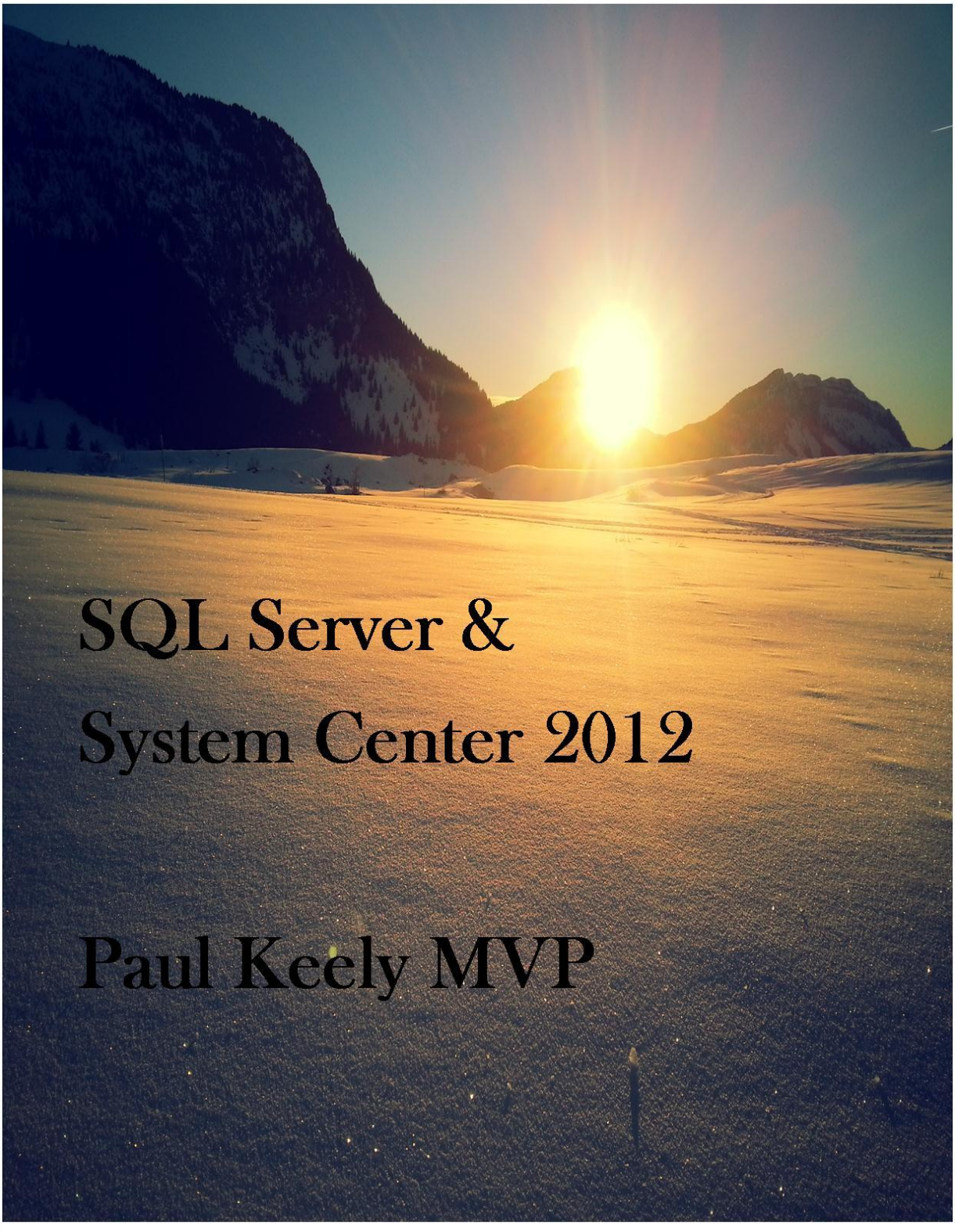
SQL Server &
System Center 2012
Paul Keely MVP

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Don't have the time or want to just check something quick …

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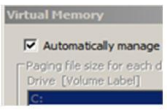
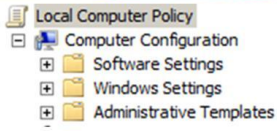
AV: Create **exceptions** for SQL data files



Page file: Place your page file on separate fast disks

Power Settings: Change your windows power settings to High Performance

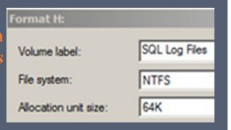


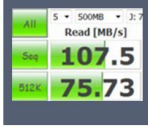
Configure the account that the SQL service is running under to have Perform Volume Maintenance Tasks. Computer Configuration\Windows Settings\Security Settings\Local Policies\User Rights Assignment\Perform volume maintenance

Storage

Use RAID 10 whenever possible

Block Sizes: Format your SQL drives with 64K block sizes





IOPS: Test your IOPS with a tool like SQLIO

Performance

MSSQL$: Buffer Manger\Buffer cache hit ratio

This should be as close to 100% as possible. Below 97-98% indicates SQL server needs more physical memory

MSSQL$: Buffer Manger\Page Life Expectancy

The minimum value here should be 300

LogicalDisk(*)\Avg Disk sec/Read

Should be under 20ms. Beyond 50ms is very bad

LogicalDisk(*)\Avg Disk sec/Write

Should be under 20ms. Beyond 50ms is very bad

\Processor Information(_Total)\% Processor Time

Should be below 60% and over 80% indicates processor pressure

Application	SQL Version	Collation	SQL Components	Notes
SCCM	SQL 2008 R2 SP1 CU6	SQL_Latin1_General_CP1_CI_AS	DB engine& SSRS	No dynamic ports, SQL replication may be needed for some Management Point configurations.
SCOM	SQL 2008 R2 SP1	SQL_Latin1_General_CP1_CI_AS	SSRS, and Full text Search	Heavy SQL requirement
SCSM	SQL 2008 R2 SP1	SQL_Latin1_General_CP1_CI_AS	SSRS, and Full text Search	Heavy SQL requirement
SCO	SQL 2008 R2 SP1	Not specified		Has very little specified SQL requirements
SCVMM	SQL 2008 R2 SP1	Not specified		
SCDPM	SQL 2008 R2 SP1	Not specified		Can be installed with a local copy of SQL express, does not support install on a cluster

Introduction

This guide has been written to help you make decisions about arguably one of the most important building blocks of any System Center deployment; the database server. As more organisations are deploying more of the applications within the suite we will look at the options of co-existing different System Center databases on the same instance or a new instance on the existing SQL server.

This guide was written by Paul Keely with the intention of helping other System Center administrators plan for the SQL platform that will be needed for an enterprise deployment, and help the SQL DBA get a better understanding of System Center and its requirements on SQL. The data in this guide comes from sources like TechNet, Microsoft guides, white papers, blogs and personal experience. Where a personal opinion is given it will be listed as such.

The main area of personal opinion will be centred on database sizing, virtualisation and co-location. The reason this guide is giving advice on database sizing etc. is that the TechNet forums are constantly choked with questions from people like;

What size should my Operations Manager DB be?

Where should it be located?

Can I have the SCCM DB on the same instance as my SCVMM DB?

How do I move my SCO DB?

This guide will endeavour to answer as many of these questions as possible and act as a reference for SQL server performance with regard to System Center.

Chapter 3 “The SQL Server” is designed to help the typical System Center Administrator make informed decisions about the SQL backend. It goes into some detail on SQL performance and how it can be configured. It will likely be of limited use to the dedicated SQL admin. The rest of the chapters will likely be more helpful to the SQL admin as they will guide you through the System Center requirements for SQL and will help you understand some of the requirements on your systems.

This guide is not a diehard SQL performance guide, as that is not what the guide was intended to be and there is plenty of content of indepth SQL performance and tuning information on the web.

Overview of SQL

SQL server is used by System Center for operational databases and reporting data warehouses. It is the single most critical component of any System Center application. It needs to be designed and configured correctly and its failure is a big issue for your management system.

The first revision of this document will focus on SQL 2008 R2 as at the time of writing System Center 2012 SP1 was not released, but as soon as it is, the document will be updated to look at SQL 2012 also.

Overview of System Center

System Center is an application suite of products that manages from the desktop to the cloud and is totally dependent on databases held on SQL server. The different applications have different requirements and needs from SQL server. In general SCOM and SCSM are more SQL intensive than say SCO or DPM. When you read this, you may have some mission critical SCO environment running tens of thousands of run books and it will of course have a higher DB requirement then a SCOM environment monitoring 250 servers.

How can System Center interact and help SQL? Well SCOM can help you monitor your SQL server and instances with the SQL management pack. SCCM can check the configuration of your server and patch it for you. DPM will of course backup your DB's and could restore it with ease and SCO can automate regular tasks on your SQL server.

It's possible to run the DB server as a VM and a lot of the applications can use a DB on the same instance, all of this is however is dependent on the load you are going to place on the SQL server.

The SQL server

In this section we will go into a lot of detail on the SQL server and how we need to configure SQL and the OS. In general the first question you are going to have to answer is physical or virtual. Deciding whether to virtualise or stay on physical is a really important question. The current trend for companies is to virtualise everything or as much as possible. So should you virtualise your System Centre SQL servers? The two main factors that will influence your decisions are

- The number of SC applications you want to deploy
- The size of your environment

The number of SC applications you want to deploy.

With the new licencing model of SC suite forcing you to buy the full suite and not an individual product it is very likely that companies are going to be deploying a large number of the products. If from the outset of your SC project you know you are going to deploy some of the big hitters like SCOM, SCSM and SCCM then it might make more sense to consider a physical server with multiple instances. When Microsoft blog about how they deployed one application or another they always have the SQL backend on physical servers.

The size of your environment.

If you are deploying SCOM to monitor 300 servers, it's very likely that you could deploy SCOM on VM's with the DB's also deployed to a SQL instance on a VM. If you are going to be managing a large environment with a lot of servers and desktops then it's likely that you are going to need a SQL backend that is capable of meeting the needs of the SC applications Some points to consider when deploying SQL to support System Center;

- SQL server "sprawl" makes its manageability harder
- Consolidate where possible
- Keep in close contact with the storage provisioning team throughout your project

No matter what you decide on, make one thing clear, don't place your System Center application on the same server as your SQL instance, just don't. Microsoft has really "deemphasized" the focus of System Center away from small companies to the medium to large enterprise. The reason for this is small organisations in general lack the IT skills needed to support the complexity of System Center. So don't go deploying an enterprise product or products sharing the same server with your DB instance and start moaning later that the console performance sucks, it doesn't, your design does.

SQL Server Workloads

SQL server has to manage two types of workloads in relation to System Center, Online Transaction Processing (OLTP) and a Data Warehouse (DW). Examples of the different DB's profiles are

Database	Type
SCOM Operational DB	OLTP
SCOM Reporting DB	DW
SCCM database	OLTP
SCSM Operational DB	OLTP
SCSM Reporting DB	DW
SCO	OLTP
SCVMM	OLTP
SCDPM	OLTP

OLTP

OLTP databases will have a high number of short transactions. The data tends to be more volatile and it has a higher number of write activities to the data files and in general the OLTP DB will generate more IOPS than a DW. From a SC perspective data in an OLTP DB like the SCOM operational DB only stays in the DB for short period of time.

DW

The DW in SC is used to hold data for longer time frames and from the DW we can run reports to ascertain for example performance data over a long timeframe, normally up to a timeframe of just over one year. In general the DW will normally have longer running queries than the OLTP, and often the data is more static.

Windows Server Settings

There are a number of settings that can be configured at the OS level that can have a big effect on SQL.

Disks, Partitions and RAID

Server 2003 had issues with disk alignment that were fixed in Server 2008 onwards, however the assumption that I am making with this guide is that the minimum server OS is Server 2008 R2 SP1.

The optimum block sizes for disks hosting SQL files is 64K block sizes. As much as possible we are looking for RAID 10 for all SQL data base files. There is a good web based configuration tool that can help with sizing and IOPS calculations. RAID10 costs a lot so if you can't get all your DB's onto it, make sure to get tempdb there.

SQLIO

The SQLIO tool is a Microsoft tool that tests your disk input/output per second or IOPS. The longer it takes SQL to read or write from disk will be directly reflected in the way the console performs for a user, when they try and open a new performance dashboard, or report on how well a specific application deployment is going.

The tool is strangely named as it has very little to do with SQL and more to do with hammering the I/O of your disk subsystem. It's important to understand how your storage has been provisioned and what type of storage you are using before using this tool. The first reason is if you are sharing your storage with other live applications there is a strong chance that the SQLIO tool may negatively affect their storage I/O during the test. The second is that if you configure your test to write a quantity that the storage system can manage within its cache, you may get an I/O result that does not actually reflect the real speed.

AV Settings

Microsoft's official AV statement on SQL and AV is here. In the document it lists some of the factors that you need to consider and the common exclusions to think about. If you do a search on AV and SQL you will find a lot of different opinions on its effects on performance. I personally find the risk too high to leave servers unprotected. In the screen shot below I am using EPP from SCCM 2012, and I am not using any exclusions. The important thing to point out is that in this example as the AV is scanning the DB files there is a 1-1 correlation between the I/O usage for the AV and SQLSERVR. The I/O reads being exactly the same for AV and SQL. A better value for the AV's hit on I/O should be between 5-7% of what SQL is using.

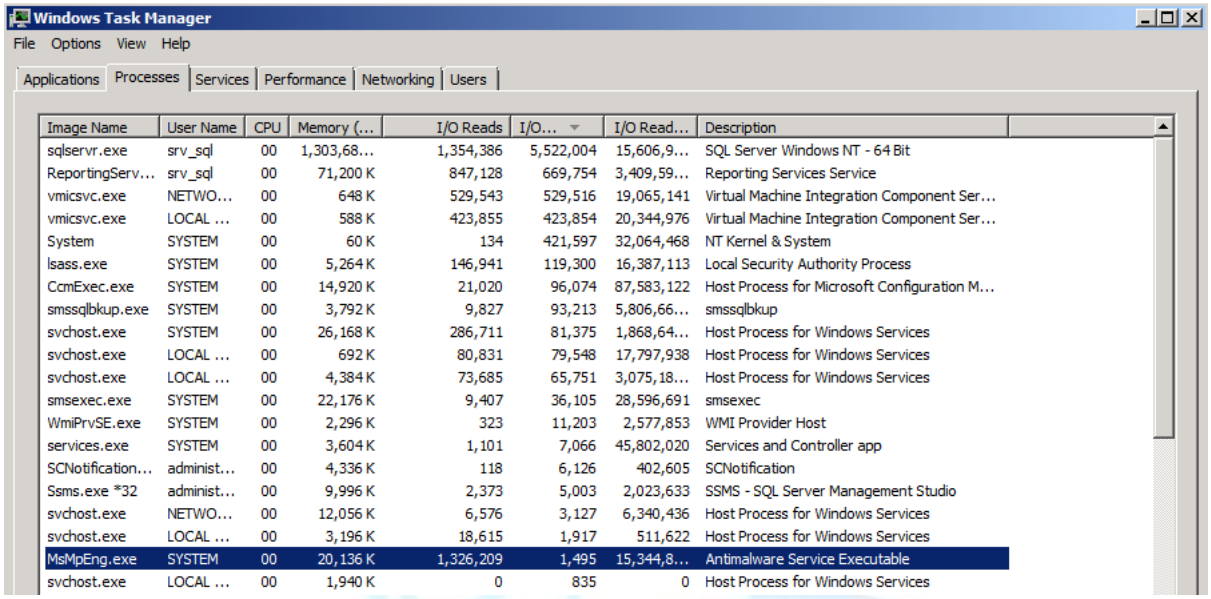


Image Name	User Name	CPU	Memory (...	I/O Reads	I/O...	I/O Read...	Description
sqlservr.exe	srv_sql	00	1,303,68...	1,354,386	5,522,004	15,606,9...	SQL Server Windows NT - 64 Bit
ReportingServ...	srv_sql	00	71,200 K	847,128	669,754	3,409,59...	Reporting Services Service
vmicsvc.exe	NETWO...	00	648 K	529,543	529,516	19,065,141	Virtual Machine Integration Component Ser...
vmicsvc.exe	LOCAL ...	00	588 K	423,855	423,854	20,344,976	Virtual Machine Integration Component Ser...
System	SYSTEM	00	60 K	134	421,597	32,064,468	NT Kernel & System
lsass.exe	SYSTEM	00	5,264 K	146,941	119,300	16,387,113	Local Security Authority Process
CcmExec.exe	SYSTEM	00	14,920 K	21,020	96,074	87,583,122	Host Process for Microsoft Configuration M...
smssqlbkup.exe	SYSTEM	00	3,792 K	9,827	93,213	5,806,66...	smssqlbkup
svchost.exe	SYSTEM	00	26,168 K	286,711	81,375	1,868,64...	Host Process for Windows Services
svchost.exe	LOCAL ...	00	692 K	80,831	79,548	17,797,938	Host Process for Windows Services
svchost.exe	LOCAL ...	00	4,384 K	73,685	65,751	3,075,18...	Host Process for Windows Services
smsexec.exe	SYSTEM	00	22,176 K	9,407	36,105	28,596,691	smsexec
WmiPrvSE.exe	SYSTEM	00	2,296 K	323	11,203	2,577,853	WMI Provider Host
services.exe	SYSTEM	00	3,604 K	1,101	7,066	45,802,020	Services and Controller app
SCNotification...	administ...	00	4,336 K	118	6,126	402,605	SCNotification
Ssms.exe *32	administ...	00	9,996 K	2,373	5,003	2,023,633	SSMS - SQL Server Management Studio
svchost.exe	NETWO...	00	12,056 K	6,576	3,127	6,340,436	Host Process for Windows Services
svchost.exe	LOCAL ...	00	3,196 K	18,615	1,917	511,622	Host Process for Windows Services
MsMpEng.exe	SYSTEM	00	20,136 K	1,326,209	1,495	15,344,8...	Antimalware Service Executable
svchost.exe	LOCAL ...	00	1,940 K	0	835	0	Host Process for Windows Services

The recommended AV exclusions for SQL are

SQL Data Files

- .mdf
- .ldf
- .ndf

Backup Files

- .bak
- .trn

Full-Text cataloge files

- Default instance: Program Files\Microsoft SQL Server\MSSQL\FTDATA
- Named instance: Program Files\Microsoft SQL Server\MSSQL$instancename\FTDATA

Processes to exclude from virus scanning

SQL Server 2012

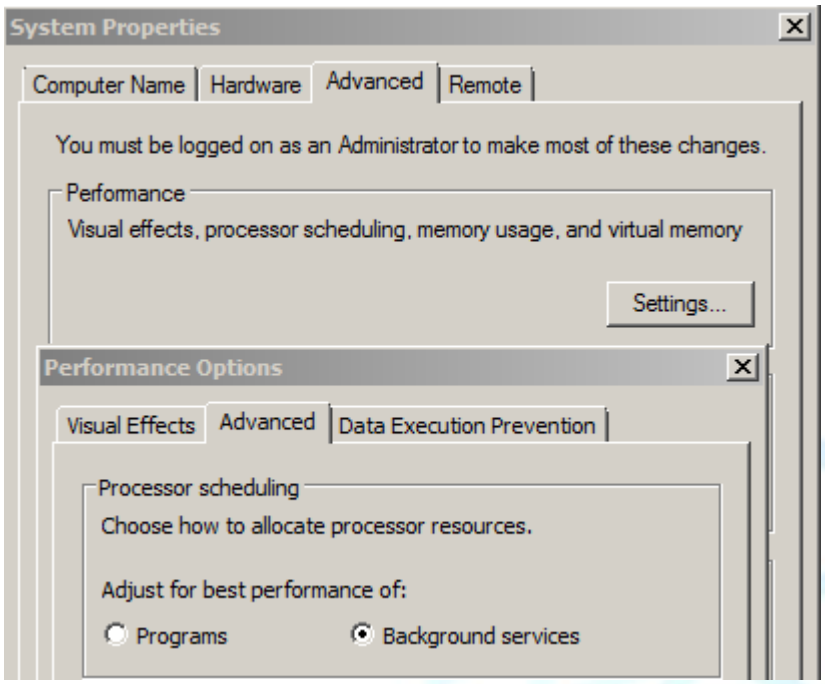
- %ProgramFiles%\Microsoft SQL Server\MSSQL11.<Instance Name>\MSSQL\Binn\SQLServr.exe
- %ProgramFiles%\Microsoft SQL Server\MSRS11.<Instance Name>\Reporting Services\ReportServer\Bin\ReportingServicesService.exe
- %ProgramFiles%\Microsoft SQL Server\MSAS11.<Instance Name>\OLAP\Bin\MSMDSrv.exe

SQL Server 2008 R2

- %ProgramFiles%\Microsoft SQL Server\MSSQL10_50.<Instance Name>\MSSQL\Binn\SQLServr.exe
- %ProgramFiles%\Microsoft SQL Server\MSSQL10_50.<Instance Name>\Reporting Services\ReportServer\Bin\ReportingServicesService.exe
- %ProgramFiles%\Microsoft SQL Server\MSSQL10_50.<Instance Name>\OLAP\Bin\MSMDSrv.exe

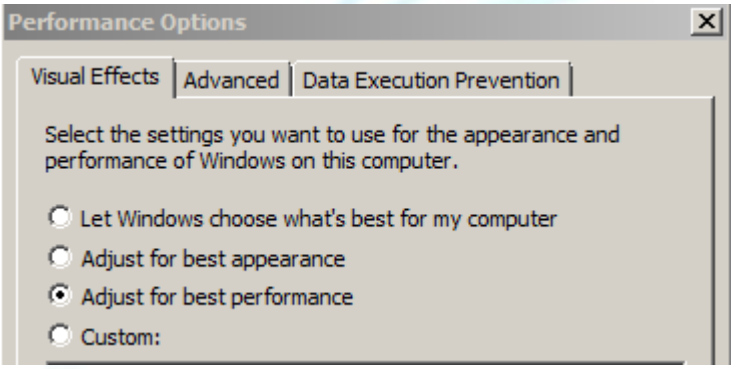
Processor Scheduling

As SQL runs as a background service your processor scheduling should be set to Adjust for best performance of: Background services



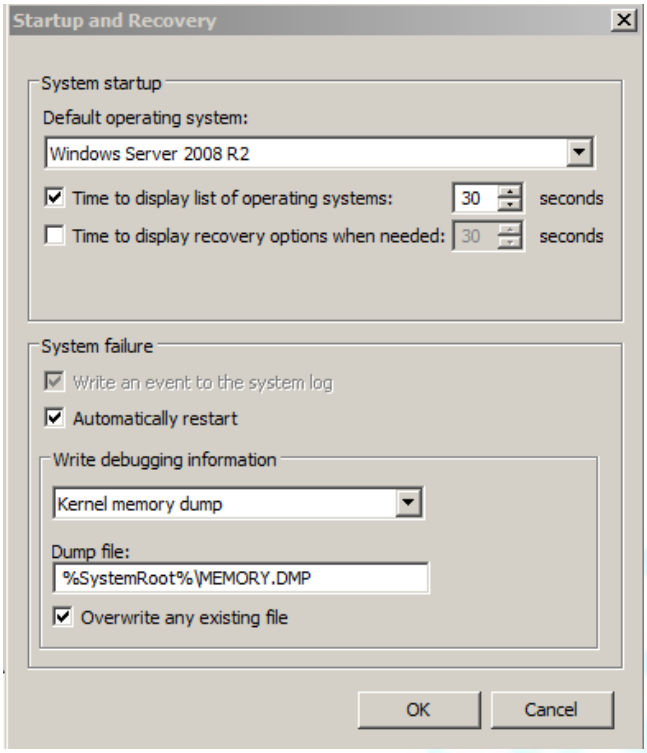
Visual Effects

Should be set for adjust for Best Performance



System Failure

Set the system failure to Automatically restart



Page files

By default Windows sets the page file to be 1.5 times the size of the available amount of RAM. The 3 main components that make the foundation of your OS are the CPU, Memory and the Hard Disk. Windows, applications and drivers use virtual memory addresses that are translated to actual RAM by the hardware. Virtual Memory Manager (VMM and not to be confused with the VMM that manages your virtual environment) is the component within the OS that translates the virtual address space to the physical memory on your server. When a process tries to write into memory it will request a virtual address from VMM. Once it has been written VMM then decides if it will stay in RAM, if there is sufficient stress on RAM you may need to move the data to the page file to make room for another process. When you try and access the data again it has to be loaded from the page file and a page fault occurs.

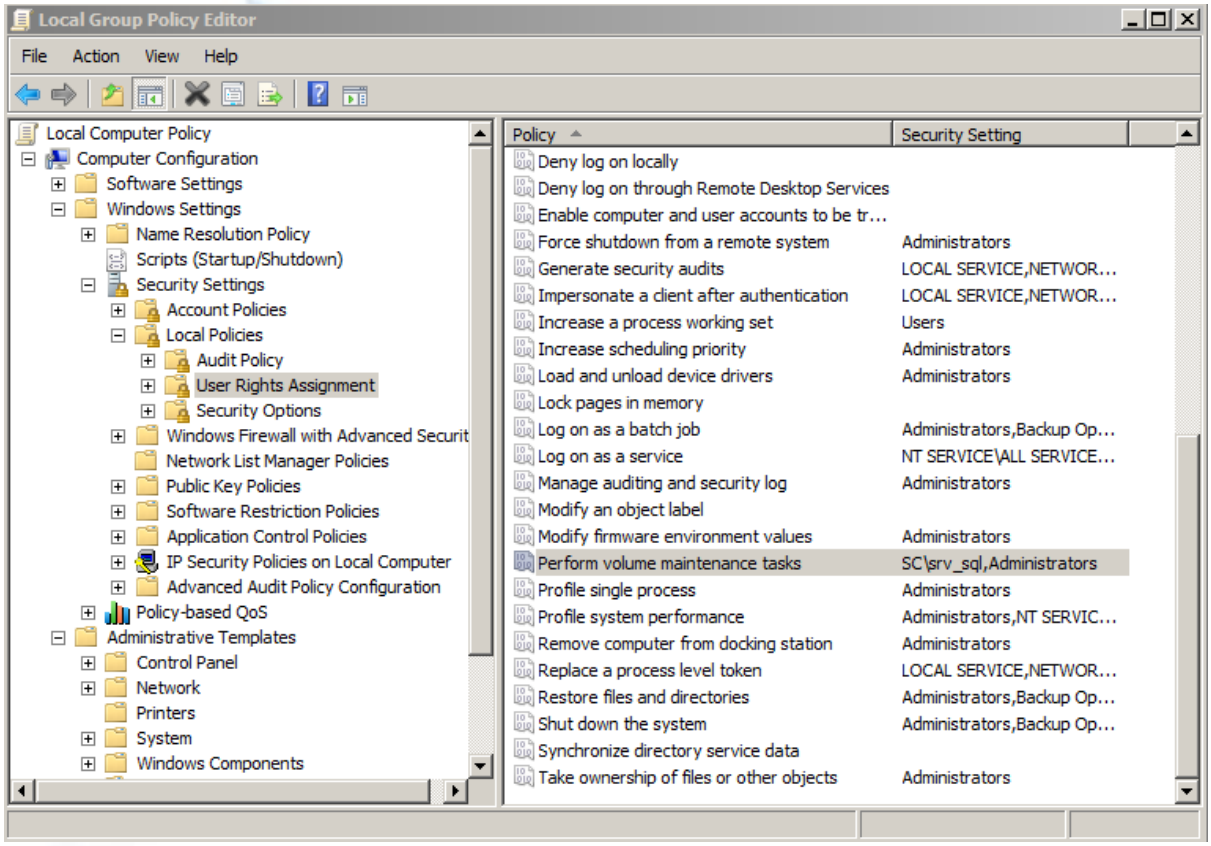
There are 2 types of page fault that can occur, Soft and Hard. The soft page fault occurs when SQL requests a new page from VMM. The second and more damaging from a performance standpoint is the Hard Page Fault. When VMM has assigned SQL pages to its virtual address space but then ran out of physical memory and so sent one of SQL's pages to the page file on your hard disk. When SQL now makes a call for that page then VMM has to find that page in the page file, and then write the page to memory. When you are paging a lot you need to add more memory to the server.

