HP OpenView Smart Plug-in for Microsoft® SQL Server

For HP OpenView Operations for UNIX

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Reference Guide

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1 Microsoft SQL Server 6.5 Metrics

This chapter provides detailed and summary listings of the DB-SPI metrics for SQL Server, version 6.5, and explains pertinent information about how they work. The information provided here should prove valuable in understanding each metric, especially if customization is desired. This chapter contains the following information:

- SQL Server, Version 6.5, Metric Summary
- SQL Server, Version 6.5, Metric Specifications

MS SQL Server 6.5 Metrics

DB-SPI metric monitor templates are designed to be efficient and easy to use. In fact, you may want to use most of the templates without making any modifications whatsoever. This document provides the detailed information you need if you decide to customize any of the templates.

For easy reference, Table 1-1 lists all metrics contained in the chapter. The tables that follow show the detailed information for each SQL Server metric.

MS SQL Server 6.5 Metric Summary

MS SQL Server 6.5 Metric	Description	Area	Type	Interval	Min/Max	Threshold	Reset	Severity	A or G	Rpt Access	Graph
M001_CacheHitPct	% of times a data page was found in the cache.	LRU Stats	S	1 hr	Min	70%	80%	Warning	A & G	Auto, Opt & App	LRUStats
M002_CacheFreeBufPct	% of free buffers in the procedure cache.	LRU Stats	S	1 hr	Min	70%	80%	Warning	A & G	Auto, Opt & App	LRUStats
M003_LogLogicalIOAvg	Logical pages written per physical write for transaction log	IOStats	S	1 hr	Max	3000	W/O	Warning	A & G	Auto, Opt & App	IOStats
M004_BatchWritesRate	# of multiple pages written to disk in a batch per minute.	IOStats	S	5 m	Max	3000/ min	W/O	Warning	A & G	Auto, Opt & App	IOStats
M005_PageReadsRate	# of 2K pages read from disk (physical reads) per minute.	IOStats	S	5 m	Max	3000/ min	W/O	Warning	A & G	Auto, Opt & App	IOStats

MS SQL Server 6.5 Metric	Description	Area	Type	Interval	Min/Max	Threshold	Reset	Severity	A or G	Rpt Access	Graph
M006_SnglPgeWrtsRate	# of 2K pages written individually to disk per minute.	IOStats	S	1 hr	Max	3000/ min	W/O	Warning	A & G	Auto, Opt & App	IOStats
M007_ReadsOutstdRate	# of read requests issued to the operating system that have not been completed.	IOStats	S	1 hr	Max	2/ min	W/O	Warning	A & G	Auto, Opt & App	IOStats
M008_WritsOutstdRate	# of write requests issued to the operating system that have not completed.	IOStats	S	1 hr	Max	1/ min	W/O	Warning	A & G	Auto, Opt & App	IOStats
M009_TransactionRate	Server transactions rate	Server	S	1 hr	Max	100/ sec	Cont	Minor	A & G	Auto, Opt & App	Trans
M010_RAMgrEffctvPct	Read Ahead Manager Effectiveness.	RAStats	S	1 hr	Max	100 %	95%	Warning	A & G	Auto, Opt & App	RAStats
M011_UserConnectPct	% of current users connected	Process	S	5 m	Max	90% 98%	W/O	Major Critical	A & G	Auto, Opt & App	Users

MS SQL Server 6.5 Metric	Description	Area	Type	Interval	Min/Max	Threshold	Reset	Severity	A or G	Rpt Access	Graph
M012_RASlotsUsedPct	% of Read Ahead slots used	RASt ats	S	1 hr	Max	95%	90%	Warning	A & G	Auto, Opt & App	RAStat s
M013_LocksInUsePct	% locks in use	Serve r	S	5 m	Max	80%	70%	Major	A & G	Auto, Opt & App	Locks
M014_BlckdProcessCnt	# of blocked processes	Serve r	S	5 m	Max	3 for 1 min	W/O	Warning	A & G	Auto, Opt & App	Server
M215_VirtDevSpUsdPct	% of space used on a specific virtual device	Spac e	S	1 hr	Max	90% 95% 99%	W/O	Minor Major Critical	A	Auto & App	
M216_TransLogUsedPct	% of transaction log space used for each database	Spac e	D	15 m	Max	80% 90% 99%	W/O	Minor Major Critical	A	Auto & App	
M017_CmdQueueLenPct	% of command queue length used	Serve r	S	1 hr	Max	10%	W/O	Warning	A & G	Auto, Opt & App	Server
M218_DBSpaceUsedPct	% database space used	Spac e	D	1 hr	Max	95%	W/O	Critical	A	Auto & App	
M019_ProcCacheUsdPct	% procedure cache used	Cach e	S	1 hr	Max	95%	W/O	Warning	A & G	Auto, Opt & App	Cache

MS SQL Server 6.5 Metric	Description	Area	Type	Interval	Min/Max	Threshold	Reset	Severity	A or G	Rpt Access	Graph
M020_ProcCacheActPct	% of procedure Cache active	Cache	S	1 hr	Max	70%	W/O	Warning	A & G	Auto, Opt & App	Cache
M021_SinglPgeWritPct	% single page writes	IOStats	S	1 hr	Max	50%	W/O	Warning	A & G	Auto, Opt & App	IOStats
M022_BufChainAvgLen	Buffer chain average length.	Cache	S	1 hr	Max	4	W/O	Warning	A & G	Auto, Opt & App	Cache
M023_ReadWriteErrCnt	# of SQL Server read/ write errors since the last probing.	Error	S	1 hr	Max	0.5	W/O	Warning	A & G	Auto, Opt & App	Error
M024_PacketErrorCnt	# of packet errors while reading or writing packets.	Error	S	1 hr	Max	0.5	W/O	Warning	A & G	Auto, Opt & App	Error
M025_CPUUsedPct	% CPU time used by SQL Server	Server	S	5 m	Max	95% for 15 Min	W/O	Warning	A & G	Auto, Opt & App	Server
M026_ActiveConntnPct	% of total connections that are active vs sleeping	Server	S	1 hr	Min	20%	W/O	Warning	A & G	Auto, Opt & App	Users

MS SQL Server 6.5 Metric	Description	Area	Type	Interval	Min/Max	Threshold	Reset	Severity	A or G	Rpt Access	Graph
M227_PhysIOByUsrPct	% of physical I/O used by process ID	Server	S	5 m	Max	95% for 10 min	W/O	Warning	A	Auto & App	
M028_SuspectDBCnt	# of databases marked as suspect.	Error	S	1 hr	Max	0.5	W/O	Critical	A & G	Auto, Opt & App	Error
M029_OpenDBPct	% of databases open	Server	S	5min	Max	90%	W/O	Warning	A & G	Auto, Opt & App	Server
M030_ServerConnect	Ability connect to a server.	Server	S	5 min	Max	0.5	W/O	Critical	A	N/A	
M230_DBConnect	Ability to connect to a database.	Data base	D	15 min	Max	0.5	Cont	Warning	A	Auto & App	
M031_NumUsersCnt	Number of users	Server	S						G		Users
M032_RunableContnPct	% of total connections that are runnable	Server	S	1 hr	Max	50%	W/O	Warning	A	Auto & Opt	

MS SQL Server 6.5 Metric Details

Metric Number	The identification number assigned to the metric. All SQL Server metrics are in the range 3000 to 3999. 3001 to 3099 : Standard Metrics 3201 to 3299 : Drill Down Metrics 3700 to 3799 : UDM Metrics
Name	The name assigned to the metric. All SQL Server metrics start with MXXX, where XXX are the last 3 digits of the metric number.
Severity	The severity of the metric (Critical, Major, Minor, Warning, Normal)
Description	What the metric means.
Alarming and/or Graphing metric	Is the metric an alarming metric (A) or a graphing metric (G) or both (A & G)? (A, G, or A & G)
Collection Interval	How often the metric is collected and analyzed. (5 min, 15 min, 1 hour, 1 time daily)
Min/Max Threshold	Designates the threshold as: Minimum or Maximum, minimum thesholds are violated when the value falls below the setting; maximum thesholds are violated when the value rises above the setting.
Threshold	The default **OVO threshold** (if any). (*=*Threshold* value is really 0, but OVO alarms occur at <= or >= values. Since a 0 value would trigger an alarm, the threshold is set to 0.5)
Reset (value)	Does the threshold generate a message/alarm once (without reset), again when another value is detected (with reset) or when the original, exceeded threshold value continues at every collection interval (continuous)? (Without reset, With reset, Continuous)
Message Text	The messages (if any) that may be displayed for each condition.

