

VMware vSphere 4

The Most Efficient SQL Server Consolidation Platform

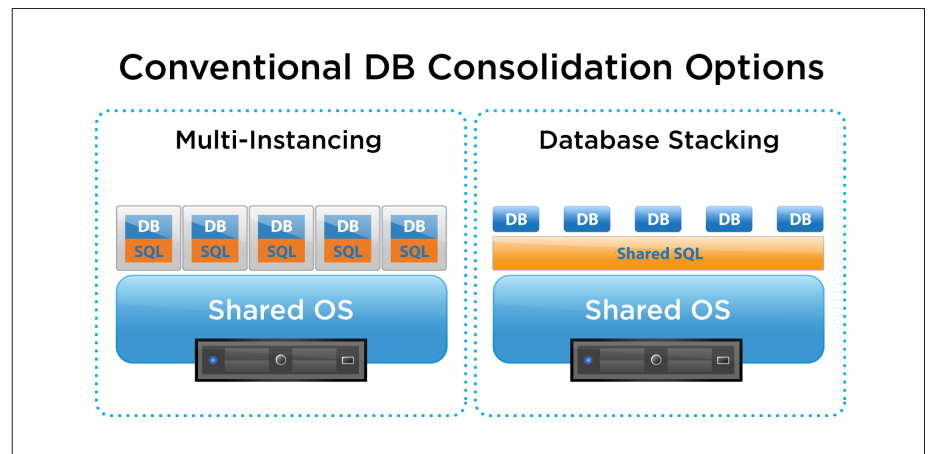
The Need to Consolidate SQL

Do you have a large and rapidly increasing number of SQL Server instances to support? Are your SQL Server costs and administration requirements growing out of control? Many IT departments are faced with similar challenges, as new databases are being deployed left and right in support of a broad range of apps. To make matters worse, each SQL database is typically deployed on a dedicated server, with tremendous over-provisioning of capacity. IDC estimates that each year, more than 1.2 million x86 servers are shipped to support database deployments, equivalent to more than 15% of the total x86 server market. This huge growth places a tremendous management and financial burden on IT organizations, specifically:

- **Server sprawl and high infrastructure costs** are driven by the '1 database to 1 server' deployment model. Most SQL Server instances barely utilize 6% of their server capacity on average, leading to tremendous waste of resources.
- **High Software licensing costs** because of the requirement to license SQL Server and the supporting Windows OS for each instance.
- **High administration costs** as each SQL instance, regardless how small, requires the full attention of System Administrators and DBAs.
- **Difficult to size and scale.** Production databases are typically sized for multiple years of service. Allocate too little capacity, and your database might break its SLAs. Allocate too much capacity, and over-provisioning can quickly lead to spiraling costs. Re-sizing databases requires re-provisioning on a new physical server, a highly disruptive process.
- **Complex and expensive high availability.** Many SQL Server instances are not critical enough to justify the cost and complexity of implementing High Availability and Disaster Recovery solutions such as clustering or database mirroring, leaving them vulnerable to downtime.

Conventional Database Consolidation Helps, But...

SQL Server consolidation is not new. Customers have been cutting costs out of their SQL deployments for years. Without virtualization, there are two fairly common consolidation approaches: Multi-Instancing and Database Stacking, as illustrated below.

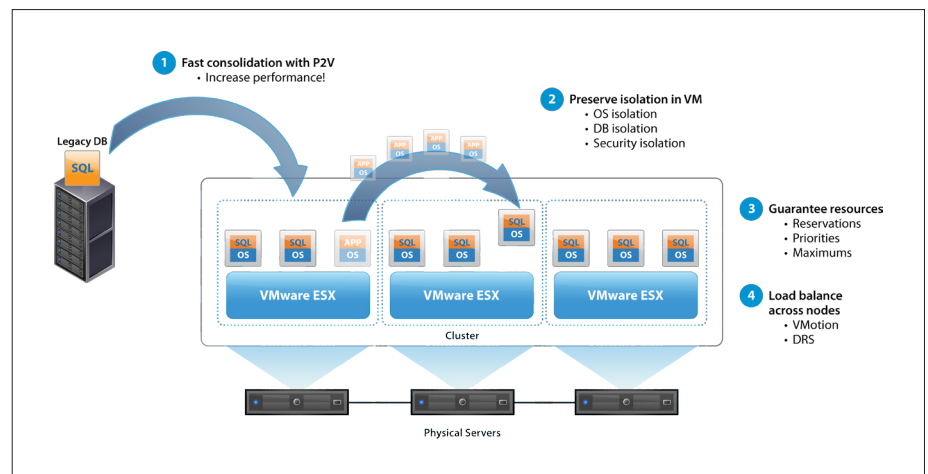


Both of these approaches can be very efficient and yield consolidation ratios typically in the 5X to 20X range. However, there are also some inherent challenges:

- **Lack of OS (and SQL) isolation:** All the databases are running on a shared OS image (and SQL image in the case of DB Stacking). If that image gets corrupted (fault, security, etc.), all the databases are impacted simultaneously.
- **Difficult consolidation process:** Legacy databases have to be re-tested and re-provisioned on the new, standard OS / SQL version and patch level. And, some databases—such as those supporting software vendor apps—simply can not run on that same OS / SQL version and have to be excluded from consolidation plans.
- **Lack of load balancing between physical nodes:** If a physical server gets overloaded, there is no simple way to migrate a database from one physical node to another. Hence, the utilization of the physical node has to be constrained, and there is still some risk that database Service Levels could suffer.