If you leave the page file at 1.5 times the amount of RAM you won't hurt performance, but on a server with large amounts of RAM do you still need such a large page file? On systems with hundreds of gigs of memory a page file of 8GB would seem appropriate, it is also considered a good idea to have a second page file on a separate disk to the OS.

Perform volume maintenance tasks.

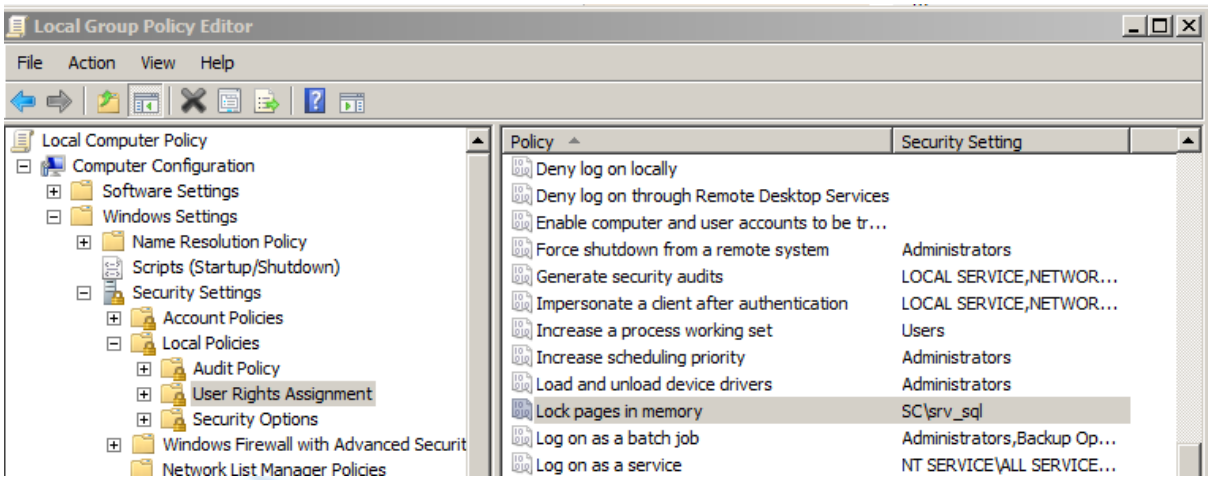
When we perform a number of SQL tasks like creating a new DB for your new SCOM instance or try and grow your existing SCCM data file, or restore your SCSM DB then the OS needs to perform a volume maintenance task. Normally when Windows creates a new DB for example it will go through a process of zeroing out the entire file. This can take a long time, however if you grant your SQL server service the right, then it allows the OS to skip this task and perform the task almost instantaneously. The GPO is located under Computer Configuration\Windows Settings\Security Settings\Local Policies\User Rights Assignment\Perform volume maintenance tasks. This setting is recommended on all SQL servers.

In the example below I have listed the account SC\SRV_SQL because it is the account that my SQL services are running under.



Lock Pages in Memory (LPIM)

When a driver or application made a request for resources and the OS did not have enough resources available to meet that request the OS would periodically page out large amounts of memory from SQL. This "trim" afforded the OS more memory but had a negative effect on SQL. The main reason for this was poorly written buggy drivers. Microsoft set about taking steps to prevent this from happening and the official stance is that there is no need to enable LPIM. Some of the SQL experts still say that there is a mixed opinion from Microsoft and amongst the SQL MVP community about the relevance of this setting. That being said if your server does page out memory and negatively affect your SQL server then you will have the option to enable LPIM. Once again this is a GPO setting and is in the same place as the "Perform volume maintenance tasks", Configuration\Windows Settings\Security Settings\Local Policies\User Rights Assignment\Lock pages in memory



An error similar to this in the SQL error log indicates that the SQL working set has been trimmed and that you may either call Microsoft Support or enable LPIM

A significant part of SQL memory has been paged out.

When you enable LPIM it's only the SQL buffer pool that gets locked, and it's strongly recommended that you enable Max Memory Settings at the instance. When you use LPIM the SQL buffer pool can't be moved and as such it requires less overhead to manage it. This can have a significant performance gain on high end SQL environments.

Power Settings

Running Windows Server on the default power plan can result in less than optimum CPU performance on the server. In Glenn Berry's excellent book "SQL Server Hardware" he has conducted performance testing using the "Balanced" power plan and using "High performance" power plan and he recorded significant performance gains using the latter.

Location

Some of the applications like VMM support hosting your SQL server in a separate domain to your VMM server, while others don't. In my opinion it makes no sense to locate your SQL instances in separate domains or separate data centres. If you are storing your SQL server in a separate domain to your System Center application servers then you run the risk of authentication failures with Kerberos and trusts etc. There are enough things to troubleshoot and manage in System Center without adding more complexity into the mix. My rule of thumb is having my SQL backend in the same domain and data center as my System Center servers.

Where multiple data centers exists the common question is, where do I locate my SQL servers? This is a great question and the source of many a question on the TechNet forums. This is a slightly more complex question than it sounds. When deciding where to place your SQL DB's consider the following points:

Number of servers	The data center that hosts the greatest number of servers is a good location in terms of the pure number of servers to monitor and backup etc.
Storage	Hosting your SQL in a data center where you have fast storage possibly with tired storage. SAN replication, availability etc all help swing the decision
Number of console users	Housing SQL closer to the greater number of admin users in the past was a great idea for applications like SCOM. It still is a good idea to place a terminal server in the data center where you place your SQL backend.

Instance specific configuration

Now that we have the OS configured in a SQL friendly way it's time to look at the SQL instance, as we can have many instances on the SQL server you will need to make the changes per instance. It is considered a best practice to separate your OLTP databases from your DW databases and as such some of the settings listed here are recommended for one workload versus another, and that will be indicated.

The tempdb

Tempdb in some ways is similar to the page file in the OS. It holds temporary objects, temporary stored procedures and table variables. Tempdb gets copied from the model database when the SQL server starts and as such it gets flushed and resized. The tempdb log file is only flushed under memory pressure and as a result an IO issue with tempdb can impact the throughput of the whole instance. The important thing here is that a poorly performing tempdb will affect the full instance, and all your DB's. So if you have co-located your SCOM, SCO and VMM DB on one instance than all your apps are likely having an issue just because of your Tempdb

When you install SQL it will create a Tempdb file group in the location where you installed SQL. The default size of the tempdb is 8MB. The best practice is to

- Create a number of separate files in tempdb
- Size them to an appropriate size
- Store them on fast disks

Create a number of separate files in tempdb

There used to be a recommendation to have a Tempdb per CPU core. Servers with large CPU numbers made this advice outdated. Now the recommendation is to start with between 4 and 8 files, and expand as needed. Having a number of equally sized files in the primary file group means that you will reduce file contention.

Size them to an appropriate size

So how big is appropriate? Not too easy to answer, but it is recommended that the files be on a separate disk and as such could be as big as the disk allows. If for example your operations manager DB is sized initially at 50 GB, a tempdb size of 24 GB would be a good starting point. So if we take into account the previous topic and we have 4 tempdb files then we would be dividing 24 GB by 4 so that we have equally sized files. It's important that all files are the same size.
Errors like 3976: "The version store must shrink because the tempdb is full" or
1101 or 1105: "The session connecting to SQL Server must allocate space in tempdb" indicate that there is a sizing issue with tempdb. If you size your tempdb too small or left it to the default configuration then it will have to autogrow constantly and this will cause significant system overheads.

Let's think about the default sizing of tempdb and how it will affect your instance. As we have already said the default size of the DB is 8MB with a 1MB log file. Looking at the Perfmon of a tempdb below, it's 609MB. What does that mean? Well if this DB is set as default (and it is), then its sitting on the SQL application drive, in this case C:, and it has been using autogrow to get from 8MB to 609MB. Every time it autogrow's it is temporally unavailable, and this situation is a mess!

\\SQL1	
LogicalDisk	_Total
Avg. Disk sec/Read	0.000
Avg. Disk sec/Write	0.000
Memory	
Available MBytes	419.000
Processor Information	_Total
% Processor Time	0.000
SQLServer:Buffer Manager	
Buffer cache hit ratio	100.000
Page life expectancy	273.000
SQLServer:Databases	tempdb
Data File(s) Size (KB)	609,728.000

As you can see the DB is running with the full defaults.

Database files:

Logical Name	File Type	Filegroup	Initial Size (MB)	Autogrowth	Path
tempdev	Rows ...	PRIMARY	8	By 10 percent, unrestricted growth ...	C:\Program Files\Microsoft SQL Server\MSSQL10_50.
templog	Log	Not Applicable	1	By 10 percent, unrestricted growth ...	C:\Program Files\Microsoft SQL Server\MSSQL10_50.

When this server restarts the DB will be flushed, a new one will be created at 8MB and it will autogrow continually to reach the 609MB size.

Store them on fast disks

Ideally your tempdb should be stored on a RAID 10 set. When Microsoft published a blog on how they deployed SCOM 2007 they made a big deal of how they placed tempdb on high performing RAID 10 set.

The bottom line

- Place your tempdb on its own logical disk
- Map that logical disk to a RAID 10 set
- Size your tempdb in advance to be nearly the full size of the disk
- Split the file group over 4-8 equally sized files
- Monitor the DB for Average Disk sec/Transfer looking for MDF. >20, LDF >15ms

Optimize for ad-hoc workloads

When SQL's query optimizer has sent a job to the Query Executor, it then stores the plan in the plan cache. As the optimizer has already worked out the cost of executing the plan it makes sense to have it cached so that it can be reused quickly. Sounds great, but you could have a lot of execution plans being cached end up, with plan cache bloat occurring.

What would make more sense, is for the first time an execution plan runs, just cache a small subset or stub of the plan, but if the query is run again, then cache the plan in full. This is exactly what the settings "Optimize for ad-hoc workloads" does. The SQL MVP experts whose blogs and books I read all recommend this setting.

Min and Max Server Memory

SQL will allow you to set the Min and Max server memory settings. The minimum setting is the amount of memory SQL will try and hold onto, however the OS can still override this. As SQL will try and pre-cache memory, the maximum memory setting is arguably the more important to prevent SQL from taking too much from the OS. So what if you have a number of instances on the same SQL server? How should you configure the max memory setting? Well each instance has to be given a max setting that allows each of the other instances a level of memory they require. So if your SQL server has 3 instances and your server has 32 GB of memory then you could consider a memory plan like;

Server OS	2Gb
Server based applications	2Gb
SQL instance 1	10Gb
SQL instance 2	10Gb
SQL instance 3	8Gb

Changes you make to the memory settings take effect straight away and you don't need to restart services.

How can you know if you are on the money with your memory settings? Well it turns out there are two counters that can help, Available Mbytes and Page Life Expectancy (PLE).

PLE is a measure of how long a page will stay in the buffer cache's memory uncontested. The figure of 300 seconds is considered about as low as you're looking for. Values like 30 seconds is considered critical, on many SQL servers that I am working on I see values like 4000 seconds!

The Available Mbytes should really not descend below 500Mb, and a value of about 1Gb would be considered the safe "low water mark". So how do I use these two counters to work out my max memory settings?

Well if you have a low PLE value (below 300) but you have a high available memory value than you have room to assign more memory to your SQL instance. On the other hand a very high PLE value paired with a low memory value could indicate that you have too much memory assigned to SQL and not enough for the OS.

SQL backup compression

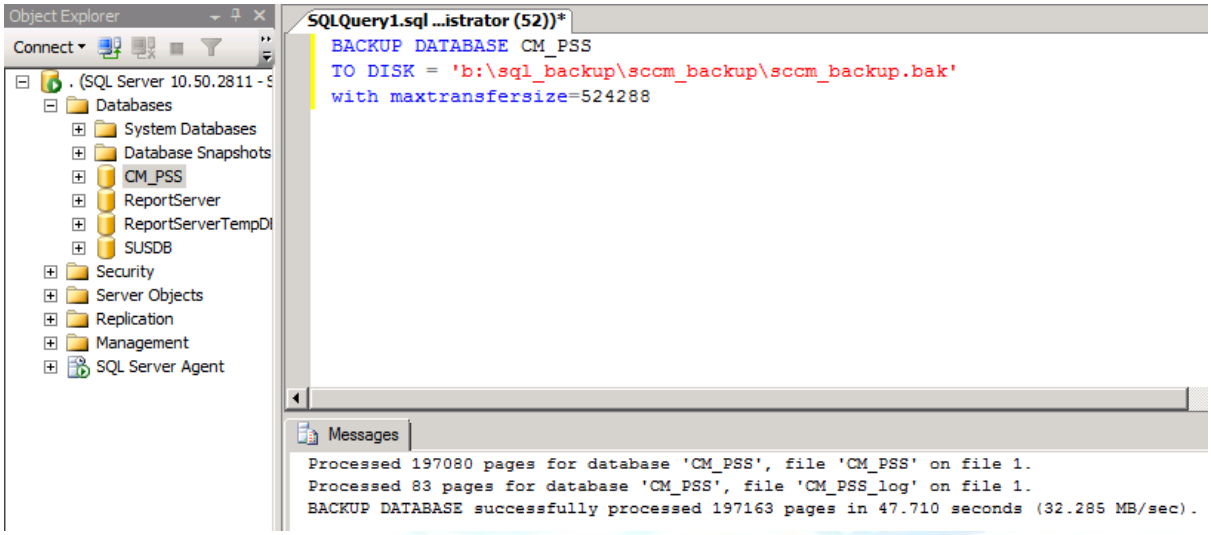
If you are using SQL native backup then it makes sense to use the SQL backup compression setting. This allows the backup to complete quicker. Your backup disk set is the one SQL file that can exist on a RAID5 set as the relatively poorer IOPS of RAID 5 is not as noticeable on the backup, and certainly not if you use SQL backup compression. With compression there is always a trade-off, in SQL you get a higher CPU usage to perform the compression but reduced I/O due to the smaller file size of the backup.

A lot of Host Bus Adaptors are optimized to handle throughputs of 128KB of I/O per second. SQL is configured to runs its backup routine with a throughput 1,000 KB of I/O per second.

Throttling this back to half that amount will reduce the latency and may speed up the backup process. Microsoft has a good article on TechNet describing backup performance.

Running the following command we can back up the SCCM DB CM_PSS to disk and change the transfer I/O size

BACKUP DATABASE CCM_PSS
TO DISK =N'B:\SQL_BACKUP\SCCM_BACKUP\SCCM_BACKUP.BAK'
WITH MAXTRANSFERSIZE=524288



Max degree of parallelism

The SQL Server configuration option 'max degree of parallelism' controls the number of processors used for the execution of one query with a parallel plan. By default its set to zero and that allows SQL to run a query over multiple cores.

This setting is considers the best option for DW DB but not quite as optimal for OLTP. When I learned this I thought of all the SCOM installs where I sat the Operational DB beside the Reporting DW....

To get a better understanding of why you may need to change this you need to understand a little about wait stats and they are described more in the section, SQL performance. The main wait stat that tells us we are having issues with SQL and they could be related to Max degree of parallelism in the CXPACKET. I don't have the depth of knowledge to advise on this but both Glenn Berry and Paul Randal have fantastic resources to help out.

The Server Principle Name (SPN)

The SPN is the name that identifies a SQL instance running on a server. When the SQL service starts it tries to register its SPN with AD. The SPN is the name that a client uniquely identifies an instance of a service, a service here refers to a service like the SQL server service. Kerberos authentication can use an SPN to authenticate a service. When a client wants to connect to a service, it locates an instance of the service, composes an SPN for that instance, connects to the service, and presents the SPN for the service to authenticate. If the SPN registration fails then Kerberos authentication fails and SQL falls back to NTLM. If your application does not support NTLM then you will have authentication issues.

From SQL 2008 onwards when we create an instance the first will default to port 1433, but thereafter any other instances will install on a dynamic port and during setup you have no choice on what that port is going to be. The SQL service will try and register its SPN in the following format.

MSSQLSvc/FQDN:PORT. So to explain this, MSSQLSvc is the name of the SQL service, the FQDN is the fully qualified domain name of the server and the port is the SQL port number.
The default instance and all other instances on the SQL server service and will use the port number to differentiate themselves from other instances.

There are two options for running the SQL service, the first is with a local account like the local system like NT AUTHORITY\SYSTEM. The second option is that we run the SQL service under a domain account. Most people prefer the second option as it offers better centralised control.
The main difference from an SPN perspective is that the local system can update the SPN with no intervention. A standard user does not have the right to update its own SPN, and this can require a little help on our part.

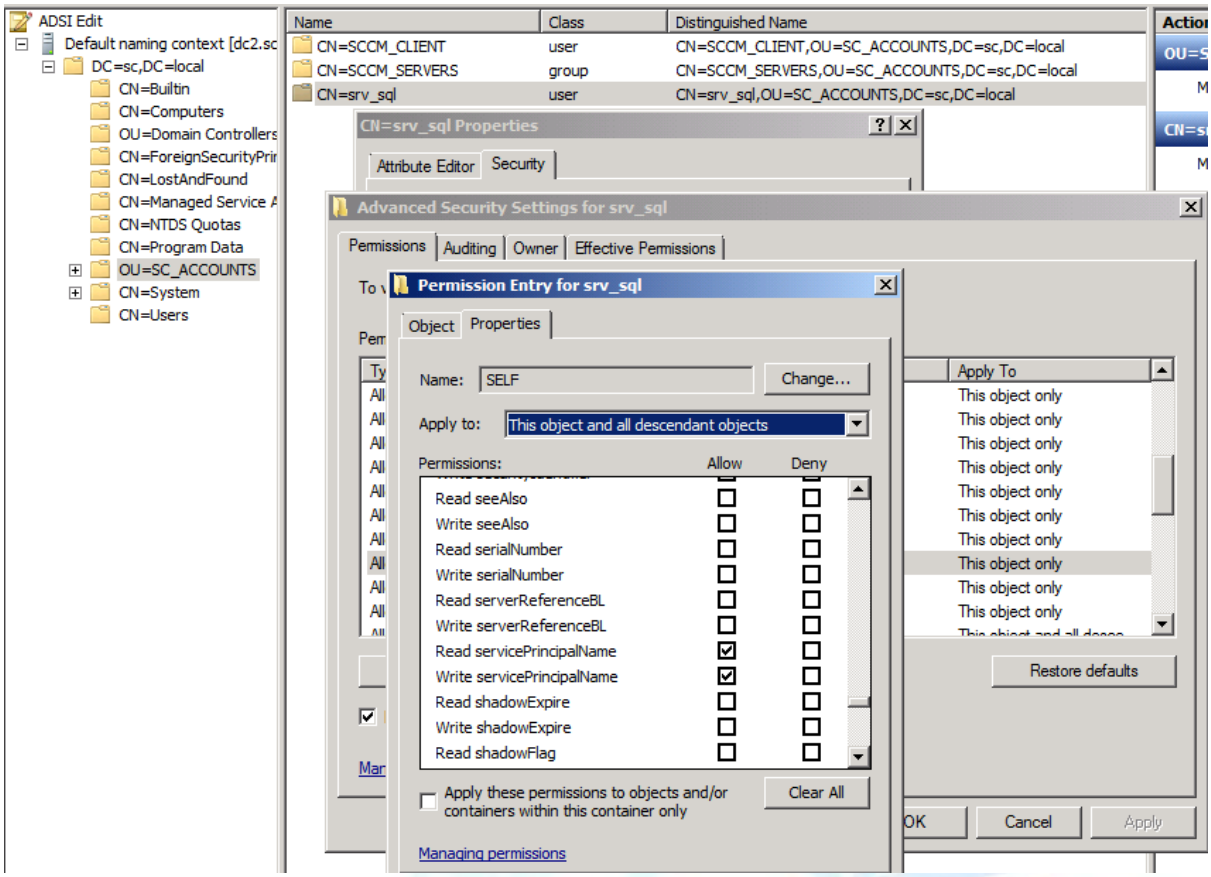
There are a number of ways that you can assist with the SPN being registered.
Add the user to the domain admins group
Change the user's permissions with ADSI Edit
Use the setspn command utility

Add the user to the domain admins group

Using this option you can add the service account to the domain admins group, wait for replication and then restart the service. You could then remove the account from the domain admins group. While this is a very easy way to achieve this it may be considered a security risk for some organisations. It is also not a great long-term solution if you use the same user account for different SQL instances.

Change the user's permissions with ADSI Edit

This is an easy option to configure and as such is the most popular. Using ADSI Edit navigate to the user account that the SQL service is running under. The object of "SELF" needs to be granted Read and Write servicePrincipleName



Use the setspn command utility

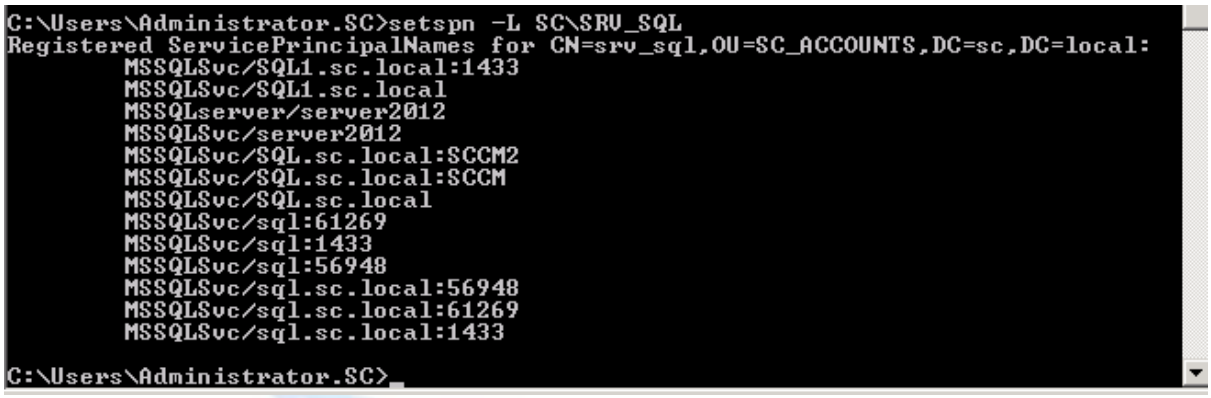
The setspn utility allows a user with domain admin privileges to register the SPN from a SQL server. The difference with the setspn is that it makes a permanent change, whereas in the previous example we are adding and removing a user to the domain admins group and they only have the update self permissions while they are in the admins group.

Let's look at an example here;
I have a SQL server called SQL1 in a domain called SC.LOCAL and the port for the instance is 61269. The SQL service will run under an account called SVC_SQL. Reporting services are installed under port 80.

SQL FQDNs NetBIOS Names
setspn.exe -A MSSQLSvc/sql1.sc.local:60611 sc\svc_sql
setspn.exe -A MSSQLSvc/sql1.sc.local:612696 sc\svc_sql

Reporting Services FQDN and NetBIOS
setspn.exe –A http/sql1.sc.local:80 sc\svc_sql
setspn.exe –A http/sql1:80 sc\svc_sql

When I do a setspn –L SC\SRV_SQL you can see that the service account has been used to register the SPN for a number of servers and for a number of instances



On a last point of note, if you are using a clustered SQL instance there can sometimes be an issue with registering the SPN, have a read here for some more info.

Standard or Enterprise

Microsoft offers a number of SQL options and in the main the System Center admin is only going to deal with SQL Standard and or Enterprise, the exceptions for this are;

A: The default install of a SCCM secondary site will install a SQL Express
B: DPM will give you the option of a local SQL Express install
In both of here situations you can opt for a pre-existing SQL instance.

The following tables will give an overview of the feature sets of the two versions. In the first table we are manly looking at features as they pertain to System Center or are common features. The second table mainly shows the additional features of the Enterprise version.

KEY: Full Feature = ☑ Partial/Limited = ○

Feature	SQL 2008 Enterprise	SQL 2008 Standard
Number of CPU's	As many as the OS supports	4
Scalability and Performance	☑	○
Always On	☑	○
Security	☑	○
Data Warehouse	☑	
Business Intelligence	☑	○
Enterprise Manageability	☑	○
Programmability	☑	☑
X64 Hardware Support	☑	☑
I64 Hardware Support	☑	
Multi Instance Support	50 Instances	16 Instances
Hypervisor Support	☑	☑
Clustering	16-Node Failover	2-Node Failover
DB Mirroring	Full	Single-thread
Integration Services		
SQL Server Import and Export	☑	☑
SSIS Run Time	☑	☑
Data Profiling Tools	☑	☑
SSIS Package Designer and Service	☑	☑

Reporting Services		
Office Integration	☑	☑
Built in Forms Authentication	☑	☑
Application Embedding	☑	☑
Report Builder	☑	☑
Scale out Reporting	☑	
Infinite Click through	☑	
Dynamic Address Windows Extensions	☑	
Scalability & Performance		
Table and index partitioning	☑	
Parallel index operations	☑	
Parallel consistency checks (DBCC)	☑	
Database snapshots	☑	
Scalable shared databases	☑	
Indexed views	☑	
Enhanced read-ahead and scan	☑	

For a full list of SQL features on a PDF go here

What's important to highlight is that you can cluster with both instances and they can both access the same amount of memory. Enterprise is a far more feature rich version but comes with a higher price tag.

Running SQL on a VM

In the survey I posted with the results listed at the end of this document, 70% of respondents are running SQL on a VM to support System Center. It's likely that this number will continue to rise in the future as companies will only deploy servers in a virtual environment. As most VM environments are built on a highly available model you get the benefit of another level of redundancy for your SQL environment. When I was doing some research before writing this e-book I posed the following question on the TechNet SQL forum;

"If you are going to deploy a SQL instance to a VM what are the things you might do differently compared to running it physical?"

A number of the SQL MVP's responded to the question and one reassuring comment was "*If you provide the correct resources for the VM, no there won't be a difference. If you don't then there will be*".

Acknowledging the fact that you are going to need the same IOPS and memory requirements no matter if you deploy to physical or virtual then some of the biggest mistakes are;

1. Oversubscribing host hardware with too many vCPUs mapped to pCPUs. Anything beyond 2:1 is definitely going to affect performance regardless of what the hypervisor vendor says.
2. Oversubscription of memory on the host hardware leading to ballooning issues of memory demanding VMs like SQL server. This goes against all the vendor recommended practices for virtualizing SQL Server
3. Undersized I/O subsystem. The I/O requirements for SQL Server are still the same in a VM. The 6TB SAN with only 15 drives in it that is being used for the VM environment using 1Gb/s iSCSI is a recipe for disaster if you put your entire infrastructure on it without testing and knowing your I/O workload and demand. Size is not the same thing as performance.
4. Using more virtual CPUs than necessary for a VM. Each virtual CPU has a scheduling overhead associated with it and at times the hypervisor has to schedule all of the virtual CPUs concurrently through a process known as co-scheduling. To do this it has to pre-empt the same number of physical processors as virtual CPUs. When other activity from smaller VMs is being scheduled this can cause a larger VM to wait, and performance is affected. If this is a problem, a 4vCPU VM can perform faster than an 8vCPU VM by as much as 3-5 times depending on the level of problem that exists. Less is more in a virtual world.

SQL and Hyper-V

Running SQL on Hyper-V has been fully tested and benchmarked by Microsoft. With Server 2012, Hyper-V has closed the gap with ESX and more people are likely to deploy SQL on Hyper-V 3.0. There are two useful documents from Microsoft with regard to SQL.

The first is "Running SQL Server 2008 in a virtual Environment – Best Practices and Performance Recommendations"

The second is from the SQL CAT team and that is the "High Performance SQL Server Workloads on Hyper-V"

Some of the key points to underline are;

- Using pass through disks there was almost no difference in IOPS when using SQL on Hyper-V or Physical

- Dynamically expanding disks will hurt your performance on SQL big time
- Running iSCSI through a NIC that has standard network traffic going through it can dramatically reduce throughput efficiency.