Instruction Text	Problem-solving information. (Probable causes, Potential impact, Suggested actions, and Reports)
Report Type	If a report is available, how it is generated. (Operator, Automatic, Application Bank, N/A) Note: All the reports that are automatic actions or operator actions are also in the Application Bank in OVO. However, metrics that are Graphing only metrics (no alarms, just graphs) do not have an OVO template for Operator or Auto actions, so they are ONLY in the Application Bank. N/A means that no report is planned.
Area	The logical area (if any) that the metric belongs. (Database Status, Space Management, Performance, Errors, Archive/ Trace, Rollback Segments, PQO (Parallel Query Option), MTS (Multi-threaded Server), MISC)

Metric M001_CacheHitPct

Metric Number	3001
Name	CacheHitPct
Severity	Warning
Description	Percentage of times a data page was found in the cache.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Minimum
Threshold	70%
Reset (value)	Reset at 80%
Message Text	DBSPI-3001.1: Cache hit percentage *Value* too low <=*Threshold_Value*.

Metric Number	3001
Instruction Text	**Probable Cause(s):** Percentage of read requests that read information from memory rather than disk. Microsoft SQL Server 7.0: A low value for the Cache Hit Ratio is an indication of high physical reads. * Increasing the cache can have a positive effect. However over allocation of the cache may lead to excessive paging by the operating system. * Data cache may be too small or configured inefficiently; inefficient SQL or SQL not supported by indexes is causing too much data to be looked at. * If SQL Server has just been restarted and data cache is being loaded, this value will be low, which is normal. MS SQL Server 6.5: Less data pages are found in data cache and therefor more pages get fetched from disk. **Potential Impact:** **Suggested Action(s):** MS SQL Server 7.0: This may mean you are starting to measure I/O when the server is starting to load cache, or it may mean that cache is not of sufficient size to contain frequently used data pages. Investigate running SQL and correct if bad SQL. If inaccurate index statistics, etc. are causing excess table scans, then remedying bad SQL will improve the cache hit ratio as well as overall server performance. The server data cache size can be automatically set by SQL 7.0 (which is the default behavior) in which case adding RAM could be the only remedy. However, this may not be the case when SQL Server is sharing its hardware with other memory-intensive NT processes, such as other server processes, not an uncommon occurrence, or if the amount of memory configured for SQL Server to use (maximum server memory) has been set (as per the recommendations for Microsoft Full-Text Search, for example). The automatic action report for this metric will show 'Least Recently Used' statistics and which users are connected to SQL Server.The operator action for the metric generates a LRUStats graph. MS SQL Server 6.5: Most cache hit ratio studies indicate a fairly flat curve beyond several megabytes. For this reason, whether 14 MB, 16 MB, or 18 MB is given to SQL Server on a 32 MB computer will rarely make a significant difference in SQL performance. Conversely, attempting to crowd Windows NT by giving excessive memory to SQL Server can result in poor performance because of excessive paging. The implication is that you should add physical memory to the machine insignificant amounts before allocating this to SQL Server. Whether adding memory will be beneficial should be studied beforehand. Check the SQL Server cache hit ratio while the system is under a typical load. If the hit ratio is relatively high (over 90%), adding more memory will usually not be beneficial. This is because additional memory can mainly be used for additional SQL Server data cache, thereby increasing the hit ratio.

Metric Number	3001
Instruction Text (contd.)	In this case, the hit ratio is already high and the maximum available improvement quite small. If the hit ratio is consistently lower than this, adding more memory may improve the hit ratio (and thereby performance) if the locality of reference is such that it can be bracketed by economically or technically feasible amounts of memory. Another way to improve this statistic is to lower the value of the 'procedure cache' parameter thus allocating more space to the data cache at the expense of procedure cache. The automatic action report for this metric will show SQLServer:Cache Manager - Control Value for Procedure Plans, Prepared SQL Plans, Adhoc SQL Plans, Replication Procedure Plans, Misc. Normalized Trees, 'Least Recently Used' statistics and which users are connected to SQL Server. The operator action for the metric generates a LRUStats graph.
Report Type	Automatic, operator initiated, and application bank
Area	Less Recently Used Stats (LRUStats)

Metric M002_CacheFreeBufPct

Metric Number	3002
Name	CacheFreeBufPct
Severity	Warning
Description	Percentage of free buffers in the procedure cache.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Minimum
Threshold	70%
Reset (value)	With reset: 80%
Message Text	DBSPI-3002.1: Cache Free buffer percentage *Value*% too low =*Threshold*.
Instruction Text	**Probable Cause(s):** Number of free buffers in the procedure cache. NOTE - This value can be greater than 100% (which is OK). Number of free buffers falling below 70% of the 'Free Buffers' configuration parameter indicates a performance problem. **Potential Impact:** **Suggested Action(s):** The following actions can be executed to remedy the situation: * Increase 'max async I/O' and 'max lazywrite I/O' configuration parameters (default value is 8). This will only work in systems with intelligent disk subsystems. * Increase 'free buffers' configuration parameter (default value is 3% of total number of buffers). This will cause the LazyWriter to write pages to disk more frequently, thus stressing I/O system. * Add RAM to the server and adjust 'memory' configuration parameter. The automatic action report for this metric will show total number of free buffers, 'Least Recently Used' statistics and will show which users are connected to SQL Server.The operator action for the metric generates a LRUStats graph.
Report Type	Automatic, operator initiated, and application bank
Area	Less Recently Used Stats (LRUStats)

Metric M003_LogLogicalIOAvg

Metric Number	3003
Name	LogLogicalIOAvg

Metric Number	3003
Severity	Warning
Description	Logical pages written per physical write for transaction log .
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum
Threshold	3000
Reset (value)	Without reset
Message Text	DBSPI-3003.1: Transaction log logical I/O average *Value* too high >=*Threshold*.
Instruction Text	**Probable Cause(s):** **Potential Impact:** **Suggested Action(s):** The automatic action report for this metric will show 'Input/Output' statistics and which users are connected to SQL Server. The operator action for the metric generates an IOStats graph.
Report Type	Automatic, operator initiated, and application bank.
Area	I/O Stats

M004_BatchWritesRate

Metric Number	3004
Name	BatchWritesRate
Severity	Warning
Description	# of multiple pages written to disk in a batch per minute.
Alarming and/or Graphing metric	A & G
Collection Interval	5 min
Threshold	Maximum
Threshold	3000/min
Reset (value)	Without reset
Message Text	DBSPI-3004.1: Batch writes rate *Value*/min) too high >=*Threshold* min.
Instruction Text	**Probable Cause(s):** Number of multiple pages written to disk in a batch per minute is too high. Heavy transaction volume. **Potential Impact:** **Suggested Action**(s): Reevaluate the configuration option for recovery interval. Increasing the checkpoint interval will decrease checkpointing, which will reduce physical I/O. According to Microsoft, the majority of batch writes should be initiated by the Checkpoint command. Also according to Microsoft: 'If you have a disk subsystem which supports asynchronous I/O (one that supports disk arrays and or includes a smart SCSI controller), you may consider increasing the max async io option (default 8) in order to obtain higher throughput. In order to determine if higher throughput is gained, monitor SQLServer: I/O - Batch Writes/sec before the change to max async io and after the change. You should also notice an increase in the value of SQLServer: I/O Transactions/sec. This assumes the current physical disks are not experiencing I/O congestion. In addition, increasing the max async io value to high may result in excessive overhead.'The automatic action report for this metric will show 'Input/Output' statistics and which users are connected to SQL Server.The operator action for the metric generates an IOStats graph.
Report Type	Automatic, operator initiated, and application bank.
Area	I/OStats

Metric M005_PageReadsRate

Metric Number	3005
Name	PageReadsRate

Metric Number	3005
Severity	Warning
Description	Number of 2K pages read from disk (physical reads) per minute.
Alarming and/or Graphing metric	A & G
Collection Interval	5 min
Threshold	Maximum
Threshold	3000/min
Reset (value)	Without reset
Message Text	DBSPI-3005.1: Pages read rate *Value*/min too high >=*Threshold*/min.
Instruction Text	**Probable Cause(s):** A high rate of of physical disk reads.Heavy select activity that can't be satisfied by the data cache, e.g.: database dump. **Potential Impact:** **Suggested Action(s):** For maintenance jobs, such as DUMP DATABSE, UPDATE STATISTICS, REBUILD INDEXES nothing can be done. If this metric goes up because of application queries - optimize queries/indexes. The automatic action report for this metric will see if a maintainance job is running, will show 'Input/Output' statistics and which users are connected to SQL Server. The operator action for the metric generates an IOStats graph.
Report Type	Automatic, operator initiated, and application bank.
Area	I/OStats

Metric M006_SnglPgeWrtsRate

Metric Number	3006
Name	SnglPgeWrtsRate
Severity	Warning
Description	Number of 2K pages written individually to disk per minute.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum
Threshold	3000/min
Reset (value)	Without reset
Message Text	DBSPI-3006.1: Single page write rate *Value*/min too high >=*Threshold*/min.
Instruction Text	**Probable Cause(s):** **Potential Impact:** **Suggested Action(s):** According to Microsoft: Keep an eye on 'SQL Server:I/O Single Page Writes/sec. Non-zero values for this counter tends to indicate that page splitting is occurring and that further analysis should be done with DBCC SHOWCONTIG. The DBCC SHOWCONTIG is a very helpful command that can be used to reveal whether excessive page splitting has occurred on a table. Scan Density is the key indicator that DBCC SHOWCONTIG provides. It is good for this value to be as close to 100% as possible. If this value is well below 100%, then rebuild the clustered index on that table with DBCC DBREINDEX to defragment the table. The automatic action report for this metric will show 'Input/Output' statistics and which users are connected to SQL Server. The operator action for the metric generates an IOStats graph.
Report Type	Automatic, operator initiated, and application bank.
Area	I/O Stats

Metric M007_ReadsOutstdRate

Metric Number	3007
Name	ReadsOutstdRate
Severity	Warning
Description	Number of read requests issued to the operating system that have not been completed.