Database Consolidation on VMware

VMware provides Database teams with another option to consolidate SQL. The most typical configuration is illustrated in the figure below, and consists of a dedicated VMware cluster for SQL—for licensing reasons—and a single database in each Virtual Machine—for improved manageability.



The main benefits of this approach, compared to conventional database consolidation, are:

1—Fast Consolidation with P2V: With VMware, existing SQL Servers can be consolidated easily using Physical-To-Virtual (P2V) conversion tools. Well-behaved SQL databases can be converted with their existing configuration—instead of re-provisioned from scratch—into a Virtual Machine. The VM can then be tested quickly and evaluated from a performance standpoint prior to production deployment.

2—Slash Hardware and Software Costs: Customers frequently achieve hardware consolidation ratios of 5X to 20X, saving an estimated \$8,000 for each physical server that is consolidated. In addition, SQL Server can be licensed by physical processor in the VMware cluster, and licenses can be consolidated along with the hardware.

3—Guarantee resources: The performance of each individual database can be guaranteed with resource reservations and priorities.

4—Load balance across physical nodes: Virtual Machines and their SQL databases can be migrated live between physical servers, leading to very efficient load balancing, which can be automated with Dynamic Resource Scheduling. This increases resource utilization and consolidation ratios.

5—Scale dynamically to ensure service levels: With VMware, Virtual Machines can be re-sized with no downtime with ‘Hot-Add’ of CPU and memory resources. Scale your databases dynamically to ensure service levels under increasing load

6—Maximize SQL Server availability without clustering: VMware provides built-in High Availability (automated restart), Fault Tolerance (continuous availability), and Site Recovery Manager (automated Disaster Recovery) that automatically protect all SQL Server instances from outages. Without clustering, and with no changes to the OS or SQL configuration.

7—Accelerate SQL Server provisioning from the labs to production: On conventional hardware, provisioning a new production SQL Server typically requires weeks or months of lead time. With VMware, new databases can be provisioned in minutes from existing VM Templates. In addition, SQL Server Virtual Machines can be cloned into the labs to quickly create test environments.

8—Leverage Outstanding VMware vSphere Performance and Official Microsoft Support: Virtual Machines running on vSphere scale to 8 vCPUs, 255 GB of memory, and more than 300,000 IOPS, while keeping overhead limited to between 2% and 10%. Virtualize even large SQL instances with no performance bottleneck. In addition, VMware is officially certified to run SQL through the Microsoft ‘Server Virtualization Validation Program’ (SVVP), ensuring customers of collaborative support between VMware and Microsoft.

What About Licensing?

One of the most common licensing mechanisms for SQL Server is the “Enterprise Per Processor” license. Under this licensing model, customers are allowed to license only the physical processors in the vSphere cluster. By deploying a dedicated cluster for SQL, and licensing all the physical processors in that cluster, customers can create an “all you can eat” platform on which any number of Virtual Machines running any number of SQL instances can be deployed. Under this model, customers can consolidate licenses by the same consolidation ratio as achieved on physical processors, typically 5X to 20X—and realize significant license cost reductions!

Of course, each customer deployment is different, and customers should carefully assess their individual, specific licensing options. Please consult with Microsoft or your reseller for your specific licensing situation. Complete information on SQL Server licensing can be found on the Microsoft web site at www.microsoft.com/sqlserver/2008/en/us/licensing.aspx

What if I Already Consolidated SQL Server Without VMware?

VMware recommends to deploy a single SQL instance per Virtual Machine, to maximize manageability. Each VM can be migrated live, backed up independently, protected with High Availability, scaled dynamically, etc. With a single SQL instance per VM, all these operations can be applied independently to each SQL instance.

In some cases customers have already consolidated SQL Server without VMware, following the Multi-Instancing (multiple SQL instances on one OS image) or the Database Stacking (multiple DB on a shared SQL instance) models. In these situations, customers may choose to deploy those consolidated environments within a VM. In other words, deploy multiple databases and / or SQL instances on a single OS image within a single VM. These deployment configurations work well as long as the consolidated environment does not require more resources than can be supported by the individual VM (8 vCPU and 255 GB of memory). These configurations typically enable customers to achieve most of the benefits of virtualization—including load balancing across physical nodes, dynamic scalability, high availability, etc.—with fewer OS instances to manage, and without disassembling an already consolidated environment.

For more information on SQL Server on VMware Best Practices, Performance Testing, and Case Studies, visit us on the web at www.vmware.com/solutions/business-critical-apps/sql/