SQL and VMware

VMware have published a good PDF on configurations for SQL. Brent Ozar wrote a good blog. Here is an overview of the points from the PDF and the blog;

- Use Recent Hardware with powerful CPU etc.
- Use vSphere 4.1 or above to get advantage of new CPU scheduling
- If the exact CPU load that the DB will use is not known in advance, than start with a lower amount of vCPU's
- Install the latest version of VMware tools on the SQL server
- Memory overcommit can be a bad idea for SQL server
- If you use LPIM set the VM reservation to match the amount of memory assigned to the VM.

Everyone is using virtualising for SQL and so will I…. not quite. When Microsoft recently published a blog on how they deployed SCCM 2012, the blog speaks about how they used physical SQL. So why might you decide to go physical instead of virtual?

- Capacity to an existing SQL cluster
- Knowing in advance that a greater number of System Center products will be deployed from the start and likely to the mid-sized and above environments.

Capacity to an existing SQL cluster

Where an existing cluster has capacity, or it's possible to add another physical node to an existing cluster, then it's possible to take advantage of using a physical server for SQL.

If from the outset you know that you are going to require a very powerful SQL environment it may be a better idea to build a physical cluster with multiple instances on the cluster. When you use a SQL instance on a cluster there are some subtle differences with regard to what level of safeguards you may receive. In a VM environment it is assumed that the hosts are clustered and as such if the host server has an issue you can move your SQL VM to another host, just like a clustered SQL environment. The difference with the cluster is that if we have an issue with either the hardware or the OS we can move the SQL instance to another host. With a VM you are only using a single virtual server and so things like updates might not be as easy to recover from, snapshots to some degree help with this.

SQL Performance

There are 3 main areas that SQL has to interact with; they are obviously, CPU, Disk and Memory. These 3 areas are quite important to the IT pro as you may need to go to other teams and let them know that you need more CPU clock cycles, more memory or faster disks.

I wasn't sure if it was better to talk about the SQL Server BPA here or in the Troubleshooting SQL, but then decided to detail it here. The reason for this is that running the RBA should be your first step in looking at your SQL server.

So how do we go about measuring performance in SQL server for System Center? Obviously the first thing to think about is Perfmon, SCOM and once we look at these two tools we can then move onto deeper monitoring components like Dynamic Management Views.

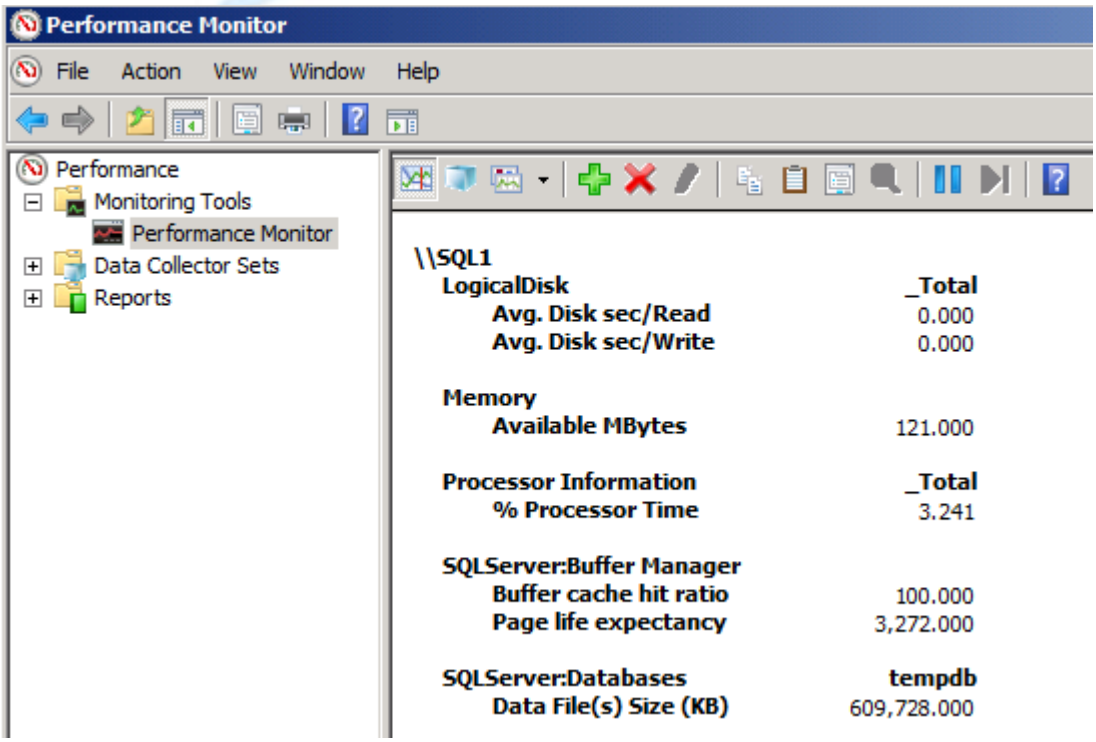
Perfmon

Perfmon is fairly lightweight but is best run from another server to get a more comprehensive monitoring picture. The advantages of Perfmon are that you can add a large amount of counters for a SQL server.

WOW and Perfmon

If you are trying to monitor 32bit SQL on a 64 bit version of Windows then you will be using WOW or Windows on Windows. If you are managing an older version of System Center in your environment and have to look at the SQL performance, you won't see any SQL performance counters loaded into your standard Perfmon view. To access your 32bit counters you need to open your Perfmon with; Mmc /32 perfmon.msc

Running Perfmon local on your SQL server should have almost no impact on the results except if you are monitoring a server with very poor performance. Running a smaller number of counters often makes it easier to read the results, another tip that I often do is view it in a "report" format as can be seen in the following image.



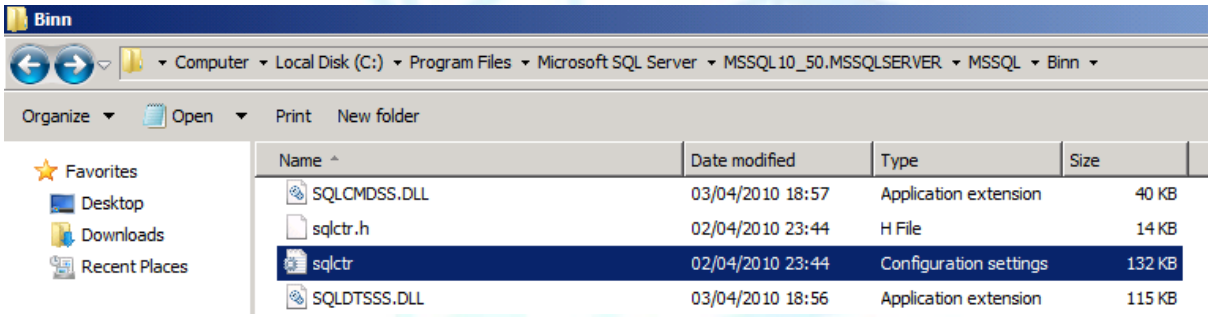
It's clear that from this report that despite the fact that I have very little memory available, SQL has cached a lot of memory as can be seen from my Buffer cache hit ratio of 100% and my PLE of 3,272.

Missing SQL counters

Performance counters from any component may not have registered fully or correctly with your OS at the install time. There are two server commands that can assist with missing counters in Perfmon, they are Lodctr and Unlodctr. Before you decide to overwrite existing perf counters you may like to take a backup of your existing counters, you can do that using;
Lodctr /c:\pefrback.txt

You can unload your SQL counters with
Unlodctr mssqlserver

To reconfigure the performance counters navigate to the Binn of your SQL install as in C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQL\Binn\sqlctr.ini



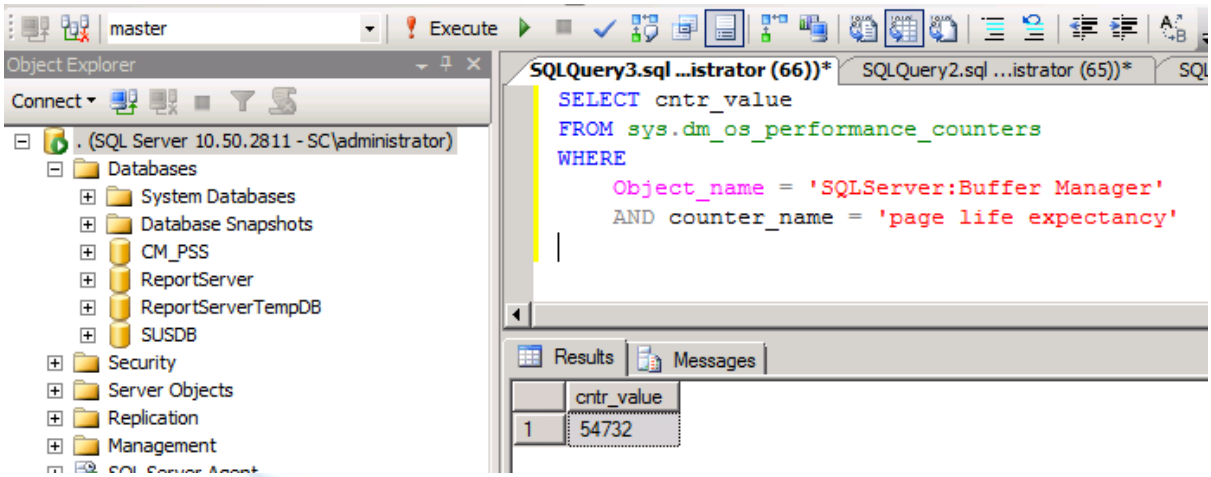
The SQL MP for SCOM

The SQL management pack is the default monitoring unit for SCOM. The SQL MP has a number of performance counters that are well suited for general SQL monitoring. The MP of course gives a nice historical view of a single or a large number of SQL servers. Things to understand is that SCOM collects a performance counter every 5 – 15 min and it would create a lot of data if you were to add a large number of perf counters to a number of SQL servers.

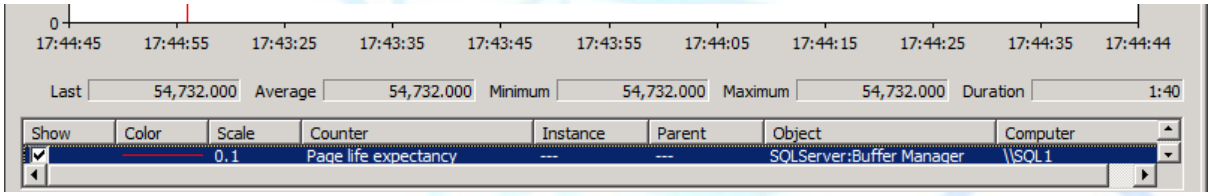
Dynamic Management Views (DMV)

DMV's are like a window into the internal running of a SQL server, they return a numeric value that assists in identifying a potential issue. DMV's are either server, or DB scoped. Most of the performance counters listed in these sections can be accessed from DMV's. Using sys.dm_os_performance_counters you can access a lot of performance values. Here is an example of monitoring Page Life Expectancy

```
SELECT cntr_value
FROM sys.dm_os_performance_counters
WHERE
        Object_name = 'SQLServer:Buffer Manager'
        AND counter_name = 'page life expectancy'
```



Here is the same result form Perfmon



Note, when you enter a DMV to look at a performance counter as shown above and you enter the syntax incorrectly you will not get a T-SQL error, it will just return a null value.

Performance counters

There are so many SQL and Windows performance counters that it's possible to lose your way when trying to monitor SQL. So in this section we are going to start off with a "cheat-sheet" of just a few counters that you can start off with and then we will go deeper into a large number of SQL counters and what ideally they should be.

Cheat Sheet

MSSQL$: Buffer Manger\Buffer cache hit ratio

This should be as close to 100% as possible. Below 97-98% indicates SQL server needs more physical memory

MSSQL$: Buffer Manger\Page Life Expectancy

The minimum value here should be 300.

LogicalDisk(*)\Avg Disk sec/Read

Should be under 20ms. Beyond 50ms is very bad

LogicalDisk(*)\Avg Disk sec/Write

Should be under 20ms. Beyond 50ms is very bad

\Processor Information(_Total)\%Processor Time

Should be below 60% and over 80% indicates processor pressure

Performance counters in more detail

In this section we are going to look at a lot of counters you might want to look for when getting into SQL performance monitoring. Firstly we will cover a number of performance counters, and then we will go into some specific areas like the tempdb.

Object	Counter	What should it be	Description
Memory	Available Mbytes	➢ 400MB	We all like to sweat the tin but give your SQL servers at least 400MB free
Memory	Pages/Sec	< 40/50	This is the rate that pages are read or written to the page file, too much paging = not enough memory
SQL Server: Buffer Manager	Page Life Expectancy	>300	This is the estimated time a page will stay in memory and could be tens of thousands on a system with lots of memory
SQL Server: Buffer Manager	Buffer cache hit ratio	Between 97-100%	This is the number of pages that were found in cache and not read from disk
SQL Server: Buffer Manager	Page Reads/sec	<90	Higher than 90 pages per second can indicate either a low amount of memory or poor indexing
SQL Server: Buffer Manager	Lazy Writes/sec	<20	The number of times SQL moves pages to disk to free up space. The ideal number is 0
Paging File	% Usage	<50%	The amount of the page file in use. It's obvious that you want this the lower the better
Paging File	% Usage	<70%	The peak amount of the page file used since the last time the server was rebooted
System	Processor Queue Length	<4 per CPU	
Network Interface	Bytes Total /sec	See description	There is no right or wrong value here, but you need to be monitoring it to understand when something is going wrong.
Physical Disk	Average Disk Sec/Read	< 8ms	Time in seconds to read from disk
Physical Disk	Average Disk Sec/Write	< 8ms	Time in seconds to write from disk
Processor	%Processor Time	<60%	This is not a hard number as it depends on the number of processors and if hyper

			threading is enabled
Access Methods	Workfiles Created/Sec	< 20	Number of files created per second
Access Methods	Full Scans / sec	< 1	Greater than 2 shows a high amount of index scanning

There are obviously a large number of counters both SQL and OS but what you have now is a good baseline to start with.

SQL Wait Stats..

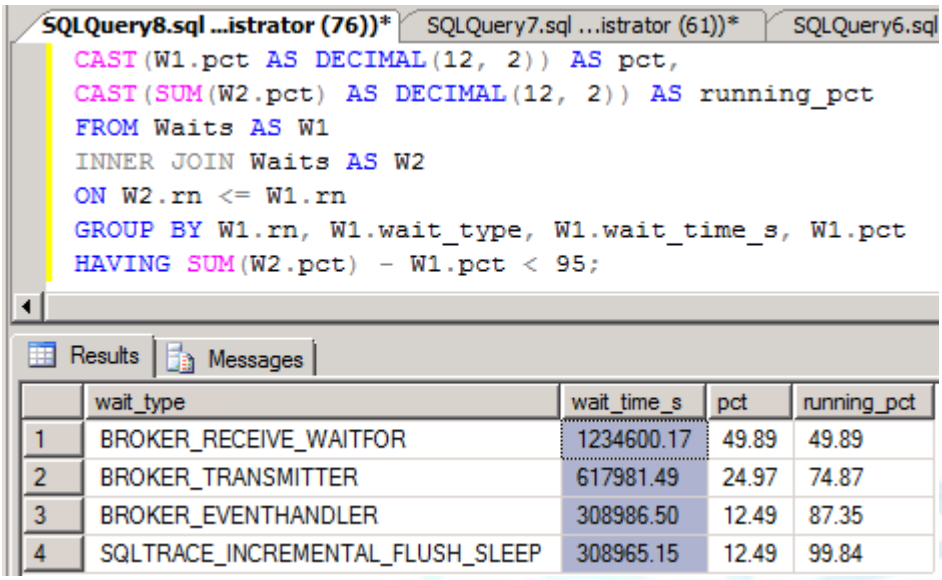
We all know the story, hey System Center admin, my console performance is slow, will you have a look? Now this can be from a number of things but one of the first places I am going to look is my SQL server. SQL has the ability to track and monitor what is happening with the server. SQL uses threads in a "first in, first out" fashion to ask the CPU to perform a task, when the thread has stopped running, but now wants access to the CPU, it may have to wait. SQL tracks why threads have to wait, all you have to do is ask SQL, what is waiting?

There are a number of scripts to help you examine what are the top waits on your system. To begin with let's start off with Glen Berry's script to get your top 4 waits.

```
-- Clear Wait Stats
-- DBCC SQLPERF('sys.dm_os_wait_stats', CLEAR);

-- Isolate top waits for server instance since last restart or wait
statistics clear
WITH Waits AS
(SELECT wait_type, wait_time_ms / 1000. AS wait_time_s,
100. * wait_time_ms / SUM(wait_time_ms) OVER() AS pct,
ROW_NUMBER() OVER(ORDER BY wait_time_ms DESC) AS rn
FROM sys.dm_os_wait_stats
WHERE wait_type NOT IN
('CLR_SEMAPHORE','LAZYWRITER_SLEEP','RESOURCE_QUEUE','SLEEP_TASK'
,'SLEEP_SYSTEMTASK','SQLTRACE_BUFFER_FLUSH','WAITFOR',
'LOGMGR_QUEUE','CHECKPOINT_QUEUE'
,'REQUEST_FOR_DEADLOCK_SEARCH','XE_TIMER_EVENT','BROKER_TO_FLUSH','BROKER_T
ASK_STOP','CLR_MANUAL_EVENT'
,'CLR_AUTO_EVENT','DISPATCHER_QUEUE_SEMAPHORE',
'FT_IFTS_SCHEDULER_IDLE_WAIT'
,'XE_DISPATCHER_WAIT', 'XE_DISPATCHER_JOIN'))
SELECT W1.wait_type,
CAST(W1.wait_time_s AS DECIMAL(12, 2)) AS wait_time_s,
CAST(W1.pct AS DECIMAL(12, 2)) AS pct,
CAST(SUM(W2.pct) AS DECIMAL(12, 2)) AS running_pct
FROM Waits AS W1
INNER JOIN Waits AS W2
ON W2.rn <= W1.rn
GROUP BY W1.rn, W1.wait_type, W1.wait_time_s, W1.pct
HAVING SUM(W2.pct) - W1.pct < 95;
```

When I run this on my SQL server I get the following output

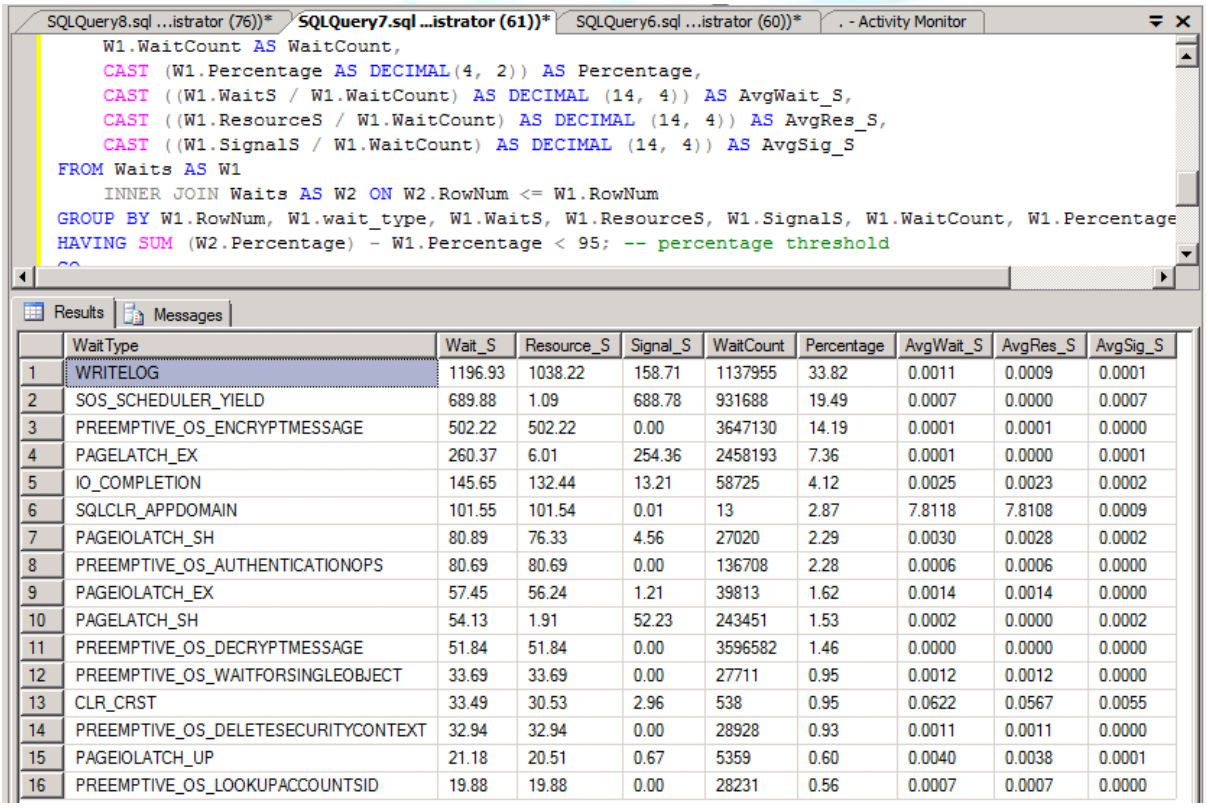


```
SQLQuery8.sql ...istrator (76))*  SQLQuery7.sql ...istrator (61))*  SQLQuery6.sql
    CAST(W1.pct AS DECIMAL(12, 2)) AS pct,
    CAST(SUM(W2.pct) AS DECIMAL(12, 2)) AS running_pct
FROM Waits AS W1
INNER JOIN Waits AS W2
ON W2.rn <= W1.rn
GROUP BY W1.rn, W1.wait_type, W1.wait_time_s, W1.pct
HAVING SUM(W2.pct) - W1.pct < 95;
```

Results | Messages

	wait_type	wait_time_s	pct	running_pct
1	BROKER_RECEIVE_WAITFOR	1234600.17	49.89	49.89
2	BROKER_TRANSMITTER	617981.49	24.97	74.87
3	BROKER_EVENTHANDLER	308986.50	12.49	87.35
4	SQLTRACE_INCREMENTAL_FLUSH_SLEEP	308965.15	12.49	99.84

Paul Randal has adapted the script to look at some more details on the waits. And using that I can see some more details on the waits.



```
SQLQuery8.sql ...istrator (76))*  SQLQuery7.sql ...istrator (61))*  SQLQuery6.sql ...istrator (60))*  . - Activity Monitor
    W1.WaitCount AS WaitCount,
    CAST (W1.Percentage AS DECIMAL(4, 2)) AS Percentage,
    CAST ((W1.WaitS / W1.WaitCount) AS DECIMAL (14, 4)) AS AvgWait_S,
    CAST ((W1.ResourceS / W1.WaitCount) AS DECIMAL (14, 4)) AS AvgRes_S,
    CAST ((W1.SignalS / W1.WaitCount) AS DECIMAL (14, 4)) AS AvgSig_S
FROM Waits AS W1
    INNER JOIN Waits AS W2 ON W2.RowNum <= W1.RowNum
GROUP BY W1.RowNum, W1.wait_type, W1.WaitS, W1.ResourceS, W1.SignalS, W1.WaitCount, W1.Percentage
HAVING SUM (W2.Percentage) - W1.Percentage < 95; -- percentage threshold
```

Results | Messages

	WaitType	Wait_S	Resource_S	Signal_S	WaitCount	Percentage	AvgWait_S	AvgRes_S	AvgSig_S
1	WRITELOG	1196.93	1038.22	158.71	1137955	33.82	0.0011	0.0009	0.0001
2	SOS_SCHEDULER_YIELD	689.88	1.09	688.78	931688	19.49	0.0007	0.0000	0.0007
3	PREEMPTIVE_OS_ENCRYPTMESSAGE	502.22	502.22	0.00	3647130	14.19	0.0001	0.0001	0.0000
4	PAGELATCH_EX	260.37	6.01	254.36	2458193	7.36	0.0001	0.0000	0.0001
5	IO_COMPLETION	145.65	132.44	13.21	58725	4.12	0.0025	0.0023	0.0002
6	SQLCLR_APPDOMAIN	101.55	101.54	0.01	13	2.87	7.8118	7.8108	0.0009
7	PAGEIOLATCH_SH	80.89	76.33	4.56	27020	2.29	0.0030	0.0028	0.0002
8	PREEMPTIVE_OS_AUTHENTICATIONOPS	80.69	80.69	0.00	136708	2.28	0.0006	0.0006	0.0000
9	PAGEIOLATCH_EX	57.45	56.24	1.21	39813	1.62	0.0014	0.0014	0.0000
10	PAGELATCH_SH	54.13	1.91	52.23	243451	1.53	0.0002	0.0000	0.0002
11	PREEMPTIVE_OS_DECRYPTMESSAGE	51.84	51.84	0.00	3596582	1.46	0.0000	0.0000	0.0000
12	PREEMPTIVE_OS_WAITFORSINGLEOBJECT	33.69	33.69	0.00	27711	0.95	0.0012	0.0012	0.0000
13	CLR_CRST	33.49	30.53	2.96	538	0.95	0.0622	0.0567	0.0055
14	PREEMPTIVE_OS_DELETESECURITYCONTEXT	32.94	32.94	0.00	28928	0.93	0.0011	0.0011	0.0000
15	PAGEIOLATCH_UP	21.18	20.51	0.67	5359	0.60	0.0040	0.0038	0.0001
16	PREEMPTIVE_OS_LOOKUPACCOUNTSID	19.88	19.88	0.00	28231	0.56	0.0007	0.0007	0.0000

So now you have a method to get into waits, what do they mean? Here are some of the most common waits and some resources on what they mean.

WAIT	Description	Comments
CXPACKET	When a parallel operation is running there are multiple threads. For whatever reason one or more of the threads finishes before the others. The CXPACKET wait is started by the finishing thread and it logs the CXPACKET Wait Stat.	The first place to look is what settings you have configured for MDOP (talked about in a previous section). Some other things to think about are, Hyper threading, and index fragmentation or rebuilt stats
PAGEIOLATCH	This occurs when the SQL task is waiting on a latch for a buffer page to be read from disk into memory. It often indicates an issue with the disk subsystem, but could also indicate a lack of memory. (A basic rule of thumb is when you see any “IO” waits in your top waits then think about your storage.	Have a think about large scans over big tables. This can be reduced by using good index’s for your queries
SOS_SCHEDULER_YIELD	The SQL OS will try and not leave any thread idle. When a running task gives up, its running thread for a new task to run.	Usually this indicates a problem with CPU pressure
OLEDB	Waiting for communication with the OLEDB	This could be an issue waiting for a linked server to return something
ASYNC_NETWORK_IO	Often when the client is dealing with a big amount of data	Look at your NIC configuration on the client
THREADPOOL	SQL’s internal OS is trying to schedule a thread	Consider configuring the max worker thread

Maintenance Tasks and Plans for SQL

SQL ideally needs to have some maintenance performed on regular basis. If you have been a SCOM admin for years and think that your SQL DB has been working fine well it's because SCOM performs its own maintenance. The 4 main tasks are;

- DBCC CHECKDB (to look for DB errors and report on them)
- UPDATE STATISTICS (to boost query performance)
- DBCC DBREINDEX (to rebuild the table indexes to boost performance)
- BACKUP

SQL and SCOM

System Center Operations Manager (SCOM) is one of the big hitters of the suite. By default SCOM has an operational DB and can have a data warehouse and a DB for Audit Collection Services (ACS). The SCOM team created a great sizing guide that is available here. For both the DB and the DW it is highly recommended that the tempDB should be on its own disk set and can expect to be between 6GB – 8GB. SCOM is a high transactional DB that has a common profile of 80% reads and 20% writes. The Operations Manager DB should have a minimum of 50% free disk space; neither the DW nor the ACS need the same amount of free disk space.