Metric Number	3007
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum
Threshold	2/min
Reset (value)	Without reset
Message Text	DBSPI-3007.1: Reads outstanding rate *Value*/min too high (>=*Threshold*/min).

Metric Number	3007
Instruction Text	**Probable Cause(s):** Number of SQL Server 'read' requests to the Windows NT I/O subsystem that have not completed. MS SQL Server 7.0: Lots of physical I/O MS SQL Server 6.5: Lots of physical io **Potential Impact:** **Suggested Action(s):** MS SQL Server 7.0: This will help identify I/O as a bottleneck. As I/O increases, disk speed will limit performance. If this is a problem, it may be necessary to replace disks with faster ones. It may be thought that adding RAM (presumably to increase the cache hit ratio) would be more efficient than upgrading to a faster disk I/O subsystem. This can be true, but also depends on the types of queries being issued and on how much RAM is already present in the system. If the system handles mostly DSS-type queries, which need to scan large amounts of data that are typically not held in cache, then the disk subsystem's throughput speed becomes a major factor in the overall performance of the server; increasing SQL Server's cache size typically does not benefit performance that much in these situations. Also, beyond a certain point (that is, beyond a certain total amount of RAM in the system), adding more RAM does not provide as much of a benefit, because the time required to search that much cache RAM begins to approach the time required to simply read the data from disk. The break-even point, of course, depends on the relative speed of the CPU(s) in the system versus disk I/O time, but can occur at 1GB or less of total cache memory, and thus is something to be considered. To put it in simple terms, upgrading from 512MB RAM to 1GB may have much more positive effect on performance than upgrading from 2GB to 2.5GB, so if your server is already at 2GB of RAM, you may need to look at other options. Finally, another possible cause/solution to investigate here is SQL 7's background maintenance operations, which can cause extra I/O to occur; these include shrinking of databases and device files, and automatic execution of UPDATE STATISTICS on tables. These may be disabled if it is determined that they are causing performance hits on a production system. The automatic action report for this metric will show ‘Input/Output’ statistics and which users are connected to SQL Server. The operator action for the metric generates an IOStats graph. MS SQL Server 6.5: If consistently above 0, this metric indicates that SELECT activity on this server is too heavy for the existing hardware configuration. While an increase in cache may alter the performance, the best possible remedies are to add more RAM or install a faster, more effective I/O system. The automatic action report for this metric will show 'Input/Output' statistics and which users are connected to SQL Server. The operator action for the metric generates an IOStats graph.
Report Type	Automatic, operator initiated, and application bank.
Area	I/O Stats

Metric M008_WritsOutstdRate

Metric Number	3008
Name	WritsOutstdRate
Severity	Warning
Description	Number of write requests issued to the operating system that have not completed.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum
Threshold	1/min
Reset (value)	Without reset
Message Text	DBSPI-3008.1: Writes outstanding rate *Value*/min too high >=*Threshold*/min.
Instruction Text	**Probable Cause(s):** Number of SQL Server 'write' requests to the Windows NT I/O subsystem that have not completed. MS SQL Server 7.0: A large number of outstanding writes indicates that the I/O subsystem may be a bottle neck. MS SQL Server 6.5: A large number of outstanding writes indicates that the I/O subsystem may be a bottle neck. **Potential Impact:** **Suggested Action(s):** * Add more RAM * Install a faster IO system, * Review the application's transaction management. The automatic action report for this metric will show 'Input/Output' statistics and which users are connected to SQL Server. The operator action for the metric generates an IOStats graph. MS SQL Server 6.5: This metric usually indicates that the I/O subsystem is a bottleneck. An increase in RAM on the system and configured cache may improve the performance. A more expensive solution would be to replace the I/O subsystem with a faster one (i.e. SCSI and faster disks). The automatic action report for this metric will show 'Input/Output' statistics and which users are connected to SQL Server. The operator action for the metric generates an IOStats graph.
Report Type	Automatic, operator initiated, and application bank.
Area	I/O Stats

Metric M009_TransactionRate

Metric Number	3009
Name	TransactionRate
Severity	Minor
Description	Server transactions rate
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum
Threshold	100/sec
Reset (value)	Reset: continuous
Message Text	DBSPI-3009.1: Transaction rate *Value*/sec too high >=*Threshold*/sec.
Instruction Text	**Probable Cause(s):** Rate of transactions for the entire server. This number increases with server modification statements. **Potential Impact:** **Suggested Action(s):** As this increases, you need to determine whether you are CPU or IO bound. If you are CPU bound, add more processors. If you are IO bound, it's time to revisit the I/O subsystem or add RAM. If this corresponds with a newrelease, consider optimizing queries. You can consider replication (allocate data between two or more servers.) Also check to see if the procedure cache is stressed. The automatic action report for this metric shows I/O statistics and which users are connected to SQL Server. The operator action for the metric generates a Trans graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Server

Metric M010_RAMgrEffctvPct

Metric Number	3010
Name	RAMgrEffctvPct
Severity	Warning

Metric Number	3010
Description	Read Ahead Manager Effectiveness. 'Read Ahead Manager Effectiveness' is designed to monitor level of effectiveness of the Read-Ahead Manager. Read-ahead Manager facilitates 'parallel data scan' capabilities, which enable asynchronous read-ahead of data when SQL Server determines that pages are being retrieved in sequential order. With read-ahead (RA), separate background threads will be used to prefetch pages for a given results set. Read-ahead is used by queries, DBCC CHECKTABLE, DBCC CHECKDB, DBCC CHECKALLOC, UPDATE STATISTICS, CREATE INDEX, exporting with BCP, and the retrieval of text and image data. Read-ahead prefetches are configured based on extents.
Alarming and/ or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum
Threshold	100%
Reset (value)	Reset: 95%
Message Text	DBSPI-3010.1: Read ahead manager effectiveness *Value* too high >=*Threshold*.

Metric Number	3010
Instruction Text	**Probable Cause(s):** 'Read Ahead Manager Effectiveness' is designed to monitor level of effectiveness of the Read-Ahead Manager. Read-ahead Manager facilitates 'parallel data scan' capabilities, which enable asynchronous read-ahead of data when SQL Server determines that pages are being retrieved in sequential order. With read-ahead (RA), separate background threads will be used to prefetch pages for a given results set. Read-ahead is used by queries, DBCC CHECKTABLE, DBCC CHECKDB, DBCC CHECKALLOC, UPDATE STATISTICS, CREATE INDEX, exporting with BCP, and the retrieval of text and image data. Read-ahead prefetches are configured based on extents. The Read-Ahead (RA) Manager prefetches pages into the cache. If Pages fetched is high and Pages found is low, Read Ahead is effective. The less effective read ahead is the closer the counters become. If pages fetched falls below pages found already in the cache, the read ahead is not effective and is not helping scan times. **Potential Impact:** **Suggested Action(s):** This counter can be used to determine read-ahead effectiveness. If 'Read Ahead Manager Effectiveness' is low (ideally < 20%), then read-ahead is effective. The less effective read-ahead is, the higher is the metric. If thevalue of 'Read Ahead Manager Effectiveness' is 100%, then read-ahead is simply overhead and is not helping scan times. In this case the read-ahead sp_configure options have to be examined and tuned. The most important parameters are RA cache hit limit and RA cache miss limit. The automatic action report for this metric will show 'Read Ahead' statistics and which users are connected to SQL Server. The operator action for the metric generates a RAStats graph.
Report Type	Automatic, operator initiated, and application bank.
Area	RAStats

Metric M011_UserConnectPct

Metric Number	3011
Name	UserConnectPct
Severity	Major Critical
Description	Percentage of current users connected. The number of current user connections to the total number of user connections configured for SQL Server.
Alarming and/or Graphing metric	A & G
Collection Interval	5 min
Threshold	Maximum
Threshold	90% 98 %
Reset (value)	Without reset
Message Text	DBSPI-3011.1: Percentage of current users connected *Value* too high >=*Threshold*.

