational Databases:** Companies often develop internal systems, systems that rely on organizational databases to manage the business processes that support their production systems.

**Departmental Databases:** Specific departments often find they need their own departmental databases to run and manage the business processes they rely on. In addition, departmental databases are often implemented in support of customer relationship management (CRM) systems.

These five database types can also be supported by two more database structures:

**Regional Databases:** Larger companies will often find that they need to implement regional copies of their operational and/or informational databases to support their distributed-computing processes. These regional databases serve as collector databases that provide local services and publish locally collected data to centralized databases.

**Geographical Databases:** Organizations with major offices in worldwide locations will often find they need to implement geographical databases. These databases can store organizational, departmental, financial, informational or even operational data locally for ease of access. Geographical databases are often linked together to support worldwide information management.

Add to this the possibility of running multiple editions of SQL Server—Express, Standard, Enterprise or Developer—as well as multiple versions—2000 and 2005—and you'll find that database consolidation is a good opportunity to do more with less.

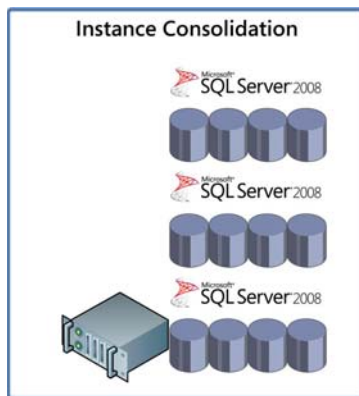
## SQL Server 2008 Consolidation Models

With its new feature set including centralized policy-based management of server configurations, Windows PowerShell integration, resource monitoring and governance, and the new FileStream data type for storing unstructured data, such as documents, SQL Server 2008 offers unparalleled capabilities for database server consolidation. In fact, SQL Server 2008 supports four consolidation models.



**Database Consolidation:** This is the simplest approach to consolidation. It brings together many databases into a single instance on a single server. You can rely on this model when all of the databases you bring together into the single instance will have similar requirements, including management structure, configuration settings, security settings and auditing models.

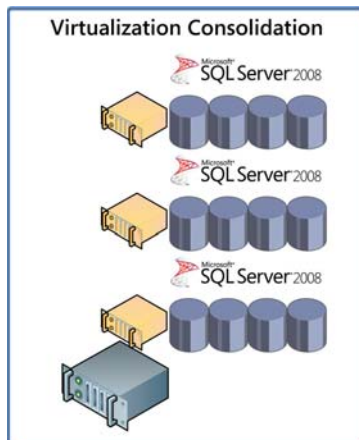
In this case, you need to make sure the server platform you select will support the databases you bring together into the single instance.



**Instance Consolidation:** When the databases you want to bring together have different requirements—management, security, configuration and auditing—you should consider running multiple instances of SQL Server 2008 on the same physical hardware. Each instance will support its own settings and configuration and will support as many databases as required because each instance is completely isolated from the others. In addition, changes to one instance do not affect changes to any other instance. Remember that the databases you group together into an instance must have similar requirements. The SQL Server Standard edition will support up to 16 instances per physical server and the SQL Server Enterprise or Developer editions will each run up to 50 instances per server.

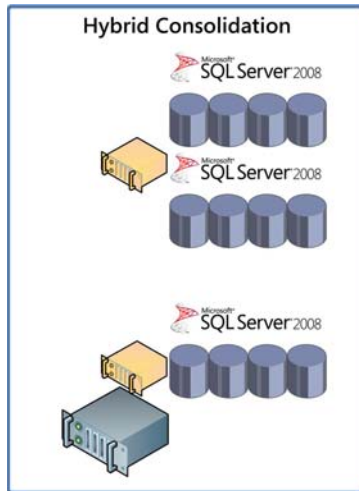
These first two consolidation models—database and instance—require little if any relearning because they directly rely on the SQL Server 2008 feature set. They will appeal to companies that want simple, yet straightforward database consolidation processes.

Organizations that want to invest more into their consolidation efforts will want to also consider the following two scenarios.



**Virtualization Consolidation:** This consolidation model introduces the concept of virtualization—the partitioning of the physical hardware into multiple containers called virtual machines (VM) to run segregated guest operating systems. Each guest operating system is completely isolated from the others. Hardware is virtualized and presented to guest operating systems through synthetic devices. Device drivers are streamlined because each guest OS addresses the same synthetic devices.

Once the guest operating systems—ideally, you will rely on Windows Server 2008 as the guest OS because it's optimized for virtualization—are installed, you can install SQL Server 2008—which is also optimized for virtualization—into the container 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 are contained within virtual hard drives—drives that are contained in files on the physical disk—which makes them easy to back up, duplicate or replicate to protect them. If absolute isolation is required between all instances, then virtualization consolidation is the answer. Note, however, that this method requires new learning in your data center because virtualization has little to do with database administration.