SQL High level requirements

- SQL Server 2008 Standard and Enterprise are both supported, but only X64-bit.
- Using a different version of SQL Server for different Operations Manager features is not supported. The same version should be used for all features.
- SQL Server collation settings for all databases must be one of the following: SQL_Latin1_General_CP1_CI_AS, French_CI_AS, Cyrillic_General_CI_AS, Chinese_PRC_CI_AS, Japanese_CI_AS, Traditional_Spanish_CI_AS, or Latin1_General_CI_AS. No other collation settings are supported.
- The SQL Server Agent service must be started, and the start-up type must be set to automatic.
- The db_owner role for the operational database must be a domain account.
- If you plan to use the Network Monitoring features of System Center 2012 – Operations Manager, you should move the tempdb database to a separate disk that has multiple spindles.

Operational DB

The operational DB server must have;

- .NET Framework 3.5 and 4
- Full Text search.

The default size the installer offers is to create a 1 GB DB. From a personal perspective this is unsuitable for anything other than a home lab. A starting point of between 30 GB to 50 GB with the log file of half the size of the DB makes more sense. The DB needs to have at least 50% free space at all times to allow maintenance tasks to run.

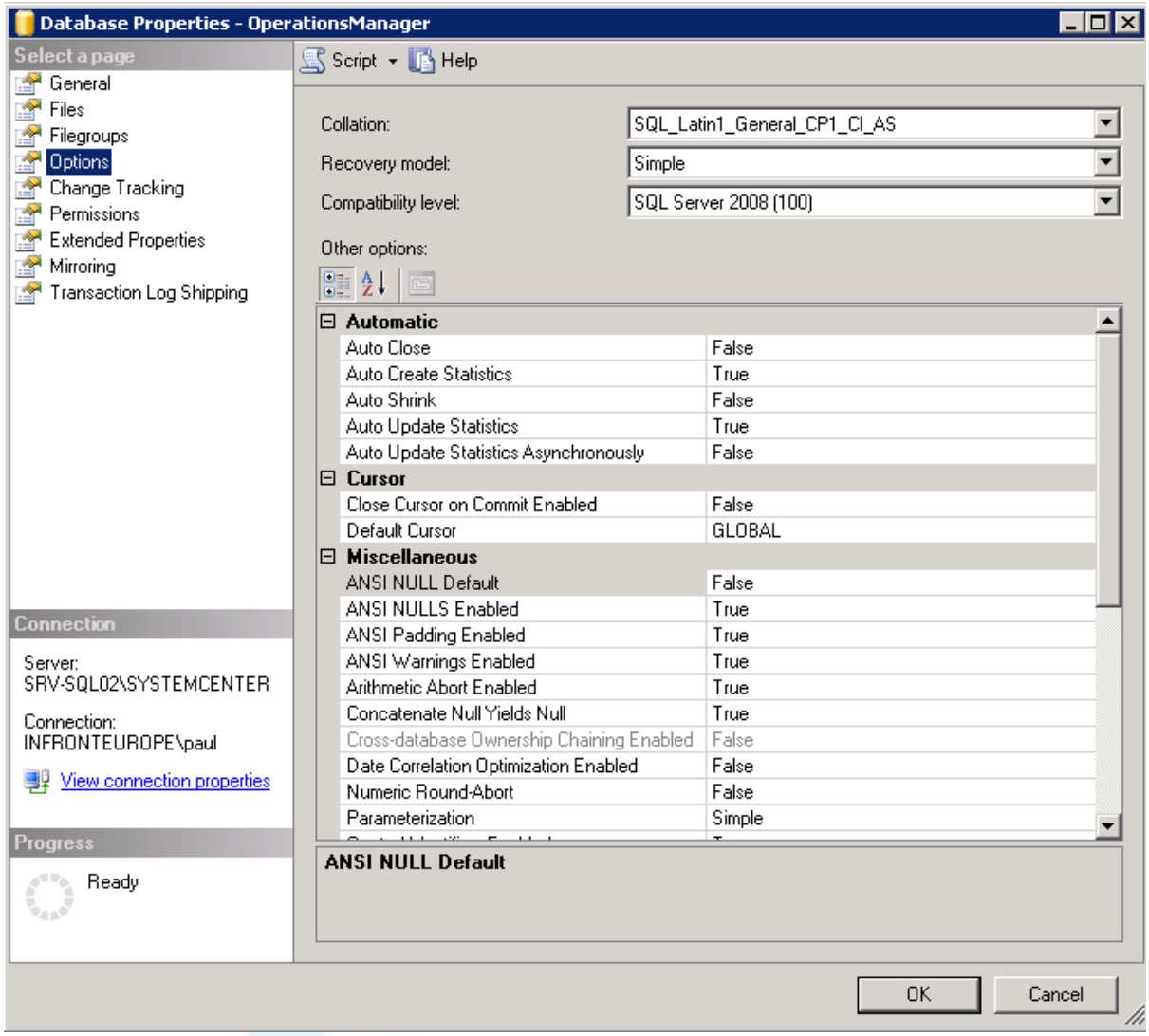
IOPS for the DW	
# of agents	Estimated IOPS
1- 500	500
501-1000	875
1001-3000	1000

Microsoft recommends that the DB files should be on a RAID 10 set With the RAID controller being a Battery Backed Write Cache.

The exact profile of the DB depends on a great number of factors; the obvious ones are the number of agents, number of MP's and the number of custom rules and monitors. Infront Consulting has a number of client MP's and they have found it make better sense to have a new Management Group with a new DB. It goes without saying that the longer you keep data in the DB the bigger it's going to be. Some SCOM admins switch off performance counters in the operational DB completely and just rely on the DW for reporting data. This frees up space and improves response times; however having performance data in the operations console is so quick and useful that most SCOM admins leave it in.

Let's have a look at a SQL DB for SCOM and what should be configured.

Recovery Model = Simple
Auto Close = False
Auto Shrink = False



Maintenance Plans and Recovery Models

SCOM has a number of maintenance plans that run automatically and help keep it running smoothly. The important thing is not to perform maintenance tasks on the DB at the same time. The two recommended tasks that could be performed on the DB are

DBCC CHECKDB
BACKUP.

SCOM runs a number of its own maintenance tasks on the DB in the forms of scoped rules. The reason for this is that the amount of activity the monitoring can create needs this maintenance to be performed on indexes etc. The reason that SCOM performs these steps is that it was believed that most SCOM DB environments would not receive the kind of attention it needed. Although this approach has come under some criticism, what is important for you to understand is you should not have your own SQL native maintenance plans competing with what SCOM is already doing.

SCOM also creates the DB in simple recovery model. The recommendation is to leave the DB to this setting unless your company/client really requires it. Many SCOM administrators feel that if you change the recovery model to full, you will have a greater admin effort in managing the size of the log files.

Kevin Holman wrote a fantastic guide on maintenance plans for operations manager and it's a great read if you are planning your SQL environment or having to justify your recovery model.

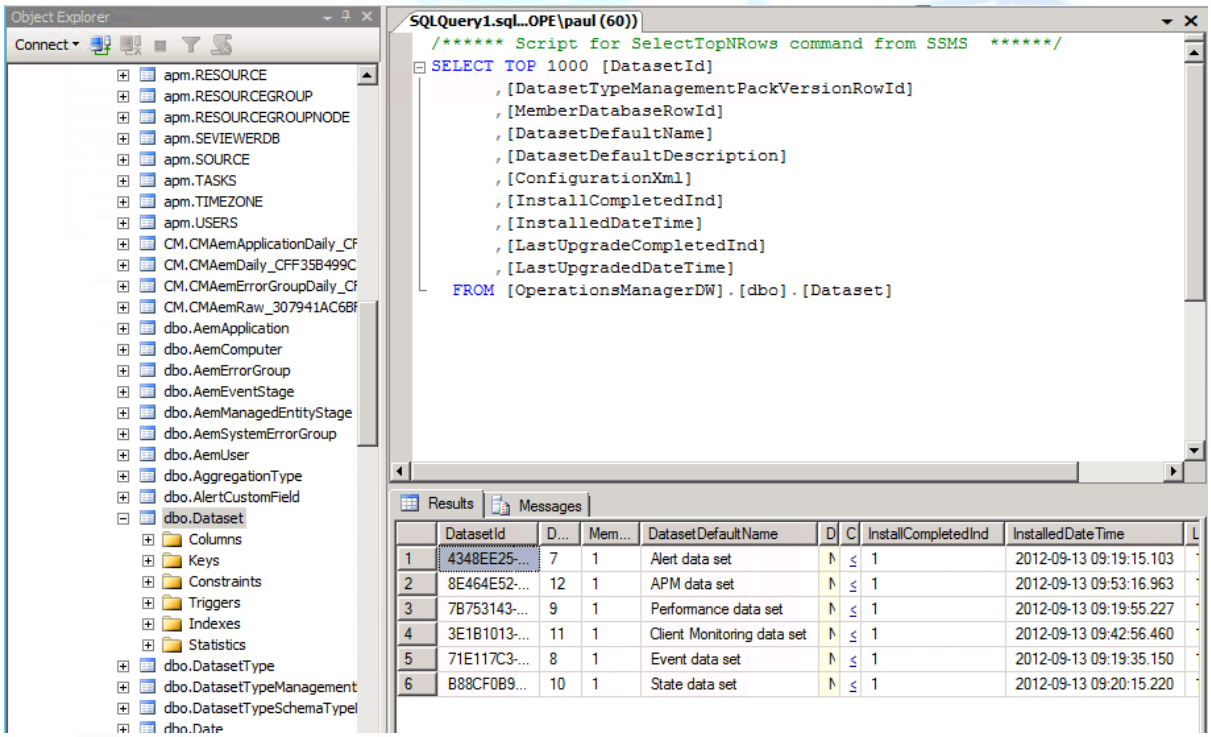
SCOM DW

The DW holds data like alerts, performance availability and events. By default the DW holds data for 400days, but it rationalizes the data. What that means is that if a specific performance counter constantly returns the same value over a period of time then the DW will just represent all those same values to just one value.

You can have a number of Management Groups all report to the same DW, if you are using SQL Enterprise and you can support "scale out" reporting you may want to look at consolidating a number of instances to support all your DW requirements.

Changing the grooming settings for the DW

To change the grooming settings for the DW you need to edit the dbo.Dataset table. To do that, connect to the OperationsManagerDW in SQL Management Studio. From there expand tables and then right-click dbo.Dataset and open the table or select top 200 rows. Find the dataset for which you want to change the grooming setting in the **DatasetDefaultName** column and make note of its GUID in the **DatasetId** column

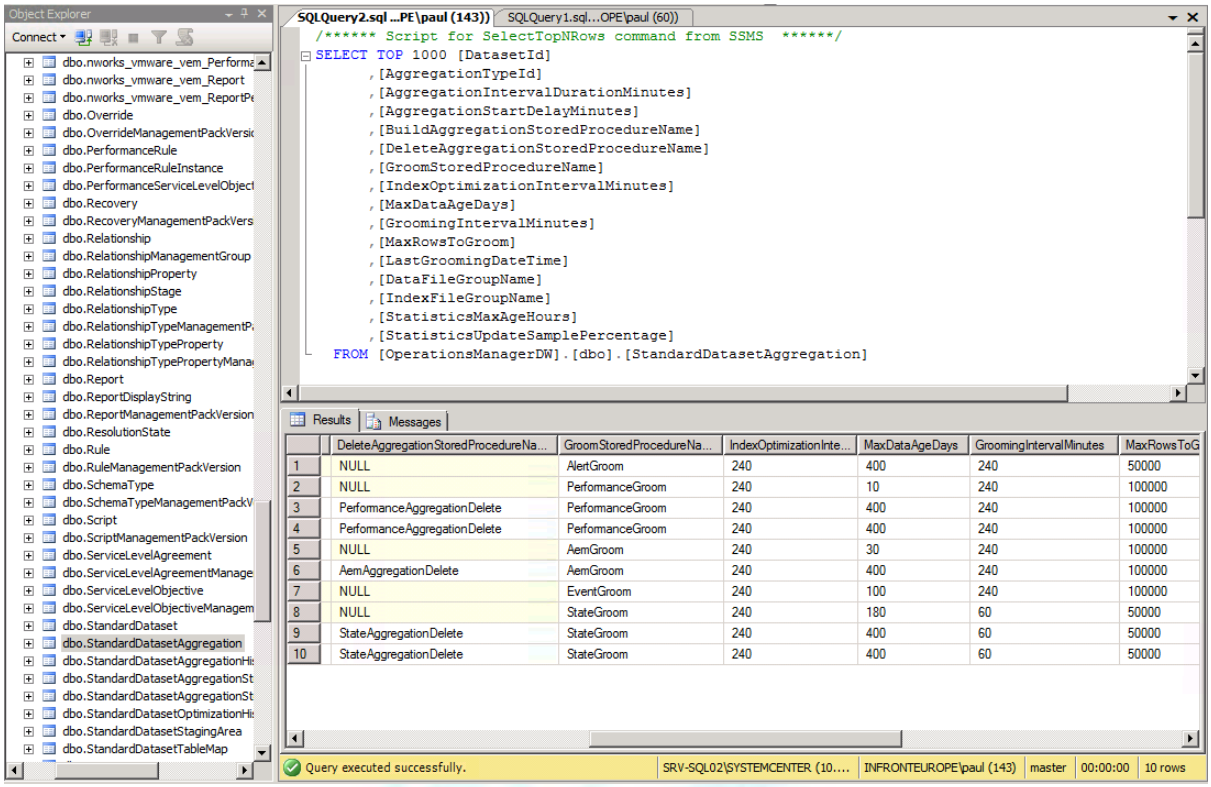


Then from the object explorer go to dbo.StandardDatasetAggregation and select to open the top 200 rows. Find the aggregation type from the list in the AggregationTypeId column by using the following values:

- 0 = raw, nonaggregated data
- 10 = subhourly
- 20 = hourly

- 30 = daily

Use the MaxDataAgeDays column to edit the value to set the grooming interval.



The default retention values are shown below

Data Set	Aggregation Type	Days To Be Kept
Alert	Raw data	400
State	Raw data	180
State	Hourly aggregations	400
State	Daily aggregations	400
Event	Raw data	100
Aem	Raw data	30
Aem	Daily aggregations	400
Perf	Raw data	10
Perf	Hourly aggregations	400
Perf	Daily aggregations	400

SQL and SCCM

SCCM 2012 is one of the real "phoenix" applications of the suite and things have changed a bit since SCCM 2007. SCCM 2012 uses SQL replication to move data around the organisation.

The basic requirements for SCCM from a SQL perspective are;
SQL Collation SQL_Latin1_General_CP1_CI_AS
The only SQL features needed are the Database Engine and SSRS
SCCM needs a minimum of 8Gb of memory reserved for the SQL instance
The PS's server account needs to be a member of the local admin group on the SCCM server
The person installing the PS needs to have SA rights on the SQL instance
It is not supported to manually edit the SCCM db.

From a personal perspective
I would always separate SCCM and the SQL instance
As SCCM does not separate out its reporting into a dedicated DW make sure your spec your disk requirements to overcompensate for the shared load of the OLTP and reporting demands.

The SCCM architecture could consist of the following components.

Central Admin Site (CAS)

The CAS needs a DB on a SQL instance. Every CAS and Primary Site (PS) must be located on separate SQL instances and if you are going to install SCCM into a large environment (more than 50k computers) then you need to choose SQL enterprise and you must do this from the start. The CAS will look to replicate by default with the SQL broker on TCP 4022. The CAS can have its own SSRS point and it will query the CAS DB.

The Primary Site (PS)

The SCCM installer will create a default 5Gb DB on a SQL instance. The SQL server will need to setup a replication channel to the CAS and by default it will do this on TCP 4022. Ideally the replication ports should be the same on each instance. Each PS can have its own SSRS and it will run reports from the PS DB.

The Secondary Site (SS)

A secondary site must use a locally installed SQL instance on the SS server. The default is to install SQL express on the OS partition. The lack of configuration and location options with SQL express may force you towards installing SQL standard on the server. Just like the other site hierarchy servers, the SS will look to replicate to its assigned PS server and again by default on port 4022.
If you are installing to a pre-existing SQL instance than you may need to ensure the following two points:

1. You grant the PS server dbcreator roll on the SQL instance
2. You start the SQL browser service

Management Point (MP)

When you install an MP you are presented with the option of using the default site DB or to create a replicate DB, the exception to that is that you can't have the MP on the SS, use a replica, it has to be a local installed SQL. Every communication between the MP and the DB has an associated CPU

utilization. Using a replica for a MP will reduce the CPU requirement on the SQL server hosting the PS's DB.

To use a replica DB the following points should be kept in mind:

Both the PS SQL server and the Replica SQL server both need to have SQL Replication Installed.
The site database needs to publish the database replica, and the other SQL server needs to subscribe to it.
The two SQL servers need to have a self-signed certificate.

Software Update Point (SUP)

Configure Manager and WSUS interact together with the help of a SCCM role called the SUP. WSUS requires its own DB. The DB can be co-located on an instance that hosts the CAS or PS server.

Microsoft Deployment Toolkit (MDT)

MDT is an additional bolt on that helps administrators with better control over Operating System Deployment (OSD) The MDT DB is a small DB with light requirements. It can be co-located with other SCCM DB's like the PS and the WSUS.

SQL Server Reporting Services (SSRS)

SCCM uses SSRS to load its reporting for its reporting server role. When you install the Reporting Server (RS) role 400 out of the box, reports are loaded into the Reports folder. Unlike SCOM or SCSM, SCCM does not use a dedicated DW; instead it runs its reports from the standard SCCM DB.

Disk Sizing

Microsoft offer some good sizing guides and information that you can get here but the following table will summarise the DB sizing.

Data Usage	Base calc	25,000	50.000	100,000
MDF	75Gb per 25,000	75Gb	150Gb	300Gb
LDF	25Gb per 25,000	25Gb	50Gb	100Gb
tempdb*		4-8 1GB files	4-8 1.5GB files	8 2Gb files
IOPS**		500 IOPS	1000 IOPS	2000 IOPS

*The tempdb figure is a personal opinion and not taken from the TechNet site.
** Unlike the SCOM sizing guide the SCCM team do not offer any guidance for IOPS in SCCM as the actual amount will depend on a large number of factors that come into play. In this example I am giving these figures to offer some guidance.

SCCM could really do with the same sizer as SCOM has and I know when I have asked for it I am told it's impossible to give a sizing guide as it has too many changeable and configurable options. I don't agree with this and think SCOM can be just as volatile in terms of the number of MP's, the number of custom rules and monitors, and the number of management groups reporting to one DW etc. Here are some resources to help

http://blogs.msdn.com/b/scstr/archive/2012/05/31/configuration_2d00_manager_2d00_2012_2d00_sizing_2d00_considerations.aspx

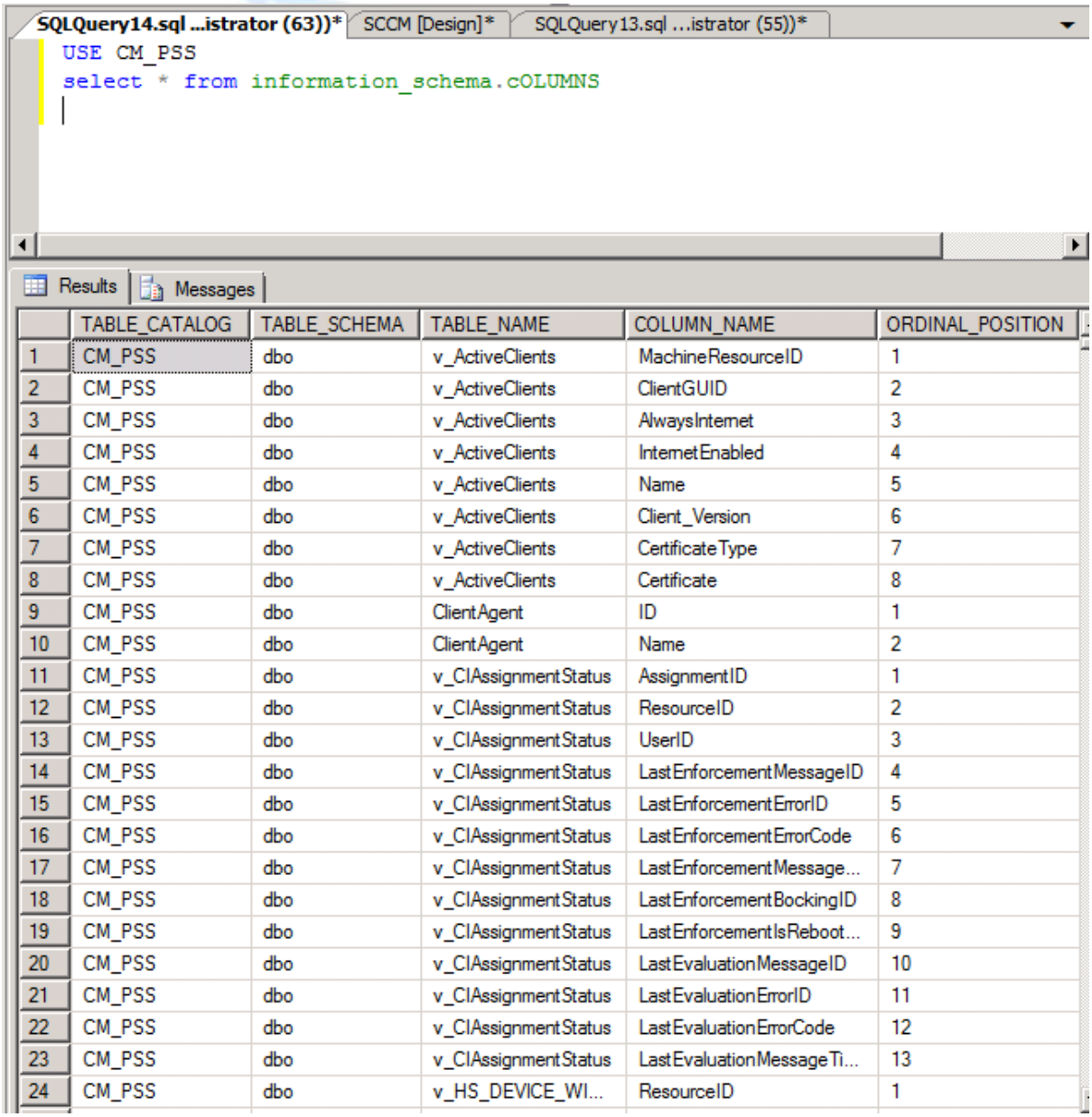
http://softwaretopic.informer.com/sccm-2012-database-sizing/

Table Structure

SCCM has a large number of tables containing all the data that SCCM is collecting. An easy way to view the tables is from T-SQL use your SCCM DB, in my case it's CM_PSS, so you can use the following;

USE CM_PSS
Select * from information_schema.columns

And from that I get an output like what we see below



	TABLE_CATALOG	TABLE_SCHEMA	TABLE_NAME	COLUMN_NAME	ORDINAL_POSITION
1	CM_PSS	dbo	v_ActiveClients	MachineResourceID	1
2	CM_PSS	dbo	v_ActiveClients	ClientGUID	2
3	CM_PSS	dbo	v_ActiveClients	AlwaysInternet	3
4	CM_PSS	dbo	v_ActiveClients	InternetEnabled	4
5	CM_PSS	dbo	v_ActiveClients	Name	5
6	CM_PSS	dbo	v_ActiveClients	Client_Version	6
7	CM_PSS	dbo	v_ActiveClients	CertificateType	7
8	CM_PSS	dbo	v_ActiveClients	Certificate	8
9	CM_PSS	dbo	ClientAgent	ID	1
10	CM_PSS	dbo	ClientAgent	Name	2
11	CM_PSS	dbo	v_CIAssignmentStatus	AssignmentID	1
12	CM_PSS	dbo	v_CIAssignmentStatus	ResourceID	2
13	CM_PSS	dbo	v_CIAssignmentStatus	UserID	3
14	CM_PSS	dbo	v_CIAssignmentStatus	LastEnforcementMessageID	4
15	CM_PSS	dbo	v_CIAssignmentStatus	LastEnforcementErrorID	5
16	CM_PSS	dbo	v_CIAssignmentStatus	LastEnforcementErrorCode	6
17	CM_PSS	dbo	v_CIAssignmentStatus	LastEnforcementMessage...	7
18	CM_PSS	dbo	v_CIAssignmentStatus	LastEnforcementBockingID	8
19	CM_PSS	dbo	v_CIAssignmentStatus	LastEnforcementIsReboot...	9
20	CM_PSS	dbo	v_CIAssignmentStatus	LastEvaluationMessageID	10
21	CM_PSS	dbo	v_CIAssignmentStatus	LastEvaluationErrorID	11
22	CM_PSS	dbo	v_CIAssignmentStatus	LastEvaluationErrorCode	12
23	CM_PSS	dbo	v_CIAssignmentStatus	LastEvaluationMessageTi...	13
24	CM_PSS	dbo	v_HS_DEVICE_WI...	ResourceID	1

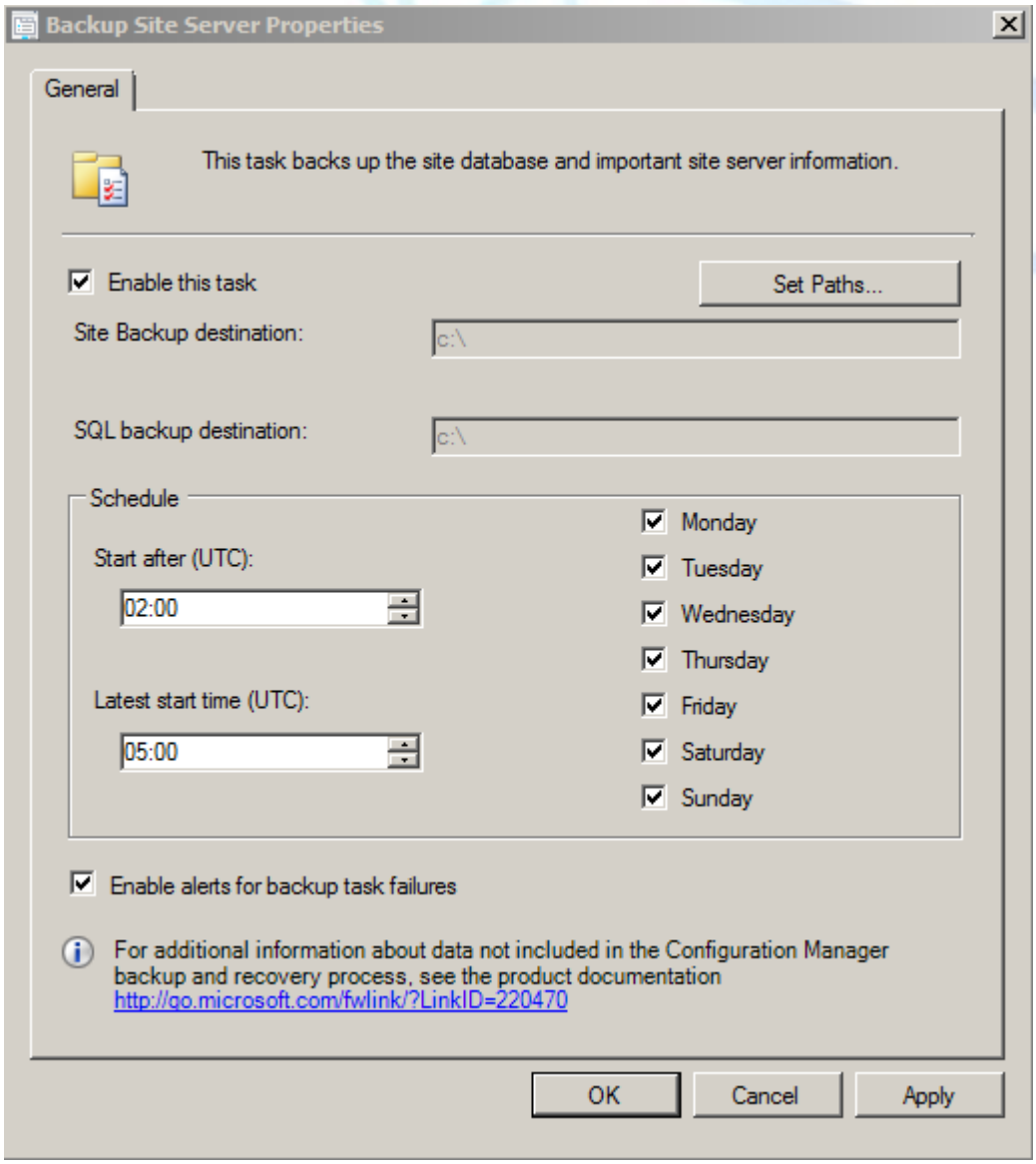
Backup and restore of the SCCM DB

The only supported way to backup and restore your SCCM DB is through SCCM's maintenance task, period. You can use SQL or a third party backup to perform an additional backup, but you must also have the SCCM internal backup if you want to stay on the good side of Microsoft Support. When you run the SCCM backup you are only performing a backup of the SQL DB (and the PS settings if you backup the PS), the images, software update packages and applications are separate and need to be catered for on a separate backup procedure.