Metric Number	3011
Instruction Text	**Probable Cause(s):** The number of current user connections to the total number of user connections configured for SQL Server. MS SQL Server 7.0: The number of users currently connected to SQL Server is close to the maximum number of connections MS SQL Server 6.5: The number of users currently connected to SQL Server is close to the maximum number of connections. **Potential Impact:** **Suggested Action(s):** MS SQL Server 7.0: If the 'user connections' parameter is configured manually, then increase the configuration parameter and buy additional licenses if necessary. In most cases, the number of user connections will be automatically increased by MS SQL Server 7.0. In this case, if the value is consistently high, try to re-configure front end applications (e.g.: MS Access, Cold Fusion, etc.) to close idle connections. Also, over time, understand what the load is on your system, an application may be leaving connections open. T he meaning and usefulness of this metric has changed somewhat from SQL 6.5 to 7.0. It may be thought that in 7.0, you would not need to alarm on this metric if the current number of user connections grows close to the maximum, because SQL Server will increase the maximum as necessary since SQL 7.0 automatically reconfigures user connections as needed. This is somewhat true, but is a case of the 'ideal situation' versus the real world situation. Ideally, a DBA could let SQL Server allocate connections as needed so as to best utilize available resources. However, in a production system, a DBA would not want the number of connections to grow indefinitely-each connection ties up a certain amount of resources (memory, and a slight amount of CPU and network bandwidth) on the server. If a buggy application is not closing connections (not an uncommon thing to occur) then the DBA would certainly want to be made aware of this. So, a DBA should set a 'max'-type threshold for this metric based on a number of user connections that is normally not exceeded, so any 'connection leaks' in applications can be found before they begin to affect server performance. This metric determines open connections, not ones that are working (processing queries, DML, etc.). See metric 3026 for percentage of connections that are active. The automatic action report for this metric will show the maximum number of user connections allowed and which users are connected to SQL Server. The operator action for the metric generates a Users graph. MS SQL Server 6.5: Increase the 'user connections' configuration parameter. Buy additional licenses if necessary. The automatic action report for this metric will show the maximum number of user connections allowed and which users are connected to SQL Server.The operator action for the metric generates a Users graph.
Report Type	Automatic, operator initiated, and application bank.

Metric Number	3011
Area	Process

Metric M012_RASlotsUsedPct

Metric Number	3012
Name	RASlotsUsedPct
Severity	Warning
Description	% of Read Ahead slots used
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum
Threshold	95%
Reset (value)	Reset at 90%
Message Text	DBSPI-3012.1: Percentage of Read Ahead slots used *Value* too high >=*Threshold*.
Instruction Text	**Probable Cause(s):** 'Read Ahead slots used' is designed to monitor availability of RA slots (queue elements in RA threads) 'Read Ahead slots used' rising above 95% indicates a performance problem - not enough RA slots configured **Potential Impact:** **Suggested Action(s):** Bump the 'RA slots per thread' configuration option by 1 and see if this warning occurs again. Note this is an advanced configuration optionand so the server must configured to allow access to this option (sp_configure 'show advanced option',1). The default threshold is set to 4 this is 1 below the Microsoft default setting of 5. Percentage can be calculated by dividing the metric by the value stored in the sp_configure option. This can be retrieved via the following query: Select value from sysconfigures where config = 1509 and comment = 'RA slots per thread' The automatic action report for this metric will show 'Read Ahead' statistics, configured read ahead slots per thread and read ahead worker threads and which users are connected to SQL Server. The operator action for the metric generates a RAStats graph.
Report Type	Automatic, operator initiated, and application bank.
Area	RAStats

Metric M013_LocksInUsePct

Metric Number	3013
Name	LocksInUsePct
Severity	Major

Metric Number	3013
Description	Percentage of locks in use. Percentage total locks currently held to the total number of locks configured for SQL Server.
Alarming and/or Graphing metric	A & G
Collection Interval	5 min
Threshold	Maximum
Threshold	80%
Reset (value)	Reset at 70%
Message Text	DBSPI-3013.1: PercentagePercentage locks in use *Value* too high >=*Threshold*.
Instruction Text	**Probable Cause(s):** Percentage total locks currently held to the total number of locks configured for SQL Server. MS SQL Server 7.0: Transactions modifying large amounts of data, possibly using many SQL commands. MS SQL Server 6.5: SQL Server will not execute queries if the number of required locks exceeds the number of locks configured. Transactions modifying large amounts of data, possibly using many SQL commands. **Potential Impact:** **Suggested Action(s):** MS SQL Server 7.0: The number of locks configured is fixed at server start-up. When the number of locks is met, other processes requesting locks abort, and new users can not connect. You should evaluate why this is occurring, then increase number of available locks (sp_configure 'locks') and reboot server for change to take effect. Note: this uses memory. The automatic action report for this metric will show all outstanding locks and which users are connected to SQL Server. The operator action for the metric generates a Locks graph. MS SQL Server 6.5: The number of locks configured is fixed at server start-up. When the number of locks is met, other processes requesting locks abort, and new users cannot connect. You should evaluate why this is occurring, then increase number of available locks (sp_configure 'locks') and reboot server for change to take effect. Note: this uses memory. This parameter should not be too high, however, because every lock configured occupies 32 bytes of RAM. The automatic action report for this metric will show all outstanding locks and which users are connected to SQL Server. The operator action for the metric generates a Locks graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Server

Metric M014_BlckdProcessCnt

Metric Number	3014
Name	BlckdProcessCnt
Severity	Warning
Description	Number of blocked processes.
Alarming and/or Graphing metric	A & G
Collection Interval	5 min
Threshold	Maximum
Threshold	3 for 1 minute
Reset (value)	Without reset
Message Text	DBSPI-3014.1: # of blocked processes *Value* too high >=*Threshold*.

Metric Number	3014
Instruction Text	**Probable Cause(s):** Number of blocked processes in the server greater than the threshold for more than one collection interval (usually 5 minutes). MS SQL Server 7.0: Readers and writers wanting same data/index page, or page locks have escalated to table lock. Potential impact is performance since blocked processes will wait until block is cleared. MS SQL Server 6.5: Blocked processes will wait until block is cleared. Readers and writers wanting same data/index page, or page locks have escalated to table lock. SQL Server will not execute queries if a number of required locks exceeds the number of locks configured. **Potential Impact:** **Suggested Action(s):** MS SQL Server 7.0: Blocked processes are an indication of contention, which occurs frequently in OLTP and mixed use systems. Action depends on the situation. You may need to restructure indexes; or reschedule load processes when readers are not running, or change page lock promotion thresholds. It is also an indication of a poorly designed application process. The automatic action report for this metric will show processes that are the source of interlocking and which users are connected to SQL Server. The operator action for the metric generates a Server graph. MS SQL Server 6.5: Blocked processes are an indication of contention, which occurs frequently in OLTP and mixed use systems. Action depends on the situation. You may need to restructure indexes; or reschedule load processes when readers are not running, change page lock promotion thresholds or increase value of locks configuration parameter (sp_configure 'locks') . This parameter should not be too high, however, because every lock configured occupies 32 bytes of RAM. The automatic action report for this metric will show processes that are the source of interlocking and which users are connected to SQL Server. The operator action for the metric generates a Server graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Server

Metric M215_VirtDevSpUsdPct

Metric Number	3215
Name	VirtDevSpUsdPct
Severity	Minor Major Critical
Description	Percentage of space used on a specific virtual device. Allocated storage is approaching total storage.
Alarming and/or Graphing metric	A
Collection Interval	1 hour
Threshold	Maximum
Threshold	90% 95% 99%
Reset (value)	Without reset
Message Text	DBSPI-3215.1: Percentage of space used *Value* on virtual device <*virtual_device*> too high >=*Threshold*.

Metric Number	3215
Instruction Text	**Probable Cause(s):** Allocated storage is approaching total storage. MS SQL Server 7.0: Allocated storage is approaching total storage with the potential impact the inability to extend databases. MS SQL Server 6.5: Allocated storage is approaching total storage. When virtual devices fill up, the impact will be the inability to extend databases. **Potential Impact:** **Suggested Action(s):** MS SQL Server 7.0: If you are approaching the device size limit, reevaluate your initial space estimation. If it looks like you were off, allocate more disk. Otherwise, analyze why the disk filled up unexpectedly. With SQL 7's autogrow feature to automatically manage device space allocation to databases, this metric takes on a different role than with 6.5. Autogrow is a useful feature that prevents databases from stopping dead in their tracks when the device is used up. However, most administrators will prefer a certain level of control in being able to plan for a database's next level of growth rather than letting SQL Server 'just do it.' In other words, as a DBA, when databases are going to allocate their own resources (i.e., take new disk space), you need to know about it. Besides, if the autogrow settings are becoming inadequate (causing the database to autogrow more and more often), if database usage is expected to change, or if remaining disk space changes, this alarm allows an administrator to act. For instance, if the database is about to autogrow and completely fill up a disk drive, it might be more efficient to plan on creating new file devices on which to store the database. You must plan database systems and their device usage based on the amount of data being stored and the amount of load expected for the database, in order to plan its size and expected growth. In other words, growth should be a planned event. Since there is always the unexpected to be dealt with, autogrow becomes a great assist in preventing a potential problem (the database stopping). However, it is possible that a database can grow so fast that the log will autogrow before anyone intended it to happen. This could be the result of just an unexpected increase in usage of the database; or, it could be someone running a query that has gotten out of control (e.g., a bad ad-hoc query). In the worst case, this could cause autogrow to execute not once but repeatedly until the disk fills up. Another potential problem is that if device files get grown and shrunk many times, disk fragmentation can result, thereby slowing performance, so this is another argument in favor of preallocating databases to the desired size once, so that autogrow is only triggered rarely, if at all. So, if using autogrow on a database, this metric becomes one that would not necessarily trigger a major alarm, but would still be one you'd want to be informed of so you can keep an eye on it. The automatic action report for this metric will show all virtual devices assigned to each database and the percentage of space used. MS SQL Server 6.5: Allocate more disks. The automatic action report for this metric will show all virtual devices assigned to each database and the percentage of space used