**Hybrid Consolidation:** The Hybrid consolidation model mixes the first two—database and instance consolidation—with the third model, virtualization consolidation. One of the major advantages of virtualization is that it focuses on maximizing hardware utilization. IT professionals in data centers everywhere are quickly discovering that the one OS-one physical server model delivers poor utilization ratios. With a multiple OS-one physical server model, they can increase hardware utilization ratios and transform them from 10 percent to 15 percent utilization to upward of 70 percent. When you consider that each physical server requires space, power and cooling, you can quickly see the allure of physical server consolidation through virtualization.

And, because each guest OS has the same capabilities as a physically installed OS, you can rely on either the one instance with multiple databases or multiple-instance models in any VM. If your VM needs more resources to run its multiple instances, simply shut it down, add more virtual resources and power it back up. That's dynamic resource management.

## Determine Your Consolidation Factor

Consolidating your SQL Server databases and instances will provide several benefits to your organization. These benefits address the hardware, software, maintenance, support power and cooling, as well as regulatory aspects of your data center operations. Specifically, they will address the following:

- Running fewer servers brings obvious savings at the hardware level. Buying fewer, more powerful servers will also reduce your need for server racks and network switches. Buying x64 servers—servers running 64-bit processors—will let you increase server resources such as memory to support massive database workloads and achieve top performance in the same physical server footprint.
- Each time you consolidate SQL Server instances, you consolidate your SQL Server licensing costs because SQL Server is licensed on a per-processor basis. Buy one license for a processor, especially a quad-core processor, and you can run as many instances or databases as you need on that processor. In addition, SQL Server licenses are now assigned to the data center farm, not a single server. This means that if you run SQL Server in VMs, the licenses you rely on will move with the VM when you move the VM from one physical server to another.

Server Model	CPU/ Cores	Form Factor	Platform
PowerEdge R805	2 x 4-core	2U	AMD
PowerEdge 2950 III	2 x 4-core	2U	Intel
PowerEdge R905	4 x 4-core	4U	AMD
PowerEdge 900	4 x 4-core	4U	Intel

Table 1. Dell PowerEdge Server Models supporting SQL Consolidation

- Maintenance and support costs are reduced because fewer systems are required. And with SQL Server 2008's new centralized management model, you can design one single standard configuration for each instance type and apply it to any number of SQL Server instances.
- Data center size is also reduced because fewer servers require less space, less power and less cooling. In addition, modern servers are more efficient and will consume less power but provide better performance.
- By consolidating your data containers and merging structured and unstructured data into fewer containers—thanks to SQL Server 2008's support for the FileStream data object—you streamline the compliance process. Using fewer containers with similar policies makes it easier to meet regulatory requirements.

Your company will be able to draw on these benefits no matter which SQL Server consolidation model you choose for your project. Each model can be applied to a number of different hardware configurations. The Dell PowerEdge servers that provide the best support for SQL Server consolidation are presented in Table 1. Each system runs 64-bit hardware, breaking traditional memory barriers, and provides support for multiple quad-core processors, the industry standard for server consolidation.

Determine which model best meets your needs. Models come in 2U or 4U form factors. You will define the consolidation factor—the ratio of consolidation per physical server—for your project through the selection of the form factor that best suits your needs. Remember: the higher the consolidation factor, the greater the potential savings.



## Additional Information

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SQL Server 2008 Homepage

<http://www.microsoft.com/sqlserver/2008/en/us/default.aspx>

SQL Server Consolidation on Dell PowerEdge Servers

[www.dell.com/sql](http://www.dell.com/sql)

Dell PowerEdge R805 Server

[http://www.dell.com/content/products/productdetails.aspx/pedge\\_r805?c=us&l=en&s=bsd&cs=04](http://www.dell.com/content/products/productdetails.aspx/pedge_r805?c=us&l=en&s=bsd&cs=04)

Dell PowerEdge R900 Server

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

Dell PowerEdge R905 Server

[http://www.dell.com/content/products/productdetails.aspx/pedge\\_r905?c=us&l=en&s=biz&cs=555](http://www.dell.com/content/products/productdetails.aspx/pedge_r905?c=us&l=en&s=biz&cs=555)

Dell PowerEdge 2950 III Server

[http://www.dell.com/content/products/productdetails.aspx/pedge\\_2950\\_3?c=us&cs=555&l=en&s=biz](http://www.dell.com/content/products/productdetails.aspx/pedge_2950_3?c=us&cs=555&l=en&s=biz)