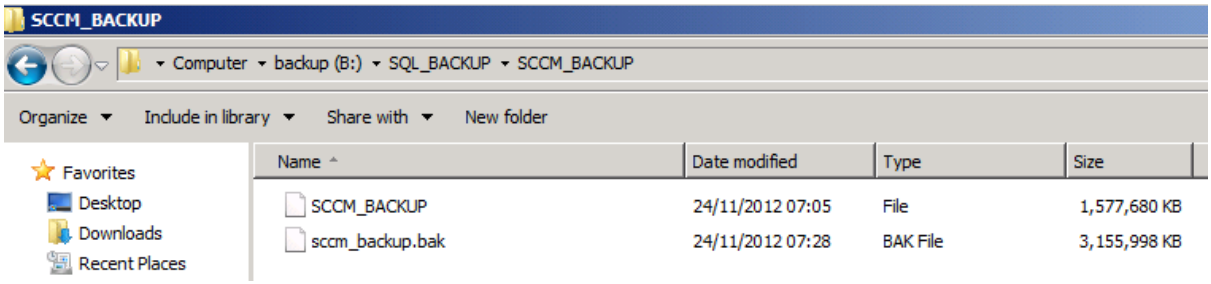
The SCCM site backup is located under;

Administration\Site Configuration\Sites\"site name"\Site Maintenance

The backup allows you to backup the DB to a specified location and choose the schedule.

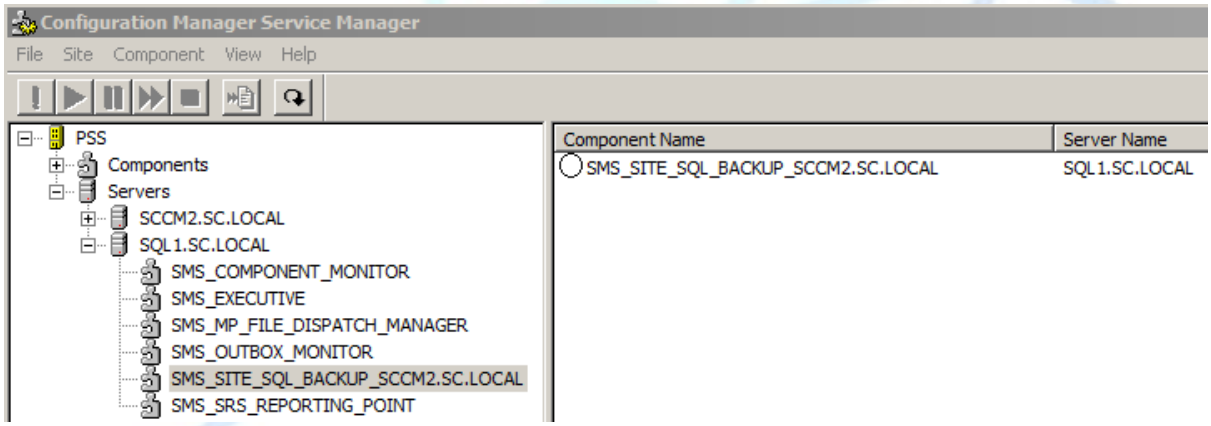


The DB will be backed up to the specified location with a standard .bak file.



Using a network share with the backup process.

Configuring the backup to happen to a local drive on the SQL server seems to make little sense. If you want to back up your DB to a network location then I have found the following points make the process a bit easier. Add the SQL Server account to the sysadmin roll, then Add the SQL Server computer account to full control on the destination share and folder permissions. When you have configured your backup settings then you can test the backup by starting the SMSBACKUP service on your SQL server.



Afterbak.bat

The SCCM backup process will overwrite the previous backup, and as such you only ever have one backup. This is probably not the safest approach for your SCCM environment. Luckily there is an easy solution. Edit the following file to suite your own site and then drop it to C:\Program Files\Microsoft Configuration Manager\inboxes\smsbkup.box
The file needs to be called afterbakup.bat

```
setlocal enabledelayedexpansion
set target=\\primary_site_server_name\ConfigMgr\Backups\%date:~0,3%
If not exist %target% goto datacopy
RD %target% /s /q
:datacopy
xcopy "C:\Backups\SCCM\*" "%target%\" /E /-Y
```

It creates 7 days' worth of backups in folders Mon, Tue, Wed etc and then backup those files with normal file backups

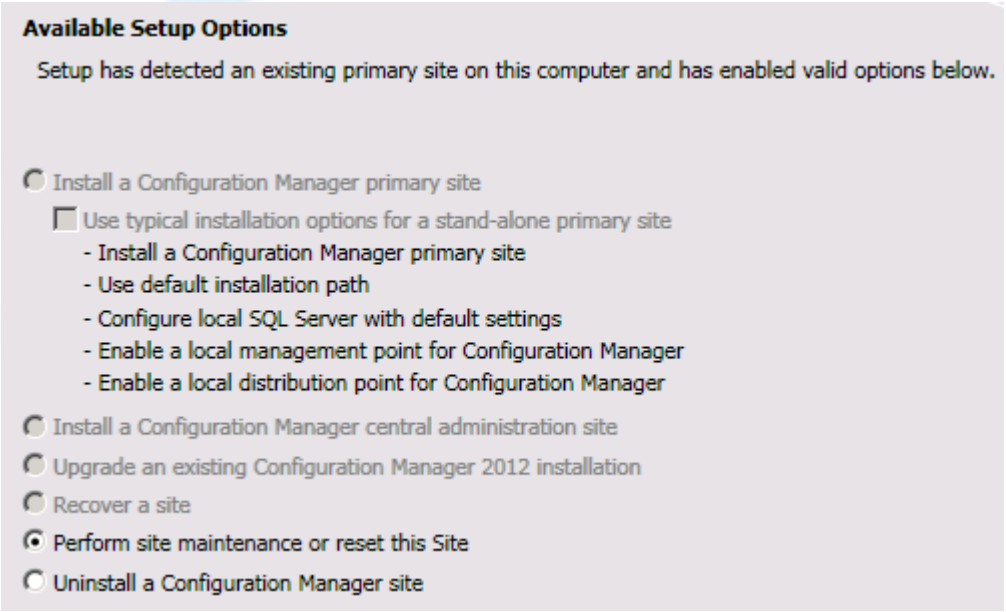
Moving the SQL DB to another server

Moving the SCCM DB to another server follows a relatively small number of steps and so the move process is fairly easy. SCCM integrates a lot of security with the server; during the move you can see from the logs how the re-configure process changes the security mappings. This will be good news if you have installed the DB on the same sever as your SCCM PS server, or you discover that the requirements on the existing instance are too great for your current SQL server.

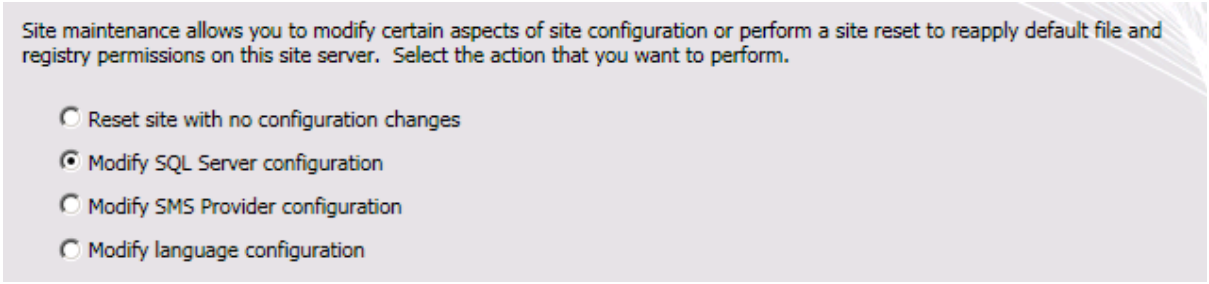
> *In a production install I was working on, it was decided to move the SQL from one SQL server to another. The reconfigure worked fine except that the new SQL had no permission with the SQL on the CAS. As a result the DB replication links could not be reinitialized. I added the two SQL servers to the local admin groups on each other, rebooted and replication started again. I won't forget that in the future!*

1. On your PS server stop the SCCM services.
2. Go to the existing SQL server and perform a DB backup
3. On your new SQL server perform a Restore Database
4. From the SCCM PS server go to program files and Microsoft System Center 2012

5. Enter Configuration Manager Setup



Choose the option to perform site maintenance or reset this site



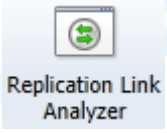
Enter the new SQL details and SCCM will configure the rest.

SCCM Console in Read Only Mode

If you perform a lower site install the primary site below a CAS or a secondary site you may get the following popup

"*Your Configuration Manager console is in read-only mode while this site completes tasks related to maintenance mode. After these tasks are complete you must reconnect your Configuration Manager console before you can edit or create new objects.*"

This can be a normal event as SQL tries to replicate data from the parent to child site. It can take some time to replicate depending on the size of the parent site. You should be able to see replication happening in the log file REPLCTRL.

In case there is an issue there is a replication monitoring tab 

If your site stays in read-only mode there is likely an issue with your SQL replication and in my experience, the most likely cause of this is the port that SCCM has been configured to use. It is not possible to configure the broker port after an install unless you perform a site reset through the SCCM install process. In the capture below you can see that the replication analyser checks that the tempdb has enough space and that the broker ports exist. In my example you can see both my broker ports are the same. There are a lot of posts on the internet on the SQL broker port for SCCM replication, but the only way I have ever got it working is by having the same port number for all broker server endpoints, it doesn't have to be the default port but it should be the same on all servers.

```
        <Detail Name="result" Value="Sufficient space detected for database tempdb in atleast one of the data and log files" />
      </Description>
    </IsDatabaseOutOfSpace>
  - <DoesBrokerConfigurationExist ssbPort="4022" SqlInstanceName="SQL.sc.local" SiteCode="CAS">
      <Result HasRun="True" HasPassed="True" />
    - <Description>
        <Detail Name="isServiceBrokerRouteConfigCorrect" Value="True" />
        <Detail Name="isServiceBrokerLoginConfigCorrect" Value="True" />
        <Detail Name="isValidEndpointCertificateExists" Value="True" />
        <Detail Name="isServiceBrokerConfigCorrect" Value="True" />
        <Detail Name="isServiceBrokerLoginCertificateCorrect" Value="True" />
      </Description>
    </DoesBrokerConfigurationExist>
  - <DoesBrokerConfigurationExist ssbPort="4022" SqlInstanceName="sql1.sc.local" SiteCode="PSS">
      <Result HasRun="True" HasPassed="True" />
    - <Description>
        <Detail Name="isServiceBrokerRouteConfigCorrect" Value="True" />
        <Detail Name="isServiceBrokerLoginConfigCorrect" Value="True" />
        <Detail Name="isValidEndpointCertificateExists" Value="True" />
        <Detail Name="isServiceBrokerConfigCorrect" Value="True" />
        <Detail Name="isServiceBrokerLoginCertificateCorrect" Value="True" />
```

Sudheesh N from Microsoft has written a great post to help with DB synchronisation

Maintenance Tasks

SCCM has a number of SQL maintenance tasks; they are all accessible in the same place as the backup tasks. There are over 34 SQL maintenance tasks within SCCM; here are a few to give you an idea of that they do.

Task	Description	Running time
Rebuild Indexes	Rebuilds the site DB's indexes	Every Sunday at 05:00
Monitor Keys	Monitors the primary keys used to identify the DB	Every Sunday at 05:00
Clear Install Flag	The Clear Install Flag task clears the installed flag on the client record in the site database if the client is not rediscovered by Heartbeat Discovery.	Every Sunday at 05:00
Delete Aged Computer Association Data	Deletes all Operating System Deployment computer association record data that has been deleted as part of completing user state restores	Saturday at 5:00
Rebuild Indexes Task	Rebuilds indexes used by the site database	Every Sunday at 05:00
Delete Aged Status Messages	deletes aged status messages	Daily at 5:00
Evaluate collection members	Just was it says on the tin	Every 5 min!

SQL and SCSM

SCSM is one of the SQL big hitters in the System Center suite. The advice for this product is, 'think about your DB instances before installing the product'. There are 8 databases involved in an SCSM deployment, they are

- ServiceManager
- DWRepository
- DWDataMart
- DWStagingAndConfig
- CMDWDataMart
- OMDWDataMart
- Analyst
- ReportServer

Requirements

- SQL 2008 R2 Standard or Enterprise
- Service Manager RTM is supported on SQL 2008 R2, SCSM
- SSRS (separate from all other System Center reporting instances)
- SQL Server 2008 R2 Native client
- Analysis services
- Full test search
- Don't use an Instance name with $ in it, as the Service Manager installer won't accept it
- Read about the collation settings here
- Unlike SCOM you can use SQL Standard for the Service Manager DB and then use SQL Enterprise for the DW.

Sizing

Luckily the SCSM team wrote a great sizing tool for SCSM. The tool contains a series of Visio documents, templates and an excel spread-sheet. It's a great collection of tools to help with SCSM and not only gives you a sizing guide but also helps with some great architecture Visio's to explain some of the process flows.

Here is an example from the guide.

Users	100-500	501-2000	2-5k	5-10k	10k
Computers	500	2000	3000	6000	50000
Incidents	1	1	1	1	1
CR/Month	20	100	150	1000	2000
DB Size GB	1.5	3	4	8	12.5
DW Size GB	7.5	15	20	38.5	62

It goes without saying that correct placement of the data bases especially the tempdb needs to follow the best practices as mentioned in this document.

SCSM Data Warehouse

If you choose to install the DW on SQL Standard there are a few points on TechNet that explain some of the differences between choosing SQL Standard or Enterprise:

SQL Server 2008 R2 is available in both Standard and Enterprise editions. Service Manager will function with both editions. However, there are additional features available in SQL Server 2008 Enterprise that can enhance your experience with the Service Manager data warehouse:

- Analysis Services Files: In the Enterprise edition of SQL Server 2008, you can decide where Analysis Services database files will be stored. In the Standard edition, there is only one default location for the files.
- Cube Processing: In the Enterprise edition, cubes are processed incrementally each night. In the Standard edition, the entire cube is processed each night and therefore, the amount of processing time required will increase as more data is accumulated. Cubes can still be queried when being processed however, reporting performance will be reduced.
- Measure Group Partitions: In the Enterprise edition, measure groups are partitioned on a monthly basis, instead of as one large partition. This reduces the amount of time it takes to process the partition.
- PowerPivot: In the Enterprise edition, you can use Microsoft SQL Server PowerPiviot for SharePoint.

There is a great blog that explains the DW in some nice details, here is a summary of some of the points in the blog.

Moving the DB

When it comes to moving either of the data bases the SCSM product group has again produced a great procedure on the move. The DW move is a very considerable and as such you will need to understand the process well before you begin. Travis Wright wrote a great blog to describe the process

Moving the OLTP

To move the SCSM DB follow these steps:

A. On all management servers stop the System Center services so that no data can be submitted to the DB
B. Take a backup of the ServiceManager database
C. Restore the Service Manager database on the target SQL Server
D. Configure the Service Manager database
E. Change the registry key on your management servers

Navigate to HKEY_LOCAL_MACHINE\Software\Microsoft\System Center\2010\Common\Database

There are two keys that can be configured here - one for the server name (DatabaseServerName) and one for the database name (DatabaseName)

Set those values to the new SQL Server name and database name (if different than originally).

F. Start the System Center services on *all* the management servers

Moving the DW

This move is complex and the steps listed here are taken from Technet.

The high-level steps of moving the Data Warehouse database to a new SQL Server computer are as follows:

1. Locate the various user accounts and SQL Servers used by the Data Warehouse Management Server
2. Stop Service Manager Services on the Data Warehouse Management Server
3. Back up the Data Warehouse databases on the old SQL Server.
4. Take the Data Warehouse databases offline on the old SQL Server.
5. Restore the Data Warehouse databases on the new SQL server.
6. Prepare the Data Warehouse databases on the new database server
7. Update Data Warehouse Management server with the new database server name.
8. Update the Data sources on the Reporting server to point to the new SQL server.
9. Update the Data sources on the Analysis server to point to the new SQL server.
10. Start Service Manager Services on the Data Warehouse Management Server

Important:

1. After the move, the databases **DWStagingAndConfig** and **DWRepository** databases have to be restored on the same SQL instance. Restoring them on separate SQL instance is not supported.
2. The SQL Server collation on the new SQL instance has to match the collation on the original SQL server instances where the Data Warehouse databases were originally hosted.

How to locate the various accounts and SQL servers that are used by the Data Warehouse Management Server

To identify the SQL Server database and instance name used by the Data Warehouse Management Server

1. Log on to the Data Warehouse Management Server as a user with administrative credentials.
2. On the Windows desktop, click **Start**, and then click **Run**.
3. In the **Run** dialog box, in the **Open** box, type **regedit**, and then click **OK**.
4. In the **Registry Editor** window, expand **HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\System Center\2010\Common\Database**
5. **Make a note of the following registry values:**
   DatabaseName
   DatabaseServerName
   DataMartDatabaseName
   DataMartSQLInstance
   RepositoryDatabaseName
   RepositorySQLInstance
   StagingDatabaseName
   StagingSQLInstance
   OMDataMartDatabaseName
   OMDataMartSQLInstance
   CMDataMartDatabaseName
   CMDataMartSQLInstance

To identify the SQL Reporting server and instance name used by Data Warehouse Management Server

1. **Log on to the Data Warehouse Management Server as a user with administrative credentials.**
2. **On the Windows desktop, click** Start**, and then click** Run**.**
3. **In the** Run **dialog box, in the** Open **box, type** regedit**, and then click** OK**.**
4. **In the** Registry Editor **window, expand** HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\System Center\2010\Common\Reporting
   Server
   ServerInstance
   WebServiceURL

To identify the Service account used by the Data Warehouse Management Server

1. **On the Windows desktop, click** Start**, and then click** Run
2. **In the** Run **dialog box, in the** Open **box, type** services.msc**, and then click** OK**.**
3. **Locate the service System Center Data Access Service, double click on it.**
4. **In the Properties window, Click on the Log On tab.**
5. **Make a note of user account under This account: box.**
6. **Repeat the steps 3-5 for the service System Center Management Configuration**

To identify the Reporting account used by the Data Warehouse Management Server

1. **Log on to the SQL Reporting Services server hosting the Service manager Reports instances. You can get the server name from step 6 by locating the registry value for Server**
2. **Once you are on the SQL reporting Service server, click Start, click All Programs, click Microsoft SQL Server 2008 R2 or Microsoft SQL Server 2008, click Configuration Tools and then click on Reporting Services Configuration Manager**
3. **In the Reporting Services Configuration Connection, connect to the correct SQL Reporting instance as noted in Step 6**
4. **In the Reporting Services Configuration Manager window, click Reporting Manager URL**
5. **In the Reporting Manager URL page, click on the hyperlink similar that would be of the following format:** http://<Servername>:portnumber/Reports
6. **Clicking on the hyperlink will open an Internet browser window. Click on the System Center folder.**
7. **Click the Service Manager Folder.**
8. **Click the Data Source DWDataMart**
9. **Make a note of the User name value under the radio button setting Credentials stored securely in the report server**
10. **Hit the back button to return to the Service Manager folder.**
11. **Click the Data Source DWStagingAndConfig**
12. **Make a note of the User name value under the radio button setting Credentials stored securely in the report server**
13. **Hit the back button to return to the Service Manager folder.**
14. **Click the Data Source ConfigurationManager**
15. **Make a note of the User name value under the radio button setting Credentials stored securely in the report server**
16. **Hit the back button to return to the Service Manager folder.**
17. **Click the Data Source MultiMartDatasource**
18. **Make a note of the User name value under the radio button setting Credentials stored securely in the report server**
19. **Hit the back button to return to the Service Manager folder.**

20. **Click the Data Source OperationsManager**
21. **Make a note of the User name value under the radio button setting Credentials stored securely in the report server**
22. **The account that is configured in the various data sources for Reporting services is the Reporting account.**
23. **Close the browser window.**

To identify the OLAP Account used by the Data Warehouse Management Server

1. **Log on to the Service Manager Server, click Start, click All Programs, Click Microsoft System Center 2012, click Service Manager and then click Service Manager Shell**
2. **In the PowerShell window, type the following commands one at a time and Hit Enter**

   $class= get-scclass –Name Microsoft.SystemCenter.ResourceAccessLayer.ASResourceStore –ComputerName <DWServerName>
   $OLAPServer= get-scclassinstance –class $class –ComputerName <DWServerName>
   $OLAPServer.Server

   Note: Replace **<DWServerName>** with the **computer name** of the **Data Warehouse management server**

3. **The last command above will return the name of the OLAP server hosting the DWASDataBase**
4. **On a machine where you have the SQL Server Management Studio installed do the following:**
   a. **Click on the Start menu, Click All Programs, Click Microsoft SQL Server 2008 R2 or Microsoft SQL Server 2008**
   b. **In the Connect to Server window, select Analysis Services option in the Server Type drop-down menu.**
   c. **In the Server Name, type the name you got from the output of the $OLAPServer.Server cmdlet in the previous steps.**
   d. **Once you are successfully connected to the OLAP server, in the Object Explorer window, under the server name, expand Databases and locate the OLAP database DWASDataBase**
   e. **Expand the DWASDataBase node.**
   f. **Expand the folder Data Sources**
   g. **Double click on CMDataMart**
   h. **In the Properties window CMDataMart make note of the Connection string.**
   i. **In the same window, under the Security Settings->Impersonation Info->Impersonation Account, there is a button …, click on it.**
   j. **In the Impersonation Info window make a note of the User name**
   k. **Click Cancel, then Click Cancel again.**
   l. **Repeat Steps g-k to make a note of the Connection string and the User name for the DWDataMart and OMDataMart.**
   m. **The account that you made a note of in steps g-l is the OLAP Account**

How to Stop Service Manager Services on the Data Warehouse Management Server

Use the following procedure to stop the Service Manager services on the Data Warehouse Management Server.

To stop the Service Manager services

1. **In the** Run **dialog box, in the** Open **text field, type** services.msc**, and then click** OK**.**
2. **In the** Services **window, in the** Services (Local) **pane, locate the following three services and for each one, click** Stop**:**
   - **System Center Data Access Service**
   - **System Center Management**
   - **System Center Management Configuration**

Use the following procedure to back up the Data Warehouse databases on the original SQL Server

To back up the database

1. **Log on to the SQL Server computer hosting the Data Warehouse databases which you noted in the previous section.**
2. **On the SQL Server computer hosting the original Data warehouse databases, click Start, click All Programs, click Microsoft SQL Server 2008 R2 or Microsoft SQL Server 2008, and then click SQL Server Management Studio.**
3. **In the Connect to Server dialog box, follow these steps:**
   a. **In the Server Type list, select Database Engine.**
   b. **In the Server Name list, select the server name for your Data warehouse database.**
   c. **In the Authentication list, select Windows Authentication, and then click Connect.**
4. **In the Object Explorer pane, expand Databases.**
5. **Right-click on the DWStagingAndConfig database, click Tasks, and then click Back Up.**
6. **In the Back Up Database dialog box, type a path and a file name in the Destination on disk box and then click OK.**

   Important
   The destination location must have enough available free disk space to store the backup files.
7. **Click on the OK button in the Back Up Database dialog box to start the back up.**
8. **Repeat the steps 3-6 for DWRepository, CMDWDataMart, OMDWDataMart and DWDataMart databases.**

How to take the Data Warehouse databases offline on the old SQL Server.
Use the following procedure to take the Data Warehouse databases offline on the original SQL Server

To take the databases offline

1. **On the SQL Server computer hosting the original Service Manager database, click** Start**, click** All Programs**, click** Microsoft SQL Server 2008 R2**, and then click** SQL Server Management Studio**.**
2. **In the** Connect to Server **dialog box, follow these steps:**
    a. **In the** Server Type **list, select** Database Engine**.**
    b. **In the** Server Name **list, select the server name for your Data warehouse database.**
    c. **In the** Authentication **list, select** Windows Authentication**, and then click** Connect**.**
3. **In the** Object Explorer **pane, expand** Databases.
4. **Right-click on the** Data Warehouse **database, click Tasks, and then click Take Offline.**
5. **In the Take database offline dialog box, click Close.**
6. **Repeat the steps 3-5 for databases DWRepository, CMDWDataMart, OMDWDataMart and DWDataMart.**

How to restore the Data warehouse databases on the new SQL Server
Use the following procedure to restore the Data Warehouses databases on the new SQL Server

To restore the databases

1. **On the new SQL Server computer, click** Start**, click** All Programs**, click** Microsoft SQL Server 2008 R2**, and then click** SQL Server Management Studio**.**
2. **In the** Connect to Server **dialog box, follow these steps:**
    a. **In the** Server Type **list, select** Database Engine**.**
    b. **In the** Server Name **list, select the server name for your Service Manager database.**
    c. **In the** Authentication **list, select** Windows Authentication**, and then click** Connect**.**
3. **In the** Object Explorer **pane, right-click on the Databases** folder and then click Restore Database.
4. **In the Restore Database dialog box, under the** To a point in time **text box, either retain the default (**most recent possible**) or select a specific date and time by clicking the browse button, which opens the** Point in Time Restore **dialog box.**
5. **To specify the source and location of the backup sets to restore, click the** From Device **option.**
6. **Click Browse to open the Specify Backup dialog box.**
7. **In the Backup media list box, select one of the listed device types. To select one or more devices for the Backup location list box, click Add.**
8. **In the Select the backup sets to restore grid, select the backups to restore. This grid displays the backups available for the specified location.**
9. **On the** General **page, the name of the restoring database appears in the** To database **list, select DWStagingAndConfig database from the list.**
10. **In the Restore options panel, select the Overwrite the existing database option.**
11. **In the Restore the database files as options panel, verify the original database file name and path are correct.**

12. **For the Recovery state options, specify the state option Leave the databases ready to use by rolling back the uncommitted transactions. Additional transaction logs cannot be restored (RESTORE WITH RECOVERY).**
13. **Click OK to restore the database.**
14. **Repeat the Steps 2-12 for databases DWRepository, CMDWDataMart, OMDWDataMart and DWDataMart.**

How to prepare the DWStagingAndConfig database on the new SQL Server
Use the following procedure to prepare the **DWStagingAndConfig** database on the new SQL Server