Metric Number	3215
Report Type	Auto
Area	Space

Metric M216_TransLogUsedPct

Metric Number	3216
Name	TransLogUsedPct
Severity	Minor Major Critical
Description	Percentage of transaction log space used for each database. Percentage of space used in database transaction log to the total log size. At 100%, all transaction processing will abort or suspend, depending on database settings.
Alarming and/or Graphing metric	A
Collection Interval	15 min
Threshold	Maximum
Threshold	80% 90% 99%
Reset (value)	Without reset
Message Text	DBSPI-3216.1: Percentage of transaction log space used (*Value*) in database <*database_name*> too high >=*Threshold*.

Metric Number	3216
Instruction Text	**Probable Cause(s):** Percentage of space used in database transaction log to the total log size. At 100%, all transaction processing will abort or suspend, depending on database settings MS SQL Server 7.0: High transaction volume, low transaction dump rate with the potential impact that when the metric value reaches 100%, all transaction processing will abort or suspend, depending on database settings. MS SQL Server 6.5: Database transaction log is getting filled up. High transaction volume, low transaction dump rate **Potential Impact:** **Suggested Action(s):** MS SQL Server 7.0: You need to periodically dump (truncate) the transaction log. If you do not, the log will grow unchecked until it fills up. You can either turn on the database option (using sp_dboption) 'trunc. log on chkpt.', which is NOT recommended on a production machine, or you can dump the transaction log, which cleans out all completed transaction. You should automate cleaning out the transaction log on a periodic basis, before the threshold is reached. If you are cleaning out the transaction log, but it is not getting any smaller, you have a long-running transaction which is not complete, or you may have an aborted transaction in the database which has not been marked as complete in the log. As a last resort, you can shut down and restart the server. This will mark the incomplete transaction as complete (and rolled back). With SQL 7's autogrow feature to automatically manage log space allocation to databases, this metric takes on a different role than with 6.5. Autogrow is a useful feature that prevents databases from stopping dead in their tracks when the logfile is used up. However, most administrators will prefer a certain level of control in being able to plan for a database's next level of growth rather than letting SQL Server 'just do it.' In other words, as a DBA, when databases are going to allocate their own resources (i.e., take new log space) , you need to know about it. Besides, if the autogrow settings are becoming inadequate (causing the database to autogrow more and more often), if database usage is expected to change, or if remaining disk space changes, this alarm allows an administrator to act. For instance, if the database is about to autogrow and completely fill up a disk drive, it might be more efficient to plan on creating new file devices on which to store the database. You must plan database systems and their device usage based on the amount of data being stored and the amount of load expected for the database, in order to plan its size and expected growth. Since there is always the unexpected to be dealt with, autogrow becomes a great assist in preventing a potential problem (the database stopping). However, it is possible that a database can grow so fast that the log will autogrow before anyone intended it to happen. In the worst case, this could cause autogrow to execute not once but repeatedly until the disk fills up. So, if using autogrow on a database, this metric becomes one that would not necessarily trigger a major alarm, but would still be one you'd want to be informed of so you can keep an eye on it. The automatic action report for this metric shows log space in MB and percent used per database and other database statistics via sp_helpdb.

Metric Number	3216
Instruction Text (contd.)	MS SQL Server 6.5: To prevent the transaction log from filling up, it must be truncated periodically. If you do not, the log will grow unchecked until it fills up. You can do this either by enabling the 'trunc. log on chkpt.' option (which is NOT recommended on a production machine) or by regularly executing the DUMP TRANSACTION statement. Even if the 'trunc. log on chkpt.' option is enabled, you might have to explicitly execute DUMP TRANSACTION statements during peak periods to prevent the log from filling up. Because the 'trunc. log on chkpt.' option is enabled, you might have to explicitly execute DUMP TRANSACTION statements during peak periods to prevent the log from filling up. Because the 'trunc. log on chkpt.' option causes the equivalent of the DUMP TRANSACTION WITH TRUNCATE_ONLY statement to be executed, it truncates the log without saving it to a device. Use this option only on databases for which transaction log dumps are not being saved (typically development systems or systems where only full database dumps, and not DUMP TRANSACTION, will be used). If you are in a production environment and using DUMP TRANSACTION to truncate the log, time the statements close enough together so that no process ever receives the 1105 error (which indicates that the log is full). When you execute a DUMP TRANSACTION statement, transactions completed prior to the earliest outstanding transaction or the earliest transaction marked for replication but not yet moved to the distribution database are truncated from the log, unless they are on the same log page as the last outstanding transaction. All transactions since the earliest outstanding transaction are considered active and are not truncated, even if they have completed. Because the DUMP TRANSACTION statement truncates only the inactive portion of the log, you should be careful not to allow stranded (uncommitted) transactions to remain in the log for a long time. For example: if a user issues a BEGIN TRANSACTION statement but never commits the transaction. Nothing logged after the BEGIN TRANSACTION can be purged out of the log until one of the following events occurs: * The user who began the transaction completes it. * The user process that issued the BEGIN TRANSACTION statement is forcibly stopped and the transaction is rolled back. * SQL Server is shut down and restarted Stranded transactions are usually due to application problems. So, if you are cleaning out the transaction log, but it is not getting any smaller, you have a long-running transaction which is not complete, or you may have an aborted transaction in the database which has not been marked as complete in the log. As a last resort, you can shut down and restart the server. This will mark the incomplete transaction as complete (and rolled back). The automatic action report for this metric shows log space in MB and percent used per database and other database statistics via sp_helpdb.
Report Type	Automatic and application bank.
Area	Space

Metric M017_CmdQueueLenPct

Metric Number	3017
Name	CmdQueueLenPct
Severity	Warning
Description	Percentage of command queue length used. When SQL Server does not have a worker thread immediately available to execute a command, it place this command into Command Queue.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum
Threshold	10%
Reset (value)	Without reset
Message Text	DBSPI-3017.1: Percentage of command queue length used *Value* too high >=*Threshold*.

Metric Number	3017
Instruction Text	**Probable Cause(s):** When SQL Server does not have a worker thread immediately available to execute a command, it place this command into Command Queue. MS SQL Server 7.0: Value of this metric running above 0 indicates that the number of user connections exceeds the max number of worker threads so that the SQL Server activated its thread pooling mechanism. Too much of thread swapping may negatively affect SQL Server performance. MS SQL Server 6.5: Value of this metric running above 0 indicates that the number of user connections exceeds the max number of worker threads so that the SQL Server activated its thread pooling mechanism. Too much of thread swapping may negatively affect SQL Server performance. **Potential Impact:** **Suggested Action(s):** MS SQL Server 7.0: Consider increasing the number of available worker threads via 'max worker threads' configuration parameter and increase memory allocated to SQL Server. However, you may wish to restrict user connections via 'user connections' configuration parameter in order to decrease the workload on the SQL Server. User connections and worker threads are counted as overhead against the SQL Server memory allocation. Thus, plan accordingly when adjusting these values. The automatic action report for this metric shows network statistics and the maximum configured worker threads. The operator action for the metric generates a Server graph. MS SQL Server 6.5: Consider increasing the number of available worker threads via 'max worker threads' configuration parameter and increase memory allocated to SQL Server. However, you may wish to restrict user connections via 'user connections' configuration parameter in order to decrease the workload on the SQL Server. User connections and worker threads are counted as overhead against the SQL Server memory allocation. Thus, plan accordingly when adjusting these values. The automatic action report for this metric shows network statistics and the maximum configured worker threads. The operator action for the metric generates a Server graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Server

