

BS&A Software and Best Practices in Virtual Environments

Questions? From your BS&A program, go to **Help>Contact Customer Support** and select **Request Support Phone Call** or **Email Support**. Or, you may call us at (855) 272-7638 and ask for the appropriate support department. Questions for our I.T. department may be submitted by phone (same number), or by emailing tech@bsasoftware.com.

BS&A Software is happy to fully support our software in virtual physical environments. The potential cost savings and maintenance simplification provided by virtual environments are undeniable.

Tested and approved configurations include both VMware and HyperV. BS&A has extensively tested both VMware and HyperV in its labs. This paper will outline the types of best practices and configurations that can be used to implement BS&A Software in a virtual environment.

Recommended hardware requirements/specifications for virtual environments can be found on the BS&A Software support page. (<http://bsasoftware.com/Technology/Hardware-Requirements>)

Versions and Compatibility

Recommended Versions. BS&A recommends SQL 2016 (or later), and Windows Server 2012 R2 (or later) for all of its customers running in a virtual environment.

Backup Compatibility. BS&A recommends using backup software and methodology that uses VSS technology in its backups. The software should clearly state it is capable of backing up the SQL version in question. Backups are important. If any doubt persists, BS&A recommends the use of “native sql backup” and – as always – test restores.

A Word About the BS&A Software Platform

Virtualized or not, BS&A Software produces some of the largest, most actively utilized databases in the local government space. There are over 25 applications in the suite. These applications interact with each other, reading and writing data to and from dozens of what can be very large tables. Other than some forms of GIS, it is very rare to find applications as resource intensive as the BS&A applications. If not properly resourced, performance can suffer.

Performance Tip #1 Disk I/O

The primary bottleneck that slows any Microsoft SQL Server (virtual or physical) is disk I/O. Most BS&A Software applications are based on large, write intensive databases. In such environments best performance is achieved by utilizing separate spindles (physical disks) for the Log files and the databases. The following rules apply:

“Store transaction logs separate from data files. Do not stripe on the same disk as the data files. For large bandwidth demands on the I/O bus, use a different bus for the transaction log files.” (*Physical Database Storage Design Article cc966414—Microsoft.com*)

“More / faster spindles are better for performance Ensure that you have an adequate number of spindles to support your IO [sic] requirements with an acceptable latency.” (*Storage Top Ten Best Practices, Article ID cc966534—Microsoft.com*)

“Isolate log from data at the physical disk level When this is not possible (e.g., consolidated SQL environments) consider I/O characteristics and group similar I/O characteristics (i.e. all logs) on common spindles.” (*Storage Top Ten Best Practices, Article ID cc966534—Microsoft.com*)

“Combining heterogeneous workloads (workloads with very different IO [sic] and latency characteristics) can have negative effects on overall performance (e.g., placing Exchange and SQL data on the same physical spindles).” (*Storage Top Ten Best Practices, Article ID cc966534—Microsoft.com*)

“Always place log files on RAID 1+0 (or RAID 1) disks. This provides better protection from hardware failure, and better write performance.” (*Storage Top Ten Best Practices, Article ID cc966534—Microsoft.com*)

High performance drives: BS&A Software recommends the use of SAS drives with 6Gbps throughput. Internally, in its highest utilized environments, BS&A has implemented new SSD technology with great success. BS&A Software recommends (where feasible) the use of SSD technology.

Performance Tip #2 (Memory Allocation)

Given the many possible bottlenecks involved with Disk I/O, BS&A Software strongly recommends sufficient RAM be allocated to any virtual machine running the database engine. It has been established that substantial performance gains can be made by minimizing disk I/O. Yet another method of doing this is by eliminating (as much as possible) the need to access the disk at all. Sufficient memory allocation is key in this effort.

Also keep in mind that the free or “Express” version of SQL Server is limited to 1GB of RAM usage when buffering databases. Lack of utilized resources may not be an indicator of lack of need of resources. Upgrading to the Workgroup or Standard versions of MSSQL can open this bottleneck and provide for substantially increased performance.

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

Performance Tip#3 CPU

While SQL Server is licensed by the CPU (in many cases), these limitations do not apply to the “multiple cores” modern processors possess. SQL Server is inherently multi-threaded and will take advantage of being assigned multiple cores in a VM Environment. It is recommended that more than one CPU/core be assigned to the virtual machines containing Microsoft SQL.

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

Summary

Many municipalities have had great success virtualizing MSSQL and BS&A Software. BS&A fully supports both VMWare and Hyper-V implementations. BS&A is happy to answer any questions and discuss any concerns that might concern virtualization. To do this from your BS&A program, go to Help>Contact Customer Support and select Request Support Phone Call or Email Support. Or, you may call us at (855) 272-7638 and ask for the appropriate support department.

Works cited or reviewed in the writing of this document

BS&A Software Hardware Recommendations: (<http://support.bsasoftware.com/References/Documents/HardwareNet.pdf>)

Microsoft Best Practices for virtualizing and managing sql server 2012. download.microsoft.com/download/6/1/D/61DDE9B6-AB46-48CA-8380-D7714C9CB1AB/Best_Practices_for_Virtualizing_and_Managing_SQL_Server_2012.pdf

Microsoft SQL Server Best Practices Article ID 966412 <http://msdn.microsoft.com/library/cc966412>

Disk partition alignment, Microsoft article 758814 [http://msdn.microsoft.com/en-us/library/dd758814\(SQL.100\).aspx](http://msdn.microsoft.com/en-us/library/dd758814(SQL.100).aspx)

Microsoft SQL Server and VMware Virtual Infrastructure Best Practices, Revision: 20090313 Item: WP-087-ISV-01-01. http://www.vmware.com/files/pdf/sql_server_virt_bp.pdf

Performance and scalability of Microsoft SQL Server on VMWareVSPHERE 4: (VMWare White paperVMW_09Q2_WP_VSPHERE_SQL_P15_R1) http://www.vmware.com/files/pdf/perf_vsphere_sql_scalability.pdf

Storage Top Ten Best Practices, Microsoft Article ID cc966534<http://technet.microsoft.com/en-us/library/cc966534.aspx>

Tuning Disk IO in VMWare. VMWare Article kb1003469 http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=1003469

Memory Architecture: Microsoft MSDN article 187499 <http://technet.microsoft.com/en-us/library/ms187499.aspx>

SQL 2008 Edition Comparison: <http://www.microsoft.com/sqlserver/2008/en/us/editions.aspx>