To configure the database

1. **On the new SQL Server computer, click** Start**, click** All Programs**, click** Microsoft SQL Server 2008 R2**, and then click** SQL Server Management Studio**.**
2. **In the** Connect to Server **dialog box, follow these steps:**
3. **In the** Server Type **list, select** Database Engine**.**
4. **In the** Server Name **list, select the new SQL server name that is DWStagingAndConfig hosting the database.**
5. **In the** Authentication **list, select** Windows Authentication**, and then click** Connect**.**
6. **In the** Object Explorer **pane, expand** Databases**, and then click** DWStagingAndConfig**.**
7. **In the toolbar, click** New Query**.**
8. **In the center pane, type the following commands, and then click** Execute**.**
   sp_configure 'clr enabled', 1
   go
   reconfigure
   go
9. **In the center pane, remove the commands you typed in the previous step, type the following commands, and then click** Execute**.**
   ALTER DATABASE DWStagingAndConfig SET SINGLE_USER WITH ROLLBACK IMMEDIATE
10. **In the center pane, remove the commands you typed in the previous step, type the following commands, and then click** Execute**.**
    ALTER DATABASE DWStagingAndConfig SET ENABLE_BROKER
11. **In the center pane, remove the commands you typed in the previous step, type the following commands, and then click** Execute**.**
    ALTER DATABASE DWStagingAndConfig SET MULTI_USER

To configure the service account database permissions

1. **In the** Object Explorer **pane, expand** Security**, and then expand** Logins**.**

Right-click Logins**, and then click** New Login

2. **Perform the following procedures in the** Login – New **wizard:**
3. **Click** Search**.**
4. **Type the username (domain\username) for the Data Warehouse service account, click** Check Names**, and then click** OK**.**

Note

5. **If the Data Access Account is running as LocalSystem, use the format <domain\computername$> in SQL Logins, where <computername> is the name of the management server.**
6. **In the** Select a page **pane, click** User Mapping**.**
7. **In the** Users mapped to this login **area, in the** Map **column, click the row that represents the name of the DWStagingAndConfig (**DWStagingAndConfig **is the default database name).**
8. **In the** Database role membership for: DWStagingAndConfig **area, make sure that the following entries are selected:**
    - configsvc_users
    - db_accessadmin
    - db_datareader
    - db_datawriter
    - db_ddladmin
    - db_securityadmin
    - dbmodule_users
    - public
    - sdk_users
    - sql_dependency_subscriber
    - db_owner
9. **In the** Database role membership for: DWRepository **area, make sure that the following entries are selected:**
    - **db_owner**
    - **public**
10. **In the** Database role membership for: DWDataMart **area, make sure that the following entries are selected:**
    - **db_owner**
    - **public**

11. **Click** Ok
12. **In the** Object Explorer **pane, expand** Security**, and then expand** Logins**.**
13. **Right-click** Logins**, and then click** New Login
14. **Perform the following procedures in the** Login – New **wizard:**
15. **Click** Search**.**
16. **Type the username (domain\username) for the Reporting account, click** Check Names**, and then click** OK**.**
17. **In the** Select a page **pane, click** User Mapping**.**
18. **In the** Users mapped to this login **area, in the** Map **column, click the row that represents the name of the DWStagingAndConfig (**DWStagingAndConfig **is the default database name).**
19. **In the** Database role membership for: DWStagingAndConfig **area, make sure that the following entries are selected:**
    - db_datareader
    - public
20. **In the** Database role membership for: DWRepository **area, make sure that the following entries are selected:**
    - **db_datareader**
    - **public**
    - **reportuser**
21. **In the** Database role membership for: DWDataMart **area, make sure that the following entries are selected:**
    - **db_datareader**
    - **public**
    - **reportuser**
22. **In the** Database role membership for: OMDWDataMart **area, make sure that the following entries are selected:**
    - **db_datareader**
    - **public**
    - **reportuser**
23. **In the** Database role membership for: CMDWDataMart **area, make sure that the following entries are selected:**

- **db_datareader**
- **public**
- **reportuser**

24. **Click** Ok
25. **In the** Object Explorer **pane, expand** Security**, and then expand** Logins**.**
26. **Right-click** Logins**, and then click** New Login
27. **Perform the following procedures in the** Login – New **wizard:**
28. **Click** Search**.**
29. **Type the username (domain\username) for the OLAP account, click** Check Names**, and then click** OK**.**
30. **In the** Select a page **pane, click** User Mapping**.**
31. **In the** Database role membership for: DWDataMart **area, make sure that the following entries are selected:**
    - **db_datareader**
    - **public**
    - **reportuser**
32. **In the** Database role membership for: OMDWDataMart **area, make sure that the following entries are selected:**
    - **db_datareader**
    - **public**
    - **reportuser**
33. **In the** Database role membership for: CMDWDataMart **area, make sure that the following entries are selected:**
    - **db_datareader**
    - **public**
    - **reportuser**
34. **Click** Ok

To configure DWStagingAndConfig tables

1. **In the** Object Explorer **pane, expand** Databases**, expand** DWStagingAndConfig**, and then expand** Tables**.**
2. **Right-click** dbo.MT_Microsoft$SystemCenter$ManagementGroup**, and then click** Edit Top

200 Rows.

3. **In the center pane, locate the column** SQLServerName_ 43FB076F_7970_4C86_6DCA_8BD541F45E3A.
4. **In the first row of this column, type the new SQL Server name hosting the DWStagingAndConfig database. In the case of named instances, type computer name\instance name.**
5. **Right-click** dbo. MT_Microsoft$SystemCenter$ResourceAccessLayer$SqlResourceStore**, and then click** Edit Top 200 Rows.
6. **Update the column** Server_48B308F9_CF0E_0F74_83E1_0AEB1B58E2FA **for rows representing DWStagingAndConfig, DWRepository, CMDWDataMart, OMDWDataMart, DWDataMart. Type the new SQL Server name hosting the respective databases. In the case of named instances, type computer name\instance name.**
7. **Right-click** dbo. MT_Microsoft$SystemCenter$ResourceAccessLayer$CMDBResourceStore**, and then click** Edit Top 200 Rows.
8. **In the center pane, locate the column** Server_48B308F9_CF0E_0F74_83E1_0AEB1B58E2FA.
9. **In the first row of this column, type the new SQL Server name hosting the DWStagingAndConfig database. In the case of named instances, type computer name\instance name.**
10. **Right-click** LFX.DataSource**, and then click** Edit Top 200 Rows.
11. **In the center pane, locate the column** DataSourceAddress.
12. **In the first row of this column, locate the entry that starts with** Data Source = <server name>; Initial Catalog = **DWStagingAndConfig**; Persist Security Info=False**. Type the new SQL Server name in place of** <server name>.
13. **Ensure the values got saved by querying the tables specified in steps 1 through 13**
14. **Close** Microsoft SQL Server Management Studio.

How to update the Data Warehouse Server to use the new Database Server name

Use the following procedure to update all the Data Warehouse Server to use the new Database Server name.

Caution

Incorrectly editing the registry might Severely damage your system; therefore, before making changes to the registry, back up any valued data on the computer.

To edit the registry

1. **Log on to the computer as a user with administrative credentials.**
2. **On the Windows desktop, click Start, and then click Run.**
3. **In the** Run **dialog box, in the** Open **box, type** regedit**, and then click** OK.

4. **In the** Registry Editor **window, expand** HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\System Center\2010\Common\Database
5. **In the right pane, double-click** DatabaseServerName**.**
6. **In the** Edit String **box, in the** Value data **box, type the name of the new SQL Server name hosting the DWStagingAndConfig database. If you are using a named instance of SQL Server, use the Computer Name\Instance name format.**
7. **Click** OK
8. **Repeat the Steps 4-6 for the registry values to reflect the new SQL server name for the DWDatamart, OMDWDataMart, CMDWDataMart, DWRepository and DWStagingAndConfig databases respectively. if you are using a named instance of SQL Server, use the Computer Name\Instance name format.**
   DataMartSQLInstance
   RepositorySQLInstance
   StagingSQLInstance

OMDataMartSQLInstance
CMDataMartSQLInstance

How to update the connection strings for the Data Sources on the SQL Reporting Services hosting Service Manager Reports

Use the following procedure to update the connection strings for the Data Sources on the SQL Reporting Services hosting Service Manager Reports

1. **Log on to the SQL Reporting Services server hosting the Service manager Reports instances. This is the registry value called Server you noted in the section "To identify the SQL Reporting server and instance name used by Data Warehouse Management Server"**
2. **Once you are on the SQL reporting Service server, click Start, click All Programs, click Microsoft SQL Server 2008 R2 or Microsoft SQL Server 2008, click Configuration Tools and then click on Reporting Services Configuration Manager**
3. **In the Reporting Services Configuration Connection, connect to the correct SQL Reporting instance as noted in the section "To identify the SQL Reporting server and instance name used by Data Warehouse Management Server"**
4. **In the Reporting Services Configuration Manager window, click Reporting Manager URL**
5. **In the Reporting Manager URL page, click on the hyperlink similar that would be of the following format:** http://<Servername>:portnumber/Reports
6. **Clicking on the hyperlink will open an Internet browser window. Click on the System Center folder.**
7. **Click the Service Manager Folder.**
8. **Click the Data Source DWDataMart**
9. **Update the Connection string value data source=<server name>;initial catalog=DWDataMart. Type the new SQL Server name in place of <server name>.**
10. **Hit the back button to return to the Service Manager folder.**
11. **Click the Data Source DWStagingAndConfig**
12. **Update the Connection string value data source=<server name>;initial catalog=DWStagingAndConfig. Type the new SQL Server name in place of <server name>.**
13. **Hit the back button to return to the Service Manager folder.**
14. **Click the Data Source ConfigurationManager**
15. **Update the Connection string value data source=<server name>;initial catalog=CMDWDataMart. Type the new SQL Server name in place of <server name>.**
16. **Hit the back button to return to the Service Manager folder.**
17. **Click the Data Source MultiMartDatasource**

18. **Update the Connection string value <root><source id='DWDataMart' connectionString='Data Source=<Server name>;Initial Catalog=DWDataMart;Integrated Security=True' /><source id='OMDataMart' connectionString='Data Source=<Server name>;Initial Catalog=OMDWDataMart;Integrated Security=True' /><source id='CMDataMart' connectionString='Data Source=<Server name>;Initial Catalog=CMDWDataMart;Integrated Security=True' /></root>. Type the new SQL Server name in place of <server name>.**
19. **Hit the back button to return to the Service Manager folder.**
20. **Click the Data Source OperationsManager**
21. **Update the Connection string value data source=<server name>;initial catalog=OMDWDataMart. Type the new SQL Server name in place of <server name>.**
22. **Close the browser window.**

How to update the connection strings for the Data Sources on the SQL Analysis services hosting the Service Manager Analysis Database

Use the following procedure to update the connection strings for the Data Sources on the SQL Analysis Services hosting Service Manager Analysis Database

1. **Log on to the SQL Analysis services server hosting the Service Manager Analysis Database. This is the value of the $OLAPServer.Server you noted in Step 29 under the section "How to find out what user accounts and SQL servers that are used by the Data Warehouse Server".**
2. **Click on the Start menu, Click All Programs, Click Microsoft SQL Server 2008 R2 or Microsoft SQL Server 2008**
3. **In the Connect to Server window, select Analysis Services option in the Server Type drop-down menu.**
4. **In the Server Name, type the name you got from the output of the $OLAPServer.Server cmdlet in the previous steps.**
5. **Once you are successfully connected to the OLAP server, in the Object Explorer window, under the server name, expand Databases and locate the OLAP database DWASDataBase**
6. **Expand the DWASDataBase node.**
7. **Expand the folder Data Sources**
8. **Double click on CMDataMart**
9. **In the Properties window CMDataMart update the Connection string Provider=SQLNCLI10.1;Data Source=<servername>;Integrated Security=SSPI;Initial Catalog=CMDWDataMart**

Replace <servername> with the name of the SQL server hosting the CMDWDataMart database.

10. **Click Ok.**
11. **Repeat steps 8-10 to update the Connection strings for the data sources DWDataMart and OMDataMart.**

How to Start Service Manager Services on the Data Warehouse Server

Use the following procedure to start the Service Manager services on the Data Warehouse server.

To Start Service Manager Services

1. **On the Windows desktop, click** Start**, and then click** Run**.**
2. **In the** Run **dialog box, in the** Open **field, type** services.msc**, and then click** OK**.**
3. **In the** Services **window, in the** Services (Local) **pane, locate the following three services and for each one, click** Start**:**

- **System Center Data Access Service**
- **System Center Management**
- **System Center Management Configuration**

Backup and restore

The SCSM DB backup is just a SQL backup process, while there are 8 DB's that need to be considered with the backup. If your SQL instance fails, all you need for recovery is the ability to restore the databases, which include the encryption keys to a computer with the same name as the original computer.

Performance

Service Manager DB performance, like many of the other products in the suite, have a number of factors that affect how SCSM will perform. When you consider that SCSM can be importing data from AD, SCOM, SCCM, SCO etc. it's easy to see how critical the SQL backend is. As with SCOM for example the number of consoles and the quantity of data coming through the connectors will all impact performance.

- Ideally you need a minimum of 8 (GB) of RAM for the management server that hosts the Service Manager database so that you can have an acceptable response time in typical scenarios.
- You should have at least 8 CPU cores on the computer hosting the Service Manager database.
- The usual stuff about sizing and placement on tempdb
- Create your DB to be a large enough size and configure the auto growth so that growth happens infrequently.

SQL and SCVMM

SCVMM would not be considered one of the big hitters in terms of SQL load. The main reason for this opinion is that not too many people have been running very large Hyper-V environments. I am sure that in Microsoft their VMM databases are under massive load but most people don't deal with that many hosts. In the sizing guide on TechNet this fact is emphasised in the way that Microsoft have not indicated IOPS guidelines.

Requirements

- SQL 2008 R2 SP1 (Standard or above)
- You must use a case-insensitive instance of SQL Server.
- SQL Roles: Database Engine and Management Tools.
- If the VMM management server and the computer on which SQL Server is running are not both members of the same Active Directory domain, there must be a two-way trust between the two domains, but in my opinion it makes no sense to separate your SQL into a different domain.
- The name of the computer on which SQL Server is installed cannot exceed 15 characters.

Sizing

TechNet offers two tables that place a sizing mark at everything up to 150 hosts and then for everything higher. The two sizing guides are fairly generic values but if your company is deploying greater than 150 hosts then you will have to think a bit more about how you size your DB environment. There are no indications of IOPS or needs on the tempdb.

In the following two tables I am not covering the minimum, as I don't believe the low watermark is the right place for any SQL backend. Also on the TechNet page it assumes you are deploying SQL on the same server, and we don't need to rant on again about local SQL, but, keep them separate.

For 150 hosts and below	
CPU	Dual-CPU, Dual-Core, 2.8GHz or greater
RAM	4GB*
Disk Space	150GB

*I would view 4GB of RAM to be too little for SQL and would have this at 8GB with 5GB reserved for SQL.

For 150 hosts and above	
CPU	Dual-CPU, Dual-Core, 3.6GHz or greater
RAM	8GB*
Disk Space	150GB

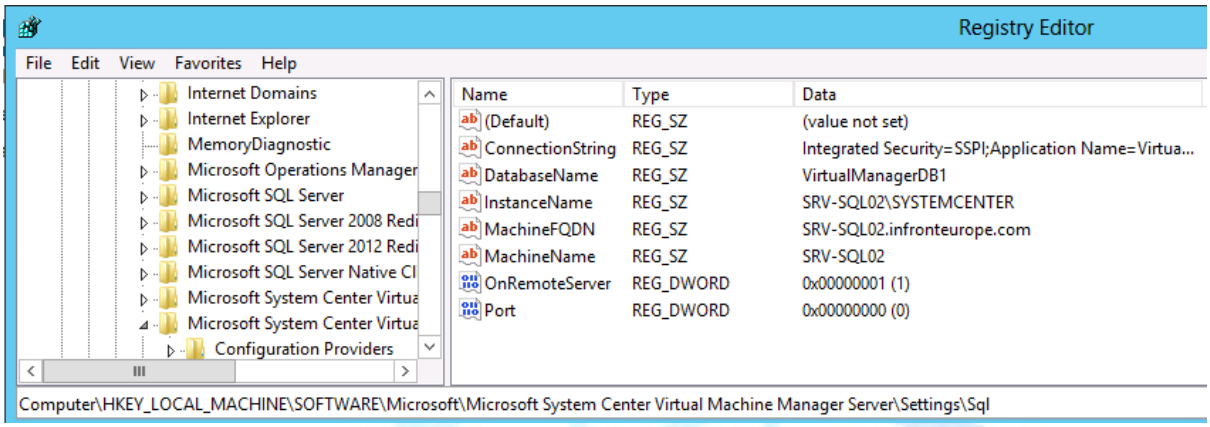
Moving the DB

Moving the DB to another SQL instance is quite a simple process but it's not the prettiest DB move compared to some of the other System Center applications. The process involves a re-install with the existing DB.

1. Stop the VMM services on the VMM server and make a note of the location of your VMM LDF and MDF files
2. In SQL management studio, backup the VMM DB
3. Uninstall SCVMM with the "Retail Database" option
4. In SQL management studio detach the VMM DB from SQL
5. Copy the files to the new SQL instance
6. On the new SQL instance in SQL management studio attach the MDF and LDF

7. Re-install SCVMM and then choose the existing DB on your new DB server

On your SCVMM server the only location in the register that mentions SQL is located under HKEY_LOCAL_MACHINE\Software\Microsoft\Microsoft System Center Virtual Machine Manager Server\Settings\SQL



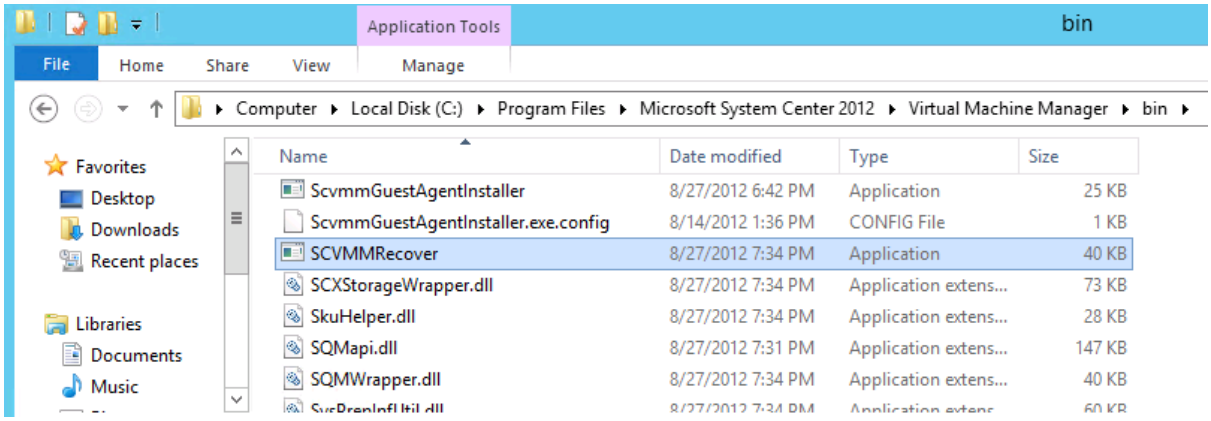
An unsupported hack is to change the SQL listing in the registry. I have used this twice in my lab and demo environments and it worked great, but it's not supported in a production environment.

Backup

The backup and restore process for SCVMM has less support restrictions for the backup process then for example SCCM. While there is a backup task in the SCVMM GUI you can also just as easily use the native SQL tools to perform the backup and restore process. SCVMM has a recovery tool called SCVMMRecovery.exe that is located on the SCVMM server. This tool however can't be used if you have your SCVMM DB located on a cluster.

BACKUP DATABASE VirtualManagerDB1 TO DISK = 'b:\backup\VirtualManager.bak' WITH FORMAT, MEDIANAME = 'SQLSERVERBACKUP', NAME = 'VirtualManager Full Backup'; GO

To restore the DB from an elevated CMD navigate to where the SCVMM binaries are located and look to the SCVMMRecover.exe as can be seen in the screen clipping below



So C:\Program Files\Microsoft System Center 2012\Virtual Machine Manager\bin\SCVMMRecover.exe C:\SCVMM_BACKUP\SCVMMBACKUP.BAK –CONFIRM
The location for the backup must to include the backup name with the .BAK

When you perform the restore you may need to look at some of the following points;

- Any hosts that were removed since your last backup will need to be removed and re-associated.
- Add any hosts that were added to VMM since the last backup.
- If you restored the VMM database to a different computer, re-associate hosts that have a status of Access Denied in the VMM console.

SQL and SCO

SCO is another application in the suite that has a gentle SQL requirement. One of the reasons for this is that Orchestrator when it was owned by Opalis could be run on data bases other than SQL.

Requirements

SQL 2008 R2, with the database engine and the usual SQL collation settings, SQL_Latin1_General_CP1_CI_AS. That's it.

Database growth

(The following section is almost a direct copy from TechNet

- Normally, when you call a runbook the database will not grow.
- Each time a runbook activity runs it should be counted individually, which should be considered when looping features, this can cause a single activity to run multiple times.
- To determine the storage needed for each invocation of the runbook, multiply the number of activities in the runbook by the number of bytes added to the database according to the selected logging level. These values are as follows:
- 524 bytes

  Default logging configuration.
- 6082 bytes

  Common published data logging level.
- 6082 bytes + data logged by activity

  Activity-specific published data logging level.
- By default, Orchestrator purges all but the most recent 500 logs for each runbook nightly at 2:00 am. To determine the storage required for each invocation of the runbook, multiply the storage needed for each invocation of the runbook by 500. If you change the Log Purge setting, multiply each invocation by the estimated number of invocations per day, week, or month as needed.
- The following table shows growth and performance estimates for the logging level configurations.

Logging Level	DB Growth Factor	Performance Factor	Recommended for Production
Default	1	1	Yes
Common published	11.6x	2.5x	Limited use with

data			planning
Activity-specific published data	Greater than 11.6x	Greater than 2.5x	No

Moving the database

1. Stop your runbooks.
2. Stop the Orchestator services on your MS,
    a. OrchestratorManagementService
    b. OpalisActionService
    c. OpalisActionServerWatchdog
    d. OpalisRemotingService
3. On your run book servers stop the following
    a. OpalisRemotingService
    b. OpalisActionService
4. Take a full backup of your SCO DB in SQL
5. Copy and restore the database backup onto the new SQL server.
6. Restore the DB from SQL MS.
7. In SQL Server Management Studio, add the Orchestrator service Account as Login and configure it to use the Orchestrator database with the permission of db_owner.
8. On your Orchestrator management server, start the Data Store Configuration tool, configure to use the new SQL server and connect the existing database.
9. Start all services on your Orchestrator management server that you stopped on step 2
10. Start all services on your Orchestrator Runbook servers that you stopped on step 3

Backup

The SQL DB is backed up through SQL native backup, SCDPM or another 3RD party backup facility. In the same way as VMM or SCOM is backed up, it's just a simple DB backup process.

Useful SQL Queries

Robert Hearn wrote a great blog on some useful queries within the SCO DB. Here are some of the queries from the blog.

List all activity runbooks across all servers

```
SELECT *
  FROM [Orchestrator].[dbo].[POLICY_PUBLISH_QUEUE] ppq
  LEFT JOIN Orchestrator.dbo.POLICYINSTANCES pin on pin.PolicyID =
ppq.PolicyID
  Where AssignedActionServer IS NOT NULL
  and TimeEnded IS NULL
```

List all running Jobs with activities that started more than 5 mins ago and have not finished

```
SELECT pin.PolicyID
  , pin.State
  , pin.Status
```

```
   , oi.ObjectID
   , oi.ObjectStatus
   , oi.StartTime
   , oi.EndTime
  FROM [Orchestrator].[dbo].[POLICYINSTANCES] pin
  LEFT JOIN Orchestrator.dbo.[OBJECTS] obj on obj.ParentID = pin.PolicyID
  LEFT JOIN Orchestrator.dbo.OBJECTINSTANCES oi on oi.ObjectID = obj.UniqueID
Where TimeEnded IS NULL
And Status IS NULL
and oi.EndTime IS NULL
and OI.StartTime IS NOT NULL
and DATEDIFF(MINUTE,oi.StartTime,getdate()) > 5
```

List of all currently-running Jobs that have not had their heartbeat update in the last 5 minutes

```
SELECT *
  FROM [Orchestrator].[dbo].[POLICY_PUBLISH_QUEUE] ppq
  LEFT JOIN Orchestrator.dbo.POLICYINSTANCES pin on pin.PolicyID = ppq.PolicyID
  Where AssignedActionServer IS NOT NULL
  and TimeEnded IS NULL
  and DATEDIFF(MINUTE, Heartbeat, GetDate()) > 5
```

Find out the highest number of runbooks that were run per hour at any given time in the last 30 days:

```
SELECT MAX(jobs.MaxInstances) FROM
(SELECT [ActionServer]
      , CONVERT(VARCHAR(19), dateadd(hour,datediff(hour,0,TimeStarted),0),
120) as Hourly
      , COUNT(*) as MaxInstances
  FROM [Opalis].[dbo].[POLICYINSTANCES]
  WHERE (DateDiff(M, TimeStarted,GETDATE()) < 1 )
  GROUP BY ActionServer, CONVERT(VARCHAR(19),
dateadd(hour,datediff(hour,0,TimeStarted),0), 120)) as jobs
```

Robert also wrote another good blog on clearing the queue for your RB servers (and this is unsupported). Consider a situation whereby for example you are monitoring a drive and when a document gets placed in the drive it will kick off a job to FTP that file, by accident then a large number of files are dropped into the folder and thousands of jobs are created. If you stop the services on your runbook server than your secondary server will just pick up the workload. Using the following two scripts will add a Stored Procedure to the DB to delete the jobs.

```
USE [Orchestrator]
GO

SET ANSI_NULLS ON
GO
SET QUOTED_IDENTIFIER ON
GO


CREATE PROCEDURE [dbo].[sp_StopAllRequestsForPolicy]
    @PolicyID uniqueidentifier
AS
```

```
BEGIN
    DELETE FROM [POLICY_PUBLISH_QUEUE] WHERE [PolicyID] = @PolicyID

    UPDATE [POLICIES] SET [Published] = 0, [PublishingTime] = getutcdate()
    WHERE [UniqueID] = @PolicyID
END
```

And the second

```
USE [Orchestrator]
GO

SET ANSI_NULLS ON
GO
SET QUOTED_IDENTIFIER ON
GO

CREATE PROCEDURE [dbo].[sp_StopAllRequests]
AS
BEGIN
    DECLARE running_cursor CURSOR LOCAL FAST_FORWARD FOR
    SELECT DISTINCT [PolicyID]
    FROM [POLICY_PUBLISH_QUEUE]

    DECLARE @policyID uniqueidentifier

    OPEN running_cursor
    FETCH NEXT FROM running_cursor INTO @policyID
    WHILE @@FETCH_STATUS = 0
    BEGIN
        EXEC [sp_StopAllRequestsForPolicy] @PolicyID = @policyID
        FETCH NEXT FROM running_cursor INTO @policyID
    END

    CLOSE running_cursor
    DEALLOCATE running_cursor
END
```

With the two scripts completed you now have a stored procedure to clear the queue, run sp_StopAllRequests

SQL and DPM

DPM is a unique component in the suite, during the install it will offer to install a local copy of SQL. In the questionnaire that was submitted at the start of this process I asked the question what was people's opinions on deploying to SQL Express. While most people said that they prefer to deploy DPM with a full version of SQL with comments like "enterprise DB for an enterprise backup". Some of the interesting points that I was not expecting came from two of the DPM experts;

1. The SQL express DB that DPM creates was custom configured to be tuned just for DPM
2. There is little performance gain in running DPM on full SQL.