Metric M218_DBSpaceUsedPct

Metric Number	3218
Name	DBSpaceUsedPct
Severity	Critical
Description	Percentage of space used in a database to the total database size.
Alarming and/or Graphing metric	A
Collection Interval	1 hour
Threshold	Maximum
Threshold	95%
Reset (value)	Without reset.
Message Text	DBSPI-3218.1: Percentage database space used *Value* in database (*database_name*) too high >=*Threshold*.
Instruction Text	**Probable Cause(s):** Percentage of space used in a database to the total database size. Database is getting filled up. **Potential Impact:** **Suggested Action(s):** The following actions can be executed to remedy the situation: Use ALTER DATABASE to increase the size of the data segment. Drop objects from the database. Delete rows from tables in the database. The most natural action is, obviously, to add space to the database by executing ALTER DATABASE command. If there is no free space available on the existing database devices, a new device has to be created by DISK INIT command, or an exiting device has to be extended by executing DISK RESIZE command. The automatic action report for this metric for 7.0 shows other database statistics via sp_helpdb. The automatic action report for this metric for 6.5 shows other database statistics via sp_helpdb; virtual device space report which shows which virtual devices have space remaining; a virtual device space report grouped by database and virtual device and a virtual device space report showing all details by database which shows fragmentation.
Report Type	Automatic and application bank.
Area	Space

Metric M019_ProcCacheUsdPct

Metric Number	3019
Name	ProcCacheUsdPct

Metric Number	3019
Severity	Warning
Description	Percentage procedure cache used.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum
Threshold	95%
Reset (value)	Without reset
Message Text	DBSPI-3020.1: Percentage of procedure cache active *Value* too high >=*Threshold*.
Instruction Text	**Probable Cause(s):** The Procedure Cache Used % counter monitors the percentage of the procedure cache consumed by cached stored procedures, triggers, views, rules, and defaults. Value of the Procedure Cache Used % falling below 90% or rising above 95% indicates a performance problem. **Potential Impact:** **Suggested Action(s):** Ideally, you want the Procedure Cache Used % to be about 90% to 95% on a long-term basis. If the Procedure Cache Used % counter is substantially lower, you have allocated too much memory for procedure cache and are w asting memory that could be used for data cache. Therefore, you should lower the procedure cache value, restart SQL Server, and continue monitoring this counter. If the Procedure Cache Used % counter is constantly more than 95%, you may not have enough procedure cache allocated. In such cases, you should increase the value of the 'procedure cache' configuration option, restart SQL Server, and continue the monitoring process. The automatic action report for this metric shows procedure cache information. The operator action for the metric generates a Cache graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Cache

Metric M020_ProcCacheActPct

Metric Number	3020
Name	ProcCacheActPct
Severity	Warning
Description	The Procedure Cache Active % counter monitors the percentage of the procedure cache consumed by cached stored procedures, triggers, views, rules, and defaults that are being used at this moment.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum
Threshold	70%
Reset (value)	Without reset
Message Text	DBSPI-3021.1: Percentage of single page writes *Value* too high >=*Threshold*.
Instruction Text	**Probable Cause(s):** The Procedure Cache Active % counter monitors the percentage of the procedure cache consumed by cached stored procedures, triggers, views, rules, and defaults that are being used at this moment. Value of the 'Procedure Cache Active %' rising above 70% may indicate a performance problem. **Potential Impact:** **Suggested Action(s):** Value of the 'Procedure Cache Active %' rising above 70% may mean (not necessarily, though) that stored procedures, triggers, views, rules, and defaults in the procedure cache are rotating all the time. If this is the case, you need to increase size of the procedure cache by adding RAM to the server and allocating more of it to SQL Server, or by increasing the value of the 'procedure cache' configuration option. It is possible, however, that contents of the procedure cache in not, in fact, changing all the time: if the active objects are the only objects that exist in the system. In this case no actions are necessary. The automatic action report for this metric shows procedure cache information. The operator action for the metric generates a Cache graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Cache

Metric M021_SinglPgeWritPct

Metric Number	3021
Name	SinglPgeWritPct
Severity	Warning
Description	% single page writes.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum
Threshold	50%
Reset (value)	Without reset
Message Text	DBSPI-3021.1: Percentage of single page writes *Value* too high >=*Threshold*.
Instruction Text	**Probable Cause(s):** The number of single page writes performed per second by logging and cache flushes. (Pages written out during the checkpoint process are recorded in the Batch Writes/sec statistic.) This does not include lazywriter batch statistics. Single-page writes are generally expensive, as opposed to batch-wide IO (used by lazywriter and checkpoint). Reducing single-page write activity is important for optimal tuning. One way is to do this is to ensure that you do not run out of free buffers in the free buffer pool. If you do, single page writes will occur when waiting for an unused cache buffer to flush. **Potential Impact:** **Suggested Action(s):** * Add more memory to the SQL Server. * Decrease 'procedure cache' configuration (assuming that procedure cache is not stressed). The automatic action report for this metric will show 'Input/Output' statistics and which users are connected to SQL Server. The operator action for the metric generates an IOStats graph.
Report Type	Automatic, operator initiated, and application bank.
Area	I/O Stats

Metric M022_BufChainAvgLen

Metric Number	3022
Name	BufChainAvgLen

Metric Number	3022
Severity	Warning
Description	Buffer chain average length
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum
Threshold	4
Reset (value)	Without reset
Message Text	DBSPI-3022.1: Buffer chain average length *Value* too high >=*Threshold*.
Instruction Text	**Probable Cause(s):** HASH BUCKETS are an array of pointers to linked lists of buffers pointing to pages in cache. Each page in cache has a structure used to manage it known as a 'buffer.' 'HASH BUCKETS' is configurable from 4999 to 265003 and is the actual number of entries. If chains of buffers become too long, then performance can suffer. **Potential Impact**: **Suggested Action(s):** Below is a table of suggested values for HASH BUCKETS based on the SP_CONFIGURE MEMORY configuration value. These values are rough suggestions, and this metric should be used to make sure your system is configured correctly. MEMORY HASH BUCKETS ========= ============ 25600 8192 51200 15000 102400 25000 204800 40000 409600 75000 Note that the actual runtime value will be the nearest prime number to the configured value. The automatic action report for this metric will show buffer chain information and which users are connected to SQL Server. The operator action for the metric generates a Cache graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Cache

Metric M023_ReadWriteErrCnt

Metric Number	3023
Name	ReadWriteErrCnt
Severity	Warning
Description	Number of SQL Server read/write errors since the last probing.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum
Threshold	0.5
Reset (value)	Without reset
Message Text	DBSPI-3023.1: Number of SQL Server read/write errors since the last probing *Value* too high >=*Threshold*.
Instruction Text	**Probable Cause(s):** This metric represents the number of disk I/O errors encountered by SQL Server since the last probing. Disk I/O failure. **Potential Impact:** **Suggested Action(s):** If persistent, disk hardware has to be examined. The automatic action report for this metric shows SQL Server information via the 'sp_monitor' command. The operator action for the metric generates a Error graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Error

Metric M024_PacketErrorCnt

Metric Number	3024
Name	PacketErrorCnt
Severity	Warning
Description	Number of packet errors while reading or writing packets.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour

Metric Number	3024
Threshold	Maximum
Threshold	0.5
Reset (value)	Without reset
Message Text	DBSPI-3024.1: *Value* packet errors while reading or writing packets.
Instruction Text	**Probable Cause(s):** This metric shows the number of network errors encountered by SQL Server since the last reading. This metric allows a DBA to monitor current user activity for SELECT queries. **Potential Impact:** **Suggested Action(s):** The automatic action report for this metric shows SQL Server information via the 'sp_monitor' command.The operator action for the metric generates a Error graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Error

Metric M025_CPUUsedPct

Metric Number	3025
Name	CPUUsedPct
Severity	Warning
Description	The percentage reported is the number of seconds of CPU time used by SQL Server in ratio to the total amount of elapsed time since the last probing. This percentage is aggregated for all CPUs in the system.
Alarming and/or Graphing metric	A & G
Collection Interval	5 min
Threshold	Maximum
Threshold	95% for 15 min
Reset (value)	Without reset
Message Text	DBSPI-3025.1: Percentage CPU time used by SQL Server *Value* too high >=*Threshold*.
Instruction Text	**Probable Cause(s):** The percentage reported is the number of seconds of CPU time used by SQL Server in ratio to the total amount of elapsed time since the last probing. SQL Server CPU load running at 100% indicates a problem. Either SQL Server has excessive load or a thread is in the endless CPU loop. This percentage is aggregated for all CPUs in the system. **Potential Impact:** **Suggested Action(s):** For Excessive load: Add CPUs to the server. For Runaway process: Detect a thread causing a CPU loop and use the KILL command to kill it. If it does not help--restart SQL Server. The automatic action report for this metric shows SQL Server information via the 'sp_monitor' command and which users are connected to SQL Server. The operator action for the metric generates a Server graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Server

Metric M026_ActiveConntnPct

Metric Number	3026
Name	ActiveConntnPct
Severity	Warning

Metric Number	3026
Description	The number of current active connection as a percentage of total connections.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Minimum
Threshold	20%
Reset (value)	Without reset
Message Text	DBSPI-3026.1: Percentage of total connections that are active versus sleeping *Value* too low =*Threshold*.
Instruction Text	**Probable Cause(s):** The number of current active connection as a percent of total connections. If this metric's value is consistently low, SQL Server resources may be tied up by a large number of idle, 'sleeping' connections. **Potential Impact:** **Suggested Action(s):** If this metric is consistently low, you may want to adjust your 'front end' applications so that they do not keep idle connections for too long. Example: MSAccess keeps idle connections for 10 minutes by default. This value may be adjusted to 5 or 3 minutes. The automatic action report for this metric shows which users are connected to SQL Server.The operator action for the metric generates a Users graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Server

Metric M227 PhysIOByUsrPct

Metric Number	3227
Name	PhysIOByUsrPct
Severity	Warning
Description	% of physical I/O used by process ID
Alarming and/or Graphing metric	A
Collection Interval	5 min
Threshold	Maximum
Threshold	95% for 10 minutes.
Reset (value)	Without reset
Message Text	DBSPI-3227.1: Percentage of physical I/O used by login ID (*user_name*) *Value* too high >=*Threshold*.
Instruction Text	**Probable Cause(s):** Number of cumulative physical reads and writes by a process as a percentage of all physical reads and writes performed by all the SQL Server users. This metric excludes SQLAgent processes. A process performs heavy I/O activity. This may cause performance problems for other users trying to run their queries. **Potential Impact:** **Suggested Action(s):** If this situation causes significant performance degradation, this connection should be closed. The automatic action report for this metric shows which users areconnected to SQL Server.
Report Type	Automatic and application bank.
Area	Server

Metric M028_SuspectDBCnt

Metric Number	3028
Name	SuspectDBCnt
Severity	Critical
Description	# of databases marked as suspect.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum

Metric Number	3028
Threshold	0.5
Reset (value)	Without reset
Message Text	DBSPI-3028.1: *Value* databases marked as suspect
Instruction Text	**Probable Cause(s):** If SQL Server can not access a database device or recover a database at startup, it marks this database as 'suspect'. The 'suspect' status prevents users from accessing the database. One or more databases on SQL Server have been marked as 'suspect'. **Potential Impact:** **Suggested Action(s):** Use the sp_resetstatus stored procedure to turn off the suspect flag on a database leaving all other database options intact. Caution: Use sp_resetstatus only when directed by your primary support provider or this manual. Otherwise, you might damage your database. If the suspect database is damaged and can not be recovered, remove the database using DBCC DBREPAIR: dbcc dbrepair(database_name,dropdb) The automatic action report for this metric shows other database statistics via sp_helpdb. The operator action for the metric generates a Error graph
Report Type	Automatic, operator initiated, and application bank.
Area	Error

Metric M029_OpenDBPct

Metric Number	3029
Name	OpenDBPct
Severity	Warning
Description	% of databases open
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum
Threshold	90%
Reset (value)	Without reset
Message Text	DBSPI-3029.1: Percentage of databases open *Value* too high >=*Threshold*.
Instruction Text	**Probable Cause(s):** The number of databases currently opened by SQL Server users can not exceed the 'Open databases' configuration parameter. Number of currently opened databases is close to the max. number of databases that can be opened by SQL Server. **Potential Impact:** **Suggested Action(s):** Increase value of the 'open databases' configuration parameter. Caution: if the SQL Server 'open databases' option was significantly increased without a corresponding increase in the memory option, SQL Server might not start because it cannot allocate the specified number of database control blocks without exceeding the specified limit of total memory. The automatic action report for this metric shows the configured number of open databases allowed among all users and which users are connected to SQLServer
Report Type	Automatic, operator initiated, and application bank.
Area	Server

Metric M030__ServerConnect

Metric Number	3030
Name	ServerConnect
Severity	Critical
Description	Ability to connect to a server

Metric Number	3030
Alarming and/or Graphing metric	A
Collection Interval	5 mins
Min/Max Threshold	Maximum
Threshold	0.5
Reset (value)	Without reset
Message Text	DBSPI-3030.1: Cannot connect to MS SQL Server <$OPTION(dbserv)>.
Instruction Text	**Probable Cause(s):** DB-SPI failed to connect to the master database of a MS SQL Server instance. This error will prevent other metrics from running. This could be caused by any of the following: * Incorrect information in the DB-SPI configuration * The user id or password that is used to connect has changed * The server is not running * The transaction log for the tempdb is full, so DB-SPI cannot build temporary tables **Potential Impact:** **Suggested Action(s):** * If the server is just busy and the connection attempt is timing out, you can use a variable MSSQL_LOGINTIME in the dbspi defaults file (please see Appendix A of the Database SPI Configuration Guide for details about the defaults file). After you add 'MSSQL_LOGINTIME ON', the following command is run: EXEC SQL SET OPTION LOGINTIME 30 or * If the server is actually down, use the server name in the message to determine which server connection is failing. Verify that the server is running. Try to connect to the server and the master database using the configured user and password. Check the transaction log for tempdb. An automatic action report shows the configured number of open databases allowed among all users and which users are connected to SQL Server.
Report Type	N/A
Area	Server

Metric M230_DBUseCnt

Metric Number	3230
Name	DBConnect
Severity	Warning
Description	Ability to connect to a database.
Alarming and/or Graphing metric	A
Collection Interval	15 min
Threshold	Maximum
Threshold	0.5
Reset (value)	Continuous
Message Text	DBSPI-3230.1: Cannot connect to database <*database_name*)>.
Instruction Text	**Probable Cause(s):** Unable to connect to database The database may be corrupt, or the 'single user' database option may be turned on. **Potential Impact:** **Suggested Action(s):** Check database configuration options using sp_helpdb, and, reconfigure if that's the problem. If the database is corrupt, reload the database from a backup. The automatic action report for this metric shows other database statistics via sp_helpdb.
Report Type	Automatic and application bank.
Area	Database

Metric M032_RunableContnPct

Metric Number	3032
Name	RunableContnPct
Severity	Warning
Description	% of total connections that are runable.
Alarming and/or Graphing metric	A
Collection Interval	1 Hour
Threshold	Max
Threshold	50%

Metric Number	3032
Reset (value)	Without reset
Message Text	DBSPI-3032.1: % of total connections that are runnable <*value*>% too high (>=<*threshold*>%).
Instruction Text	**Probable Cause(s):** The number of current runnable connections as a percent of total connections. If the percentage of runnable connections is too high, then it means that there is too much contention for MS SQL Server resources and the overall performance of the system is negatively impacted. **Potential Impact:** **Suggested Action(s):** Analyze the applications that are running by looking at the automatic action report and determine if the application needs to be corrected. The automatic action report for this metric shows which users are connected to SQL Server. The operator action for the metric generates a Users graph.
Report Type	Automatic and operator initiated.
Area	Server

Microsoft SQL Server 6.5 Reporting Metrics

The reports listed in the following table are generated by the respective metrics and are available through HP OpenView Reporter.

Report Category	Description	Interval	Metric
*SQL Server Sessions	Number of maximum number of sessions	5-minute	M031_ NumUsersCnt
*SQL Server Transactions	Number of transactions	5-minute	M009_ TransactionRate

**Session* and *transaction reports* derive from metrics collected for graphing templates (as well as Reporter reports). If you did not enable reports and graphs when you saved your configuration file (answering [yes] to the prompt), to generate these reports, run the *Enable Graphs* application against the managed node:
Admin→Enable Graphs [UNIX managed nodes];
Admin Windows→Enable Graphs [Windows managed nodes]).

2 MS SQL Server 7, 2000, and 2005 Metrics

This chapter provides summary and detailed information of the DB-SPI SQL Server, version 7, metrics. The chapter shows settings for every metric and in the process makes it clear how each metric generates messages and alerts according to the area upon which it focuses.

The information provided here is valuable for understanding each metric, especially if you want to change any monitor template setting to better suit your environment. Metrics are covered as follows:

- SQL Server, Version 7.0, 2000, & 2005 Metric Summary
- SQL Server, Version 7.0, 2000, & 2005 Metric Specifications

MS SQL Server 7, 2000, and 2005 Metrics

DB-SPI metric monitor templates are designed to be efficient and easy to use. In fact, you may want to use most templates without making any modifications whatsoever. However, if you do decided to make changes, this reference document provides information for each metric, information you need to know in order to customize any monitor template.

For easy reference, a table at the beginning of the chapter lists all SQL Server, version 7, 200, ane 2005 metrics in summary form. The remainder of the chapter covers each metric in a table that lists the details.