Requirements

The SQL backend needs to be a dedicated instance SQL Server 2012 or SQL Server 2008 R2 or SQL Server 2008 R2 SP1, Enterprise or Standard Edition.

- It must be in the same domain as the DPM server.
- The remote instance of SQL Server cannot be on a domain controller
- Setup creates the **DPMDBReaders$***<DPM server name>* and **DPMDBAdministrators$***<DPM server name>* local groups on the computer that is running the remote instance of SQL Server. You must add DPM administrators to these groups for DPM to use the remote instance of SQL Server.
- For remote instance of SQL with a firewall involved then you need port 80 open on the SQL server.
- The DPM support files need to be on the SQL server.

Moving the data base

Moving the SQL DB to another server is a fairly straight forward process. It centers around moving the DB to a server with the same name as the original server.

On your existing DPM SQL server:

1. Back up the DPM database.
2. Note the updates installed on DPM by using the **Add or Remove Programs** item in Control Panel.

On your new server, follow these steps:

1. Take the old server off the network. Name your new server the same as the old one.
2. Install DPM.
3. Install all the DPM updates that were previously installed on your old server.
4. Restore the DPM database.

Survey Results

What started this project off was that I decided to create a survey to discover how the rest of the community was dealing with the interaction between System Center and its most critical component, the SQL server. Here is what people said, in some areas I am paraphrasing or just including the important parts.

1. What is your main area of expertise ? Create Chart Download

	Response Percent	Response Count
SQL Server	12.9%	8
System Center	75.8%	47
Both	11.3%	7
answered question		62
skipped question		1

So OK its nearly all System Center folks..

2. Do you use SQL Server on VM's for System Center ? Create Chart Download

	Response Percent	Response Count
Yes	68.3%	43
No	31.7%	20
answered question		63
skipped question		0

Nearly 70% of us are hosting SQL instances on VM's to support System Center, so have a read of the section on virtualising SQL.

3. If you have to host SQL on a VM what things do you do to help SQL performance ? Download

Response Count

Hide Responses 34

Responses (34) | Text Analysis | My Categories (0)

Showing 34 text responses — No responses selected

set memory usage thresholds, and configure disk for fast read and writes
11/23/2012 1:00 PM View Responses

Weekly performance reports, SQL MP
11/20/2012 4:12 AM View Responses

Pay attention to disk performance. Preferably isolate the LUNs, ensure that the host is not excessively utilised and that there is plenty of memory to go around.
11/16/2012 1:06 PM View Responses

Win 2012 Hyper-V Proper disk design
11/13/2012 9:45 PM View Responses

tune, baseline test, optimise, best practice configuration & Settings
11/9/2012 6:06 PM View Responses

direct attach disks, split disks (databases,files)
11/8/2012 8:50 AM View Responses

Correct resource allocation for the VM. Use dedicated Fibre channel storage LUNs. Also consult performance tuning white papers to ensure OS is tuned to run SQL. Also v. Important to correctly configure AV to prevent performance degradation
11/6/2012 9:01 PM View Responses

Ensure high vRAM allocation to minimise paging to disk and tempdb utilisation Ensure vm is on minimally contested storage, from an io perspective Ensure vm vdisks are spread across different disk aggs, with each vdisk holding diff. SQL entity(db,log,tempdb) Use RDMs for vdisk on older hypervisors, less of an issue these days Ensure adequate vCPU's are allocated Ensure drs rule is created, collocating relevant SC app vm's with their SQL vm, allowing for vSwitch switching @ 10gbps (offsets some of the vSQL losses)
11/6/2012 8:12 PM View Responses

Define fixed Size databases
11/6/2012 7:47 PM View Responses

1. dedicated Disk volume for DB's data files and dedicated for tempDB. 2. Format NTFS to 64k 3. use SCSI virtual controller 4. Minimum 4 vCPU for Hyper-V R2.
11/6/2012 7:27 PM View Responses

Up the resources like no. of CPU's and RAM. Also get higher tier SAN disk for better performance.
11/7/2012 10:38 PM View Responses

Avoid the use of VHDs for the database & logs if possible.
11/7/2012 9:23 PM View Responses

Pass-through disks for logs and data Multiple processors
11/7/2012 2:14 PM View Responses

Direct access to disk array.
11/7/2012 6:12 AM View Responses

allocate dedicated disks for that system center box. do the usual sql practice and seperate SQL logs from DB and Temp.
11/6/2012 10:31 PM View Responses

SQL logs and SQL data on separate VHDs. The VHDs will be on separate CSVs also with different RAID level of the CSVs.
11/6/2012 9:13 PM View Responses

Use a LUN with good IOPs Exclude the mdb and ldf files from antivirus scanning memory reservations to ensure adequate minimal memory
11/6/2012 2:53 PM View Responses

Nothing specific, dynamic memory enabled, usually 2 vcpus
11/6/2012 2:17 PM View Responses

Other than normal SQL tuning: Seperate logs, data and system DB drives to their own VHDs
11/6/2012 1:42 PM View Responses

Memory but most import fast storage
11/6/2012 1:14 PM View Responses

FIxed Hard Disks 8 GB RAM Set Memory to 80% - 90%
11/6/2012 12:37 AM View Responses

Use Dynamic Memory Use VHDX (probably fixed, but for the moment - dyn expanding as proposed by the WS2012 perf tuning guideline document) Preexpand the mdf and ldf files Move tempdb logfile to another vhdx (even on the same host and disks)

configure memory properly, remove pagefile, separate disk I/O as much as possible VM environments where the drive I/O's are not tuned and are just a lump of space are poor performers.
11/6/2012 5:42 PM View Responses

DBs on iSCSI SAN LUNs
11/6/2012 5:27 PM View Responses

Storage Speed, RAM
11/6/2012 5:04 PM View Responses

Not much. Pay attention to the speed of disk used for data and log files.
11/6/2012 3:46 PM View Responses

I would split the mdf, ldf files on separate drives. I would also use pass through disks for SQL to give better performance.
11/6/2012 3:36 PM View Responses

RAW-Lun mapping enough memory

Use Dynamic Memory Use VHDX (probably fixed, but for the moment - dyn expanding as proposed by the WS2012 perf tuning guideline document) Preexpand the mdf and ldf files Move tempdb logfile to another vhdx (even on the same host and disks)
11/6/2012 12:28 AM View Responses

I check with the team responsible for virtualization to make sure that the SQL Server gets enough dedicated resources and does not have to share these resources with a lot of other machines.
11/6/2012 11:14 AM View Responses

Paul, it's Kev here, check out what I do when working with SQL: Fixed disks, OpsMgr sizing calculator, no Dynamic Memory and check out this blog post: http://blog.scomfaq.ch/2012/02/28/system-center-sql-server-2008-r2-performance-tuning/
11/6/2012 9:59 AM View Responses

Dedicate disk to the instance hosting the databases.
11/5/2012 5:01 PM View Responses

none, I leave this to the SQL people to do this
11/5/2012 3:14 PM View Responses

4. In terms of instance configurations for System Center what of the following do you use ?

Create Chart | Download

	Response Percent	Response Count
Lock Pages in Memory	17.8%	8
Max Server Memory	84.4%	38
Optimize for ad hoc workloads	13.3%	6
Max degree of parallelism	24.4%	11
answered question		45
skipped question		18

5. What auto grow settings do you use for System Center data files ?

Download

	Response Count
Hide Responses	42

Responses (42) | Text Analysis | My Categories (0)

Showing 42 text responses — No responses selected

auto grow but with a max size set
11/23/2012 1:00 PM View Responses

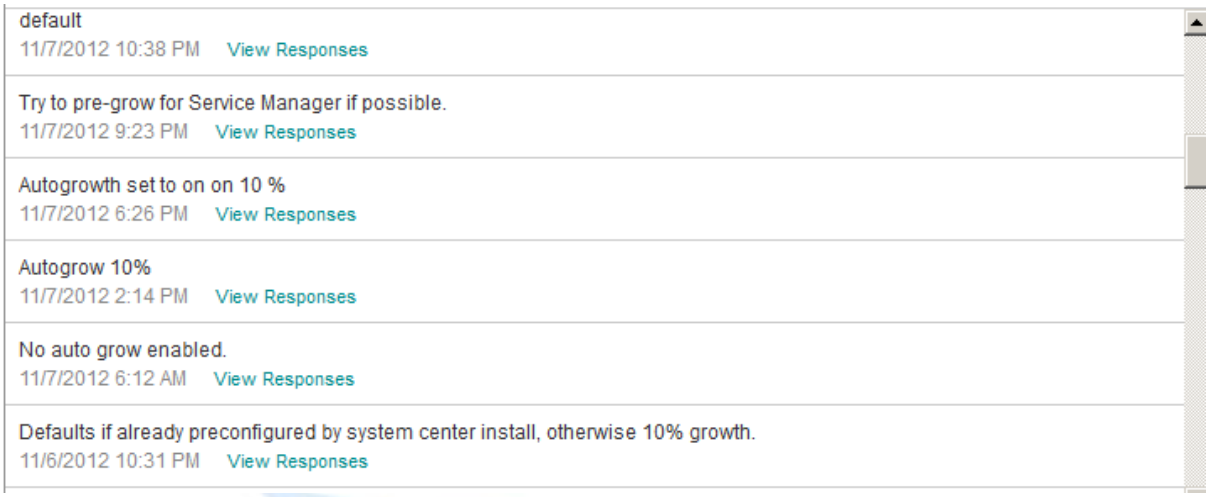
100 MB unlimited
11/20/2012 1:31 PM View Responses

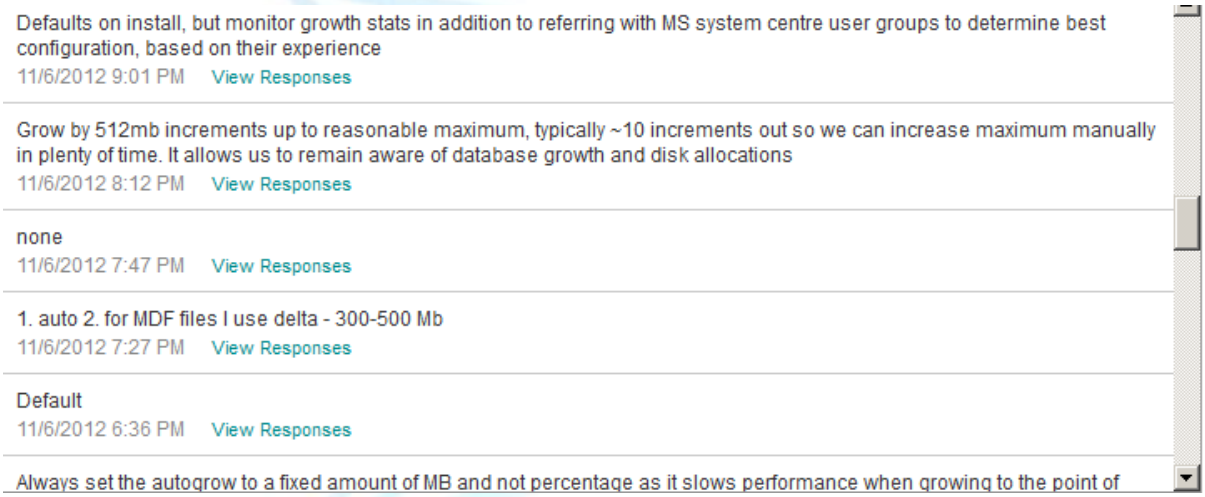
Don't use autogrow. But if I have to, set it to grow by 1024mb, rather than %
11/16/2012 1:06 PM View Responses

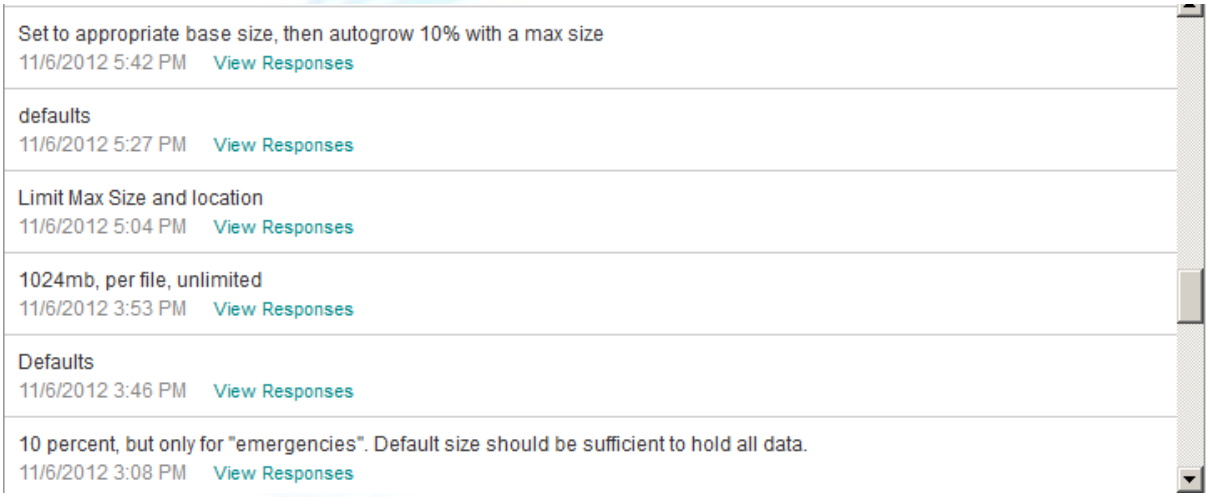
none
11/16/2012 10:25 AM View Responses

auto grow on all db's and logs, but all sized so big that most likely nothing will ever need to expand.
11/14/2012 9:12 AM View Responses

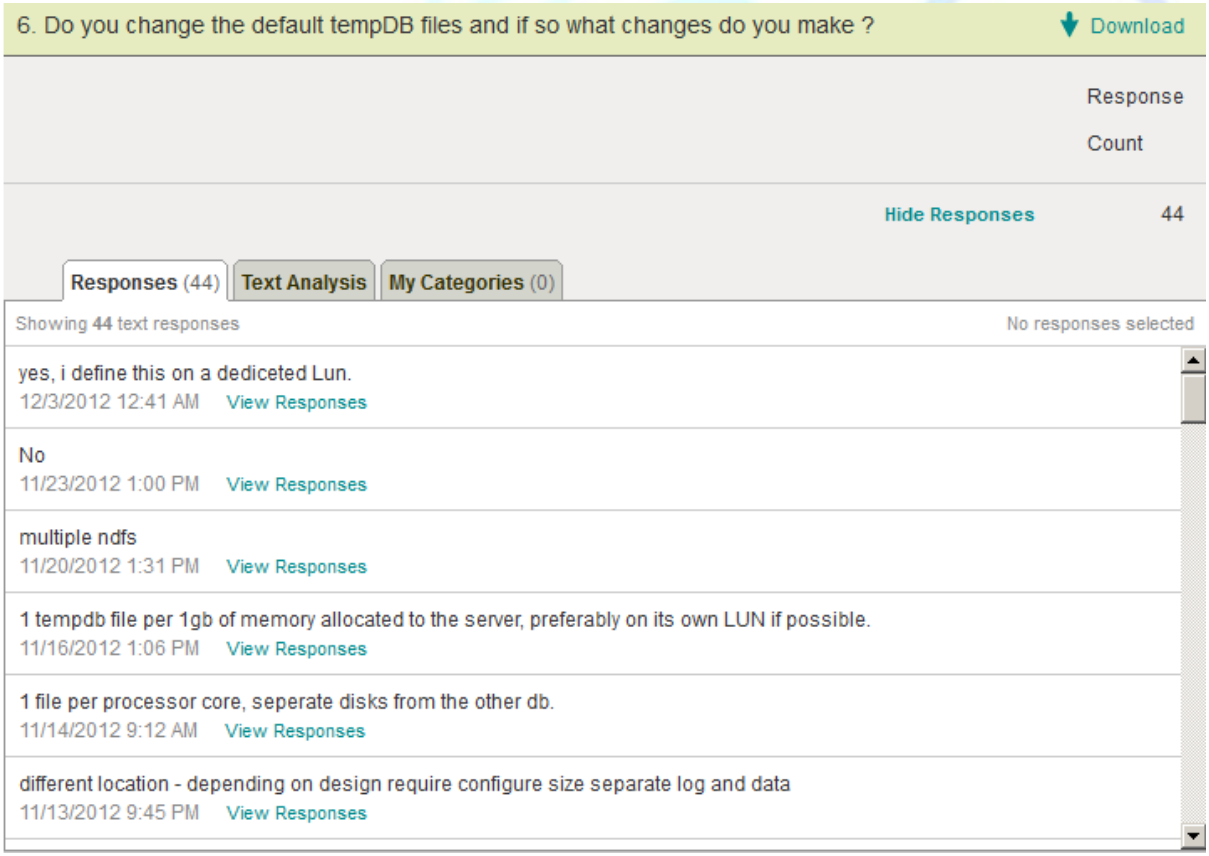
no autogrow - use scom & SQL mp to monitor size
11/13/2012 9:45 PM View Responses

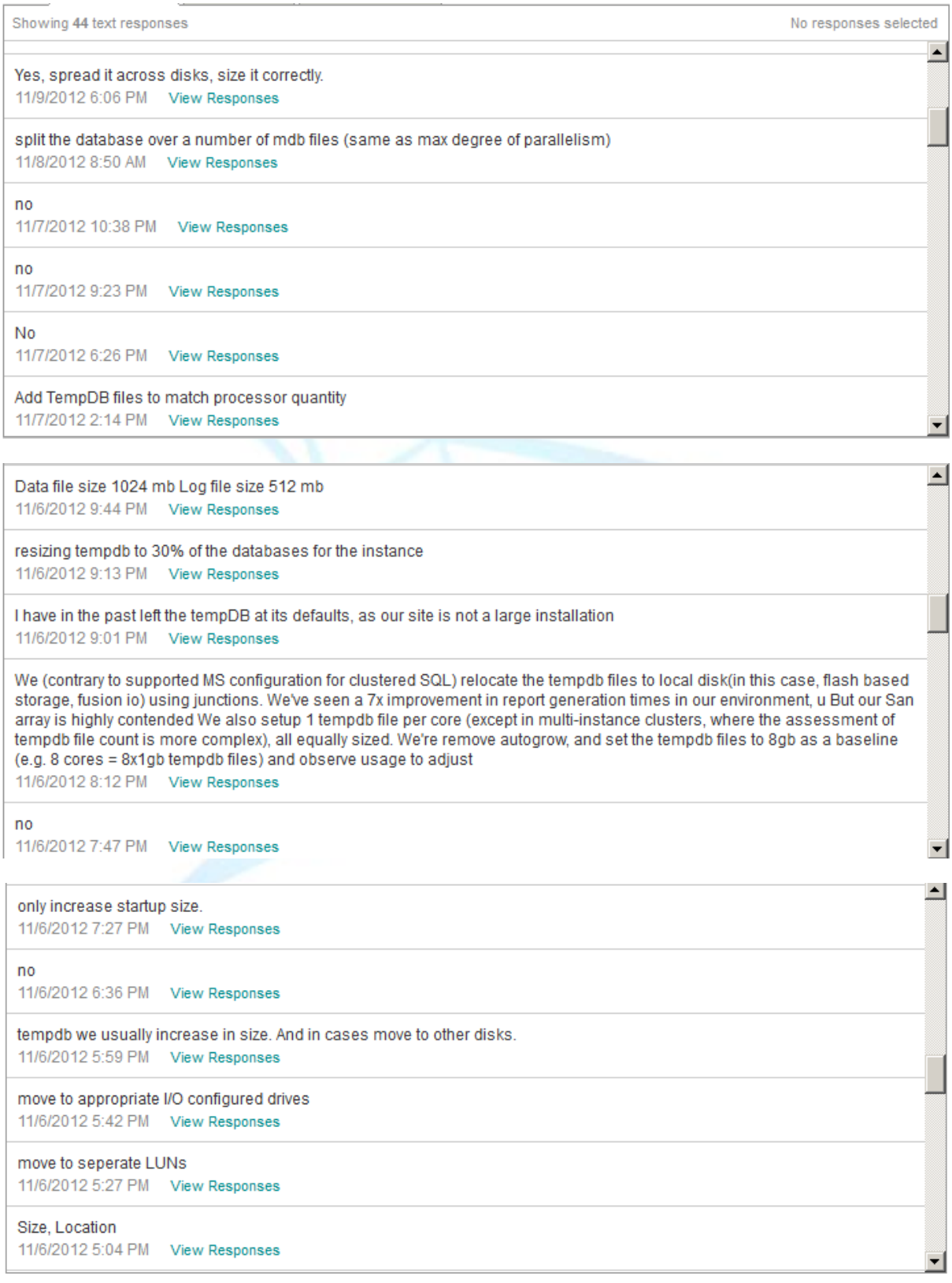

default
11/7/2012 10:38 PM View Responses
Try to pre-grow for Service Manager if possible.
11/7/2012 9:23 PM View Responses
Autogrowth set to on on 10 %
11/7/2012 6:26 PM View Responses
Autogrow 10%
11/7/2012 2:14 PM View Responses
No auto grow enabled.
11/7/2012 6:12 AM View Responses
Defaults if already preconfigured by system center install, otherwise 10% growth.
11/6/2012 10:31 PM View Responses


Defaults on install, but monitor growth stats in addition to referring with MS system centre user groups to determine best configuration, based on their experience
11/6/2012 9:01 PM View Responses
Grow by 512mb increments up to reasonable maximum, typically ~10 increments out so we can increase maximum manually in plenty of time. It allows us to remain aware of database growth and disk allocations
11/6/2012 8:12 PM View Responses
none
11/6/2012 7:47 PM View Responses
1. auto 2. for MDF files I use delta - 300-500 Mb
11/6/2012 7:27 PM View Responses
Default
11/6/2012 6:36 PM View Responses
Always set the autogrow to a fixed amount of MB and not percentage as it slows performance when growing to the point of


Set to appropriate base size, then autogrow 10% with a max size
11/6/2012 5:42 PM View Responses
defaults
11/6/2012 5:27 PM View Responses
Limit Max Size and location
11/6/2012 5:04 PM View Responses
1024mb, per file, unlimited
11/6/2012 3:53 PM View Responses
Defaults
11/6/2012 3:46 PM View Responses
10 percent, but only for "emergencies". Default size should be sufficient to hold all data.
11/6/2012 3:08 PM View Responses

One point from these results; if you leave autogrowth to the default and the tempdb to default then you are going to start off with a tiny tempdb file (8mb) and its going to grow by 10% constantly until it reaches its necessary size. On some SCOM / SCSM environments this could be gigs and gigs of dreadful autogrowth and corresponding terrible performance of your DB!





Showing 44 text responses — No responses selected

Yes, spread it across disks, size it correctly.
11/9/2012 6:06 PM View Responses

split the database over a number of mdb files (same as max degree of parallelism)
11/8/2012 8:50 AM View Responses

no
11/7/2012 10:38 PM View Responses

no
11/7/2012 9:23 PM View Responses

No
11/7/2012 6:26 PM View Responses

Add TempDB files to match processor quantity
11/7/2012 2:14 PM View Responses

Data file size 1024 mb Log file size 512 mb
11/6/2012 9:44 PM View Responses

resizing tempdb to 30% of the databases for the instance
11/6/2012 9:13 PM View Responses

I have in the past left the tempDB at its defaults, as our site is not a large installation
11/6/2012 9:01 PM View Responses

We (contrary to supported MS configuration for clustered SQL) relocate the tempdb files to local disk(in this case, flash based storage, fusion io) using junctions. We've seen a 7x improvement in report generation times in our environment, u But our San array is highly contended We also setup 1 tempdb file per core (except in multi-instance clusters, where the assessment of tempdb file count is more complex), all equally sized. We're remove autogrow, and set the tempdb files to 8gb as a baseline (e.g. 8 cores = 8x1gb tempdb files) and observe usage to adjust
11/6/2012 8:12 PM View Responses

no
11/6/2012 7:47 PM View Responses

only increase startup size.
11/6/2012 7:27 PM View Responses

no
11/6/2012 6:36 PM View Responses

tempdb we usually increase in size. And in cases move to other disks.
11/6/2012 5:59 PM View Responses

move to appropriate I/O configured drives
11/6/2012 5:42 PM View Responses

move to seperate LUNs
11/6/2012 5:27 PM View Responses

Size, Location
11/6/2012 5:04 PM View Responses

11/6/2012 5:04 PM View Responses

tempdb data files = number of 1 cpu cores auto grow 1024mb, per file, unlimited
11/6/2012 3:53 PM View Responses

If possible, add them to separate spindles on the SAN.
11/6/2012 3:46 PM View Responses

On different disks, 1 data fille per core (we have 16 cores) of equal size.
11/6/2012 3:08 PM View Responses

no
11/6/2012 3:04 PM View Responses

no change
11/6/2012 2:53 PM View Responses

Move them to a seperate LUN

No
11/6/2012 2:20 PM View Responses

No, default
11/6/2012 2:17 PM View Responses

1 TempDB file per core
11/6/2012 1:42 PM View Responses

No.
11/6/2012 1:17 PM View Responses

No
11/6/2012 1:16 PM View Responses

No
11/6/2012 1:14 PM View Responses

Preexpand it to several hundred MBs and move its log to another volume/disk/vhdx.
11/6/2012 12:28 AM View Responses

I prefer placing the tempDB on a dedicated partition. As it is resource intensive, placing it on the fastest drive available is recommended. Sometimes the tempdb is split into several files reflecting the number of processor cores, however I do not always do it and I know there are people even advising against it.
11/6/2012 11:14 AM View Responses

Depends on the size of the deployment but here's a guideline: It is recommended to split your tempdb data files into equal parts. What does that mean? Let's say if you have at least 4 cores in your SQL server split up your tempdb data files in 4 equal sized data files. This means, if your tempdb grew over a few days to 2 GB create 4 x 500MB data files. If you have 8 cores available split the tempdb File into 8 equal pieces in our example this would be 8 x 250 MB chunks.
11/6/2012 9:59 AM View Responses

Increase tempDB file size and change auto-grow settings.
11/5/2012 5:01 PM View Responses

7. Do you use Windows Firewall on a SQL server ? Create Chart Download

	Response Percent	Response Count
Yes	24.2%	15
No	50.0%	31
Sometimes	25.8%	16
answered question		62
skipped question		1

While talking to an old friend and SQL MVP, he said that he never uses Windows firewall on a SQL instance due to the excess in CPU usage from packet inspection, and I thought it would be interesting for us all to see what others are doing.

8. From a SQL server perspective what are the main configuration mistakes that are being made in System Center deployments? Download

	Response Count
Hide Responses	31

Responses (31) | Text Analysis | My Categories (0)

Showing 31 text responses — No responses selected

collation
11/23/2012 1:00 PM View Responses

Access rights, SPN, overloading by "everything is needed" settings in SCOM
11/20/2012 4:12 AM View Responses

Implementing too many maintenance jobs that interfere with the performance of the SQL server.
11/16/2012 1:06 PM View Responses

incorrect collation
11/16/2012 10:25 AM View Responses

use dedicated sql for each product disk configurations, people don't split logs & data people don't read different sql requirements for each product
11/13/2012 9:45 PM View Responses

bad configuration - going with default values
11/9/2012 6:06 PM View Responses

placing system center databases on central sql instances (sharing with other line of business apps)
11/8/2012 8:50 AM View Responses

the only issue we have is at install if the wrong collation setting is used. Otherwise we run at default for everything except where we store teh databases (ie not on C: drive)
11/7/2012 10:38 PM View Responses

Operations manager : poor performance; defined views (Valert, Vperformance..) should be optimized to support larger envrionments
11/7/2012 6:26 PM View Responses

Performance tweaks - using SC Advisor to provide advice Backup and log trimming are not set by default
11/7/2012 2:14 PM View Responses

Not breaking up DB, temp and log files onto separate disk for performance gains, data redundancy.
11/7/2012 6:12 AM View Responses

Too little free space

Sizing maintenance jobs are missing collation not set right
11/6/2012 9:13 PM View Responses

Transaction logs growing out of control. Not reviewing the reporting stats, from within SCOM, which means far too much data is being logged. Importance being to performance tune the scom agents to tune the data being recorded.
11/6/2012 9:01 PM View Responses

No consideration for disk architecture (separation of tempdb, log and db not occurring, raid levels not considered) Inadequate instance memory allocation resulting in tempdb/page pressure)
11/6/2012 8:12 PM View Responses

SQL collation
11/6/2012 7:27 PM View Responses

Not limiting memory use (i heard from a sql dba).
11/6/2012 5:59 PM View Responses

Drive I/O not being separated properly DBA's not setting ports to static Memory configuration that doesn't ensure the system has 2GB for the OS Not separating instances and Keeping SQL reporting for SCCM separate from others.
11/6/2012 5:42 PM View Responses

SQL server/database collation, wrong db size calculations
11/6/2012 3:53 PM View Responses

Right sizing the hardware requirements. I've seen a customer with 10,000 clients with a single processor VM with 2.5 GB RAM and all files on the same spindles. I've also seen a customer with 2,000 clients with a 16 core, 16 GB RAM physical box for ONLY the SCCM SQL install (sold to them by a previous consultant). There are still a lot of people who believe that you can't put SQL on a virtual box. It takes a long computer science discussion to go through the fact that as long as you have enough physical cores available to the VM that there is no processor locking problem and performance is fine.
11/6/2012 3:46 PM View Responses

disk alignment; cluster size; insufficient disk space; antivrus;
11/6/2012 3:08 PM View Responses

wrong access rights not enough resources for sql to less disk space for db
11/6/2012 3:04 PM View Responses

autogrow enabled memory reservations not defined DB grooming of OperationsManagerDB not tight enough (too much data)
11/6/2012 2:53 PM View Responses

Databases are put into full backup mode vs. simple.
11/6/2012 2:20 PM View Responses

I've found co-locating the SSRS instances for CM and OM in small deployments don't play well with eachother
11/6/2012 2:17 PM View Responses

Neglecting SQL server capacity planning.
11/6/2012 1:16 PM View Responses

Collation Settings, setting System Center Database settings the same as "other" production databases. tmp files, database sizes, auto grow etc,, System Center requires additional settings.
11/6/2012 1:14 PM View Responses

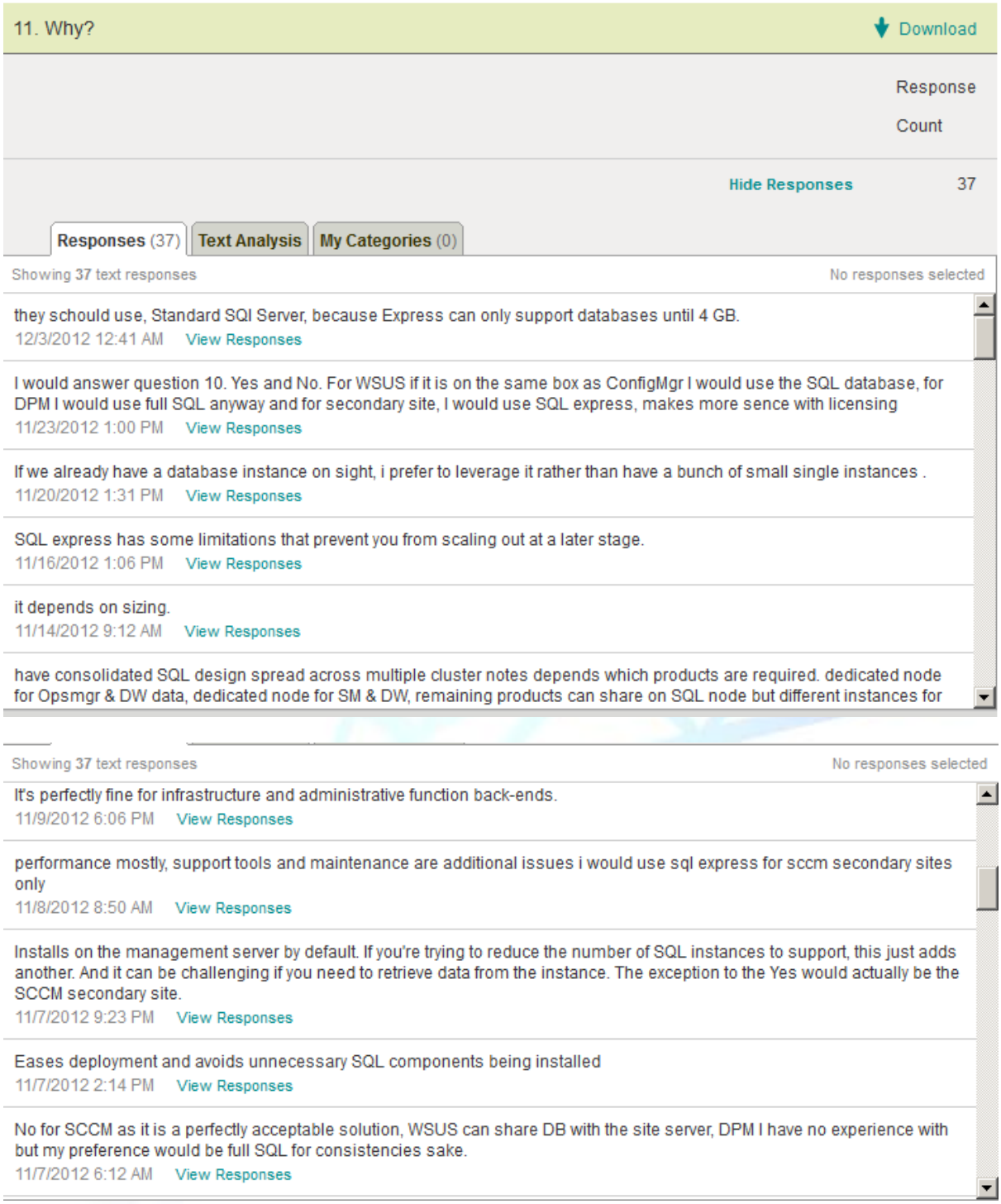
9. Do you use mixed mode authentication for SQL ? Create Chart Download

	Response Percent	Response Count
Yes	34.4%	21
No	49.2%	30
Sometimes	16.4%	10
answered question		61
skipped question		2

Whilst speaking to several SQL experts they often say, 'always enable the SA and then you have a way in that is independent to AD'. This will often be enough to fail a security audit.

10. DPM, WSUS and the SCCM Secondary Site all offer the use of SQL express, in your opinion should this be avoided ? Create Chart Download

	Response Percent	Response Count
Yes	44.6%	25
No	55.4%	31
answered question		56
skipped question		7


11. Why?
Download
Response Count
Hide Responses
37
Responses (37)
Text Analysis
My Categories (0)
Showing 37 text responses
No responses selected
they schould use, Standard SQl Server, because Express can only support databases until 4 GB.
12/3/2012 12:41 AM View Responses
I would answer question 10. Yes and No. For WSUS if it is on the same box as ConfigMgr I would use the SQL database, for DPM I would use full SQL anyway and for secondary site, I would use SQL express, makes more sence with licensing
11/23/2012 1:00 PM View Responses
If we already have a database instance on sight, i prefer to leverage it rather than have a bunch of small single instances .
11/20/2012 1:31 PM View Responses
SQL express has some limitations that prevent you from scaling out at a later stage.
11/16/2012 1:06 PM View Responses
it depends on sizing.
11/14/2012 9:12 AM View Responses
have consolidated SQL design spread across multiple cluster notes depends which products are required. dedicated node for Opsmgr & DW data, dedicated node for SM & DW, remaining products can share on SQL node but different instances for
Showing 37 text responses
No responses selected
It's perfectly fine for infrastructure and administrative function back-ends.
11/9/2012 6:06 PM View Responses
performance mostly, support tools and maintenance are additional issues i would use sql express for sccm secondary sites only
11/8/2012 8:50 AM View Responses
Installs on the management server by default. If you're trying to reduce the number of SQL instances to support, this just adds another. And it can be challenging if you need to retrieve data from the instance. The exception to the Yes would actually be the SCCM secondary site.
11/7/2012 9:23 PM View Responses
Eases deployment and avoids unnecessary SQL components being installed
11/7/2012 2:14 PM View Responses
No for SCCM as it is a perfectly acceptable solution, WSUS can share DB with the site server, DPM I have no experience with but my preference would be full SQL for consistencies sake.
11/7/2012 6:12 AM View Responses

No for SCCM as it is a perfectly acceptable solution, WSUS can share DB with the site server, DPM I have no experience with but my preference would be full SQL for consistencies sake.
11/7/2012 6:12 AM View Responses

The limitations in SQL express - 1GB RAM, 1 CPU, 10 GB databases will reflect on performance of the services. Also you cannot sale up.
11/6/2012 9:13 PM View Responses

For a smaller sites, the latest express version is adequate for use. It also has a licensing cost advantage. A full system centre deployment, with SQL can be a huge cost hit. SQL is not the cheapest of products
11/6/2012 9:01 PM View Responses

It has its place. If I'm backing up a shared SQL platform, do I want my dpm SQL database residing on the same platform I'm backing up? Independent db in this case, even if it has to be virtual, makes sense Also, SQL express scaling limits are pretty big these days,and the apps listed wouldn't suffer that badly from them, except in mega scale?
11/6/2012 8:12 PM View Responses

I would rather have everything on a properly configured SQL box. Using SQL express allows me to contain that service on one machine.
11/6/2012 6:36 PM View Responses

NOthing wrong with those. Price is right (zero), and those databases normally dont get much strain. ALso for instance DPM databases are kept on the same box in some cases, because this doesnt create a dependence on separate sql servers in case you need to restore something.
11/6/2012 5:59 PM View Responses

10GB DB now sufficient in most cases and already integrated / supported through MSFT Client Costs, especially with Virtualized SQL may otherwise make the implementations fiscally impossible. Not sure if the systemcenter licensing where SQL Standard is included applies to secondary sites: http://www.microsoft.com/licensing/about-licensing /SystemCenter2012.aspx
11/6/2012 5:42 PM View Responses

DB size limitations
11/6/2012 5:27 PM View Responses

we do not use Secondary Sites. WSUS ect is using the same SQL Instance as the Primary Sites.
11/6/2012 5:04 PM View Responses

additional SQL licences needed
11/6/2012 3:53 PM View Responses

If it is sufficient for the environment I see no objections.
11/6/2012 3:08 PM View Responses

i like the easy way of setup, and the express version is ok for these parts
11/6/2012 3:04 PM View Responses

SQL Express is not a production DB Until recently, the SQL Management tool (SQL Mgmt Studio) weren't included (different now) This really depends on the size of the environment but in large enterprise, we wouldn't encourage this. SQL Express also has size issues.
11/6/2012 2:53 PM View Responses

It is not an enterprise solution.
11/6/2012 2:20 PM View Responses

Don't want to have to deploy full sql to remote sites. Also usually install DPM to local SQL Express instance to keep all of the backup topology local. No sense in your sql server with your dpm db going down and not being able to recover.
11/6/2012 2:17 PM View Responses

Not good enough for HA or fault tolerant in any kind of way.
11/6/2012 2:12 PM View Responses

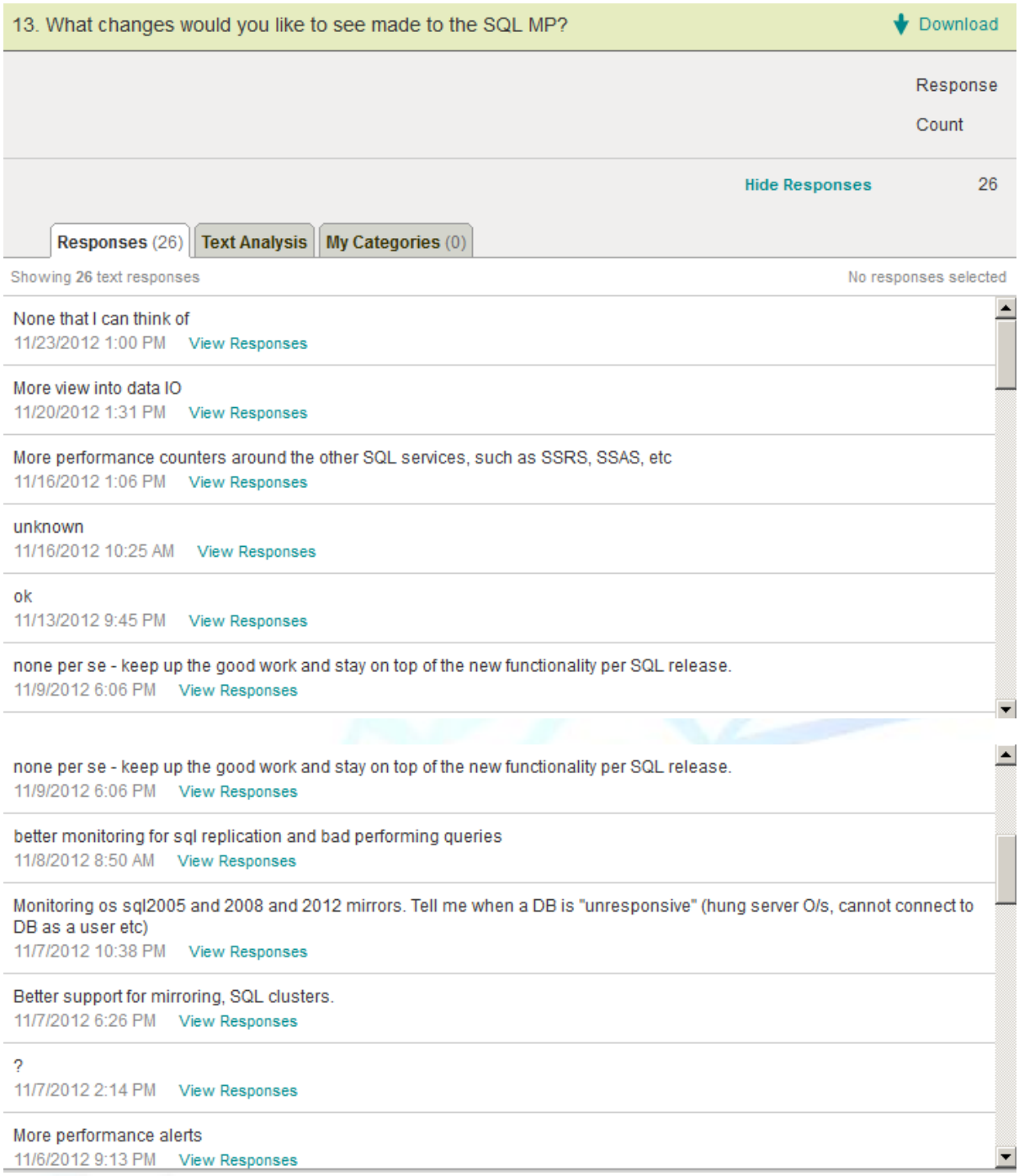
Poor management of SQL Express
11/6/2012 1:42 PM View Responses

Even at 10GB the databases grow to quickly and become unusable. Especially with WSUS.
11/6/2012 1:17 PM View Responses

If its supported, and also free. Why avoid it?

12. Do you use Operations manager to monitor SQL ? Create Chart Download

	Response Percent	Response Count
Yes	78.7%	48
No	21.3%	13
	answered question	61
	skipped question	2


13. What changes would you like to see made to the SQL MP?
Download
Response Count
Hide Responses
26
Responses (26)
Text Analysis
My Categories (0)
Showing 26 text responses
No responses selected
None that I can think of
11/23/2012 1:00 PM View Responses
More view into data IO
11/20/2012 1:31 PM View Responses
More performance counters around the other SQL services, such as SSRS, SSAS, etc
11/16/2012 1:06 PM View Responses
unknown
11/16/2012 10:25 AM View Responses
ok
11/13/2012 9:45 PM View Responses
none per se - keep up the good work and stay on top of the new functionality per SQL release.
11/9/2012 6:06 PM View Responses
none per se - keep up the good work and stay on top of the new functionality per SQL release.
11/9/2012 6:06 PM View Responses
better monitoring for sql replication and bad performing queries
11/8/2012 8:50 AM View Responses
Monitoring os sql2005 and 2008 and 2012 mirrors. Tell me when a DB is "unresponsive" (hung server O/s, cannot connect to DB as a user etc)
11/7/2012 10:38 PM View Responses
Better support for mirroring, SQL clusters.
11/7/2012 6:26 PM View Responses
?
11/7/2012 2:14 PM View Responses
More performance alerts
11/6/2012 9:13 PM View Responses

Our SQL use is not large enough to go far beyond the basic monitoring.
11/6/2012 9:01 PM View Responses

Not on ops team any more. My answer would be hopelessly outdated
11/6/2012 8:12 PM View Responses

Currently none as the most errors have been fixed.
11/6/2012 7:47 PM View Responses

1. synthetic transaction for relative SQL performance. 2. Monitoring enabled SA login.
11/6/2012 7:27 PM View Responses

Some things have been covered or are being covered.. monitoring SQL clusters is usually a bit more difficult for some counters. For instance disks. new base-os mp and new sql mp together so help somewhat already. We also come across mount points on cluster disks which makes a double difficulty on monitoring disk space and free space of db files especially if using autogrow.
11/6/2012 5:59 PM View Responses

That list is too long... - Include a distributed application template - Discover connections from application servers that we it's easy to map the servers connecting to SQL and build or automate the building of application diagrams - Make the SQL OLE DB query template easier by allowing you to browse a set of tables in the DB to build your query - Monitor table fragmentation for specific tables in a DB
11/6/2012 2:53 PM View Responses

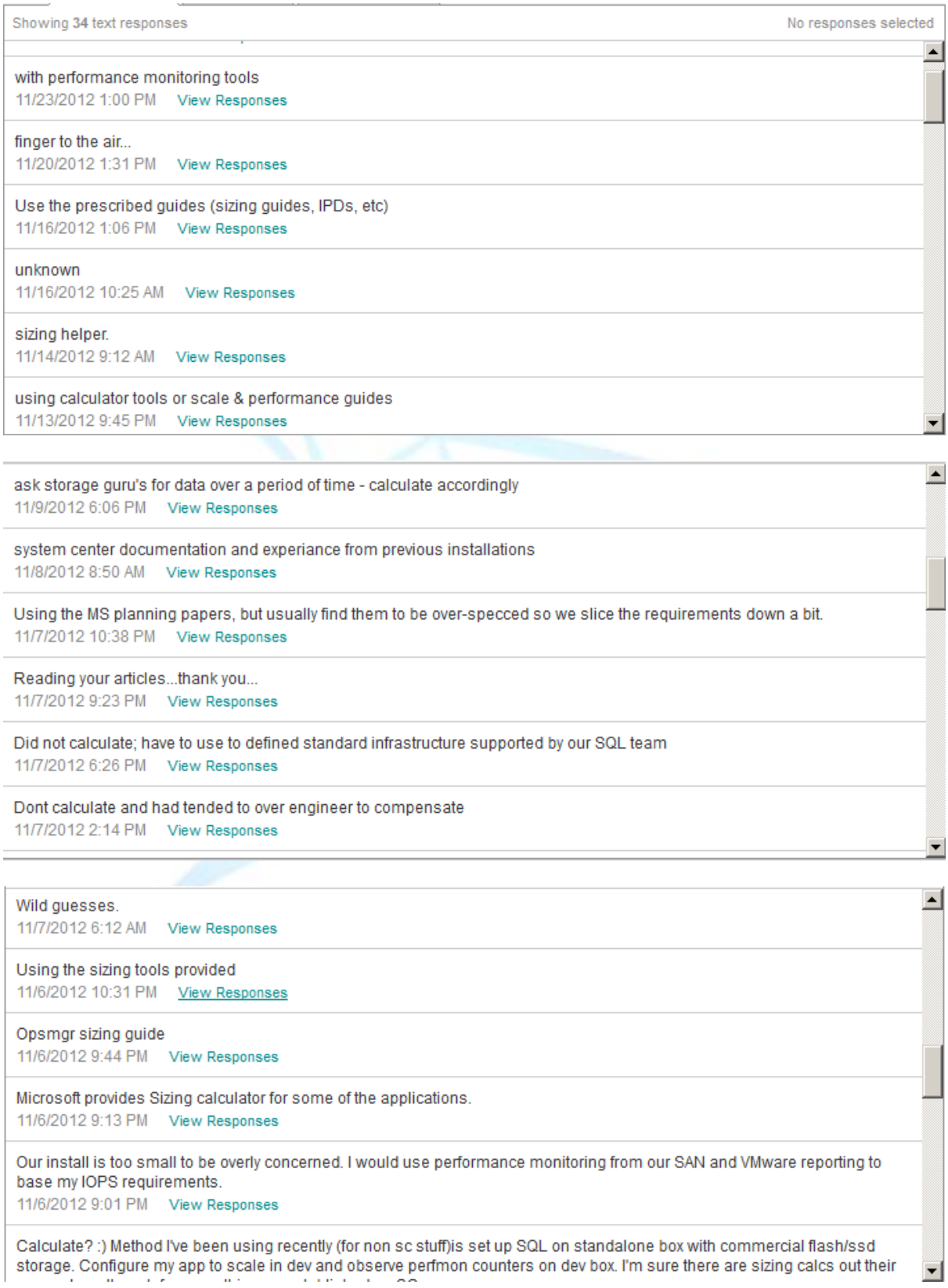
None.
11/6/2012 2:20 PM View Responses

Better default dashboarding
11/6/2012 2:17 PM View Responses

More documentation on performance collection rules, since these are very important from a SQL performance persective. Most people don't understand the reason fro why these performance counters are relevant, import and what information to extract from
11/6/2012 1:14 PM View Responses

14. What System Center DB's do you regularly see on the same instances? Create Chart Download

	Response Percent	Response Count
SCOM	65.8%	25
SCCM	57.9%	22
SCVMM	42.1%	16
SCO	44.7%	17
SCDPM	10.5%	4
answered question		38
skipped question		25



Showing 34 text responses — No responses selected

with performance monitoring tools
11/23/2012 1:00 PM View Responses

finger to the air...
11/20/2012 1:31 PM View Responses

Use the prescribed guides (sizing guides, IPDs, etc)
11/16/2012 1:06 PM View Responses

unknown
11/16/2012 10:25 AM View Responses

sizing helper.
11/14/2012 9:12 AM View Responses

using calculator tools or scale & performance guides
11/13/2012 9:45 PM View Responses

ask storage guru's for data over a period of time - calculate accordingly
11/9/2012 6:06 PM View Responses

system center documentation and experiance from previous installations
11/8/2012 8:50 AM View Responses

Using the MS planning papers, but usually find them to be over-specced so we slice the requirements down a bit.
11/7/2012 10:38 PM View Responses

Reading your articles...thank you...
11/7/2012 9:23 PM View Responses

Did not calculate; have to use to defined standard infrastructure supported by our SQL team
11/7/2012 6:26 PM View Responses

Dont calculate and had tended to over engineer to compensate
11/7/2012 2:14 PM View Responses

Wild guesses.
11/7/2012 6:12 AM View Responses

Using the sizing tools provided
11/6/2012 10:31 PM View Responses

Opsmgr sizing guide
11/6/2012 9:44 PM View Responses

Microsoft provides Sizing calculator for some of the applications.
11/6/2012 9:13 PM View Responses

Our install is too small to be overly concerned. I would use performance monitoring from our SAN and VMware reporting to base my IOPS requirements.
11/6/2012 9:01 PM View Responses

Calculate? :) Method I've been using recently (for non sc stuff)is set up SQL on standalone box with commercial flash/ssd storage. Configure my app to scale in dev and observe perfmon counters on dev box. I'm sure there are sizing calcs out their

Depends on the System Center product
11/6/2012 7:47 PM View Responses

by my experience :) There is capacity calculator for OM 2012.
11/6/2012 7:27 PM View Responses

I don't
11/6/2012 6:36 PM View Responses

I don't - I just hope for the best
11/6/2012 5:27 PM View Responses

scom sizeing tool
11/6/2012 3:53 PM View Responses

Sizer excel sheet * 2
11/6/2012 3:08 PM View Responses

Based on sizing documents from Microsoft and past history data from Operations Manager.
11/6/2012 2:20 PM View Responses

Not often
11/6/2012 2:17 PM View Responses

As with any other application. Read whatever available sizing data there is, and do your own benchmarks.
11/6/2012 1:16 PM View Responses

Not really it is very hard to give exact figures. Sizing documentation should give you some guidance here/
11/6/2012 1:14 PM View Responses

MSFT excel sheet for database size
11/6/2012 1:10 PM View Responses

For the moment, I don't - however, it would be nice to find a guide where this info is provided.

17. Do you use SCCM's desired configuration management/ Settings Management to monitor the configuration of your SQL servers ?

Create Chart Download

	Response Percent	Response Count
Yes	11.8%	6
No	88.2%	45
answered question		51
skipped question		12

18. Any other comments or input you would like to add?

Download

Response Count

Hide Responses 14

Responses (14) | Text Analysis | My Categories (0)

Showing 14 text responses — No responses selected

i'd like to see more documentation about SQL configurations for SCOM (any SC program where SQL is most likely the bottleneck). e.g. sustained disk access times needed to get a good performance instead of just expected IOPS
11/14/2012 9:12 AM View Responses

unfortunately each product describes the sql requirements only from its point of view. no official MS documentation exist for whole system center or private cloud deployment to have consolidated SQL server, Also there are a lot of different requirements and sql version requirements for each product
11/13/2012 9:45 PM View Responses

Best of luck with the white paper
11/9/2012 6:06 PM View Responses

It would be nice in SCOM if we could use a gui instead of dwdatarp.exe to adjust DB warehouse settings.
11/7/2012 10:38 PM View Responses

Microsoft should fully support its own technologies for their own products: eg for SCOM 2007 only SQL log shipping is supported for mirroring the Operations Manager Databases, where SQL mirroring and SQL clustersing could be used.
11/7/2012 6:26 PM View Responses

Showing 14 text responses — No responses selected

Again our install base is quite small, with the staff resources available. I'm sure we could do much more with the systems centre suite, such as taking advantage of orchestrator & workflows
11/6/2012 9:01 PM View Responses

Should do 17. really. Laziness prevails. SC experience mostly 2007, With a bit of 2012 Please give all commission monies to Paul Keely
11/6/2012 8:12 PM View Responses

Why did you not mention System Center Service Manager (SCSM) - this would be the instance we normally install on a SQL cluster for usage together with Orchestrator
11/6/2012 7:47 PM View Responses

real need for SQL 2012 AlwaysOn for SC 2012.
11/6/2012 7:27 PM View Responses

We have only scratched the surface of these tools. I use vmm a little bit, ops a little bit, sccm a little bit, and dpm alot. At the moment performance of SQL is not noticeable. If we are slow, we don't know it. If we were experiencing performance issues on these products or our virtual cluster in general, I would look to consolidate all the SQL instances on a single box configured

moment performance of SQL is not noticeable. If we are slow, we don't know it. If we were experiencing performance issues on these products or our virtual cluster in general, I would look to consolidate all the SQL instances on a single box configured properly. 11/6/2012 6:36 PM View Responses
no 11/6/2012 3:04 PM View Responses
Missing Service Manager in here! If there is one product which put a really high pressure on SQL it is SCSM! Especially concerning cubes 11/6/2012 1:14 PM View Responses
It would be nice to have a guidance regarding not only the combination of different SC products on the same SQL instance but also combinations of SC products on the same hardware/vm. 11/6/2012 12:28 AM View Responses
Not at this moment. 11/6/2012 11:14 AM View Responses

Wrap up

If I have made errors in this document I would appreciate your findings, and when System Center 2012 SP1 comes out the guide will be updated for SQL 2012 and some of the new features.

Paul Keely MVP
paul@paulkeely.com