MS SQL Server 7, 2000, & 2005 Metric Summary

MS SQL Server 7.0 Metric	Description	Area	Type	Interval	Min/Max	Threshold	Reset	Severity	A or G	Rpt Access	Graph
M001_CacheHitPct	% of times a data page was found in the cache.	LRUS tats	S	1 hr	Min	70%	80%	Warning	A & G	Auto, Opt & App	LRUS tats
M007_ReadsOutstd Rate	# of read requests issued to the operating system that have not been completed.	IOSta ts	S	1 hr	Max	2/min	W/O	Warning	A & G	Auto, Opt & App	IOSta ts
M008_WritsOutstd Rate	# of write requests issued to the operating system that have not completed.	IOSta ts	S	1 hr	Max	1/min	W/O	Warning	A & G	Auto, Opt & App	IOSta ts
M009_TransactionR ate	Server transactions rate	Serve r	S	1 hr	Max	100/ sec	Cont	Minor	A & G	Auto, Opt & App	Trans
M209_TransactionR ate	Database transactions rate	Datab ase	D	1 hr	Max	100/ sec	Cont	Minor	A	Auto	
M011_UserConnect Pct	% of current users connected	Proce ss	S	5 min	Max	90% 98%	W/O	Major Critical	A & G	Auto, Opt & App	Users

MS SQL Server 7.0 Metric	Description	Area	Type	Interval	Min/Max	Threshold	Reset	Severity	A or G	Rpt Access	Graph
M013_LocksInUsePct	% locks in use	Server	S	5 min	Max	80%	70%	Major	A & G	Auto, Opt & App	Locks
M014_BlckdProcessCnt	# of blocked processes	Server	S	5 min	Max	3 for 1 min	W/O	Warning	A & G	Auto, Opt & App	Server
M215_VirtDevSpUsdPct	% of space used on a specific virtual device	Space	S	1 hr	Max	90% 95% 99%	W/O	Minor Major Critical	A	Auto & App	
M017_CmdQueueLenPct	% of command queue length used	Server	S	1 hr	Max	10%	W/O	Warning	A & G	Auto, Opt & App	Server
M218_DBSpaceUsedPct	% database space used	Space	D	1 hr	Max	95%	W/O	Critical	A	Auto & App	
M022_BufChainAvgLen	Buffer chain average length.	Cache	S	1 hr	Max	4	W/O	Warning	A & G	Auto, Opt & App	Cache
M023_ReadWriteErrCnt	# of SQL Server read/ write errors since the last probing.	Error	S	1 hr	Max	0.5	W/O	Warning	A & G	Auto, Opt & App	Error

MS SQL Server 7.0 Metric	Description	Area	Type	Interval	Min/Max	Threshold	Reset	Severity	A or G	Rpt Access	Graph
M024_PacketErrorCnt	# of packet errors while reading or writing packets.	Error	S	1 hr	Max	0.5	W/O	Warning	A & G	Auto, Opt & App	Error
M025_CPUUsedPct	% CPU time used by SQL Server	Server	S	5 min	Max	95% for 15 Min	W/O	Warning	A & G	Auto, Opt & App	Server
M026_ActiveConntnPct	% of total connections that are active vs sleeping	Server	S	1 hr	Min	20%	W/O	Warning	A & G	Auto, Opt & App	Users
M227_PhysIOByUsrPct	% of physical I/O used by process ID	Server	S	5 min	Max	95% for 10 min	W/O	Warning	A	Auto & App	
M028_SuspectDBCnt	# of databases marked as suspect.	Error	S	1 hr	Max	0.5	W/O	Critical	A & G	Auto, Opt & App	Error
M030_ServerConnect	Ability to connect to a server.	Server	S	5 min	Max	0.5	W/O	Critical	A	N/A	
M230_DBConnect	Ability to connect to a database.	Database	D	15 min	Max	0.5	Cont	Warning	A	Auto & App	
M031_NumUsersCnt	Number of users	Server	S						G		Users

MS SQL Server 7.0 Metric	Description	Area	Type	Interval	Min/Max	Threshold	Reset	Severity	A or G	Rpt Access	Graph
M032_RunableContnPct	% of total connections that are runnable	Server	S	1 hr	Max	50%	W/O	Warning	A	Auto & Opt	
M233_DatabaseBackup	# of hours since last database backup.	Backup	D	1 Day	Max	876000 168 72	Cont	Major Minor Warning	A	N/A	N/A
M234_TransLogBackup	# of hours since last database transaciton log backup	Backup	D	1 Day	Max	876000 48 24	Cont	Major Minor Warning	A	N/A	N/A
M035_LongTransaction	Long running transaction	Databases	D	5 min	Max	60	W/O	Major	A	N/A	N/A
M051_FullScansRate	Full scans rate	Access Methods	S	1 hr	Max	20/sec	Cont	Minor	A & G	Auto, Opt & App	Access
M052_IndxSearchsRate	Index searches rate	Access Methods	S	1 hr	Max	1000/sec	Cont	Minor	A & G	Auto, Opt & App	Access
M053_PgesAlloctdRate	Pages allocated rate	Access Methods	S	1 hr	Max	1000/sec	Cont	Minor	A & G	Auto, Opt & App	Access
M054_ExtntsAllocRate	Extents allocated rate	Access Methods	S	1 hr	Max	300/sec	Cont	Minor	A & G	Auto, Opt & App	Access

MS SQL Server 7.0 Metric	Description	Area	Type	Interval	Min/Max	Threshold	Reset	Severity	A or G	Rpt Access	Graph
M055_PageSplitsRates	Page splits rate	Access Methods	S	1 hr	Max	1000/ sec	W/O	Minor	A & G	Auto, Opt & App	Access
M056_TblLckEscalRate	Table lock escalation rate	Access Methods	S	1 hr	Max	0.5	Cont	Minor	A & G	Auto, Opt & App	Access
M064_DBActivTransCnt	# of active transactions for the entire server	Server	S	1 hr	Max	5	W/O	Warning	A & G	Auto, Opt & App	Server
M264_DBActivTransCnt	# of active transactions for each database	Databases	D	1 hr	Max	5	W/O	Warning	A	Auto	
M066_DBLogGrowthsCnt	# of transaction log expansions for server	Server	S	1 hr	Max	4	Cont	Major	A & G	Auto, Opt & App	Trans
M266_DBLogGrowthsCnt	# of transaction log expansions per database	Databases	D	1 hr	Max	4	Cont	Major	A	Auto	
M067_DBLogShrinksCnt	# of server transaction log shrinks for server	Server	S	1 hr	Max	4	Cont	Major	A	Auto & App	
M267_DBLogShrinksCnt	# of database transaction log shrinks per database	Databases	D	1 hr	Max	4	Cont	Major	A	Auto	

MS SQL Server 7.0 Metric	Description	Area	Type	Interval	Min/Max	Threshold	Reset	Severity	A or G	Rpt Access	Graph
M068_LatchWaitsRate	Latch waits rate	Latches	S	1 hr	Max	10/sec	Cont	Minor	A & G	Auto, Opt & App	Latches
M069_AvgLatchWaitTim	Average latch wait time	Latches	S	1 hr	Max	500 ms	Cont	Minor	A & G	Auto, Opt & App	Latches
M070_LockTimeoutRate	Lock timeout rate	Locks	S	1 hr	Max	10/sec	Cont	Minor	A & G	Auto, Opt & App	Locks
M270_LockTimeoutRate	Lock timeout rate for each object type: Extent, Key, Page, Table, RID, Database.	Locks	O	1 hr	Max	10/sec	Cont	Minor	A	Auto	
M071_DeadlocksRate	Deadlocks rate	Locks	S	1 hr	Max	3/sec	Cont	Major	A & G	Auto, Opt & App	Locks
M271_DeadlocksRate	Deadlocks rate for each object type: Extent, Key, Page, Table, RID, Database.	Locks	O	1 hr	Max	3/sec	Cont	Major	A	Auto	

MS SQL Server 7.0 Metric	Description	Area	Type	Interval	Min/Max	Threshold	Reset	Severity	A or G	Rpt Access	Graph
M072_LocksWaitRate	Locks wait rate	Locks	S	1 hr	Max	10/sec	Cont	Minor	A & G	Auto, Opt & App	Locks
M272_LocksWaitRate	Locks wait rate per object type	Locks	S	1 hr	Max	10	Cont	Minor	A	Auto	N/A
M073_LockAvgWaitTime	Average lock wait time	Locks	S	1 hr	Max	500 ms	W/O	Minor	A & G	Auto, Opt & App	Locks
M273_LockAvgWaitTime	Average lock wait time for each object type: Extent, Key, Page, Table, RID, Database	Locks	O	1 hr	Max	500 ms	W/O	Minor	A	Auto	
M074_BatchReqstsRate	Batch requests rate	Server	S	1 hr	Max	500/ sec	W/O	Minor	A & G	Auto, Opt & App	Server
M075_LockMemoryPct	% of lock memory in use	Server	S	1 hr	Max	37%	Cont	Warning	A & G	Auto, Opt & App	Locks
M076_CurAvgLatchWait	Current average latch wait time	Latches	S	1 hr	Max	500 ms	Cont	Minor	A & G	Auto & Opt	Latches

MS SQL Server 7.0 Metric	Description	Area	Type	Interval	Min/Max	Threshold	Reset	Severity	A or G	Rpt Access	Graph
M277_CompletedJobs	Report on all jobs, successful, failed & canceled	Jobs	S	5 min	Max	2=Fail 3=Cancelled	Cont	Major Warning	A	Auto & Opt	
M278_FileGrpUsedSpacePct	% space used per filegroup and database	Space	D	15 min	Max	90% 95% 99%	W/O	Minor Major Critical	A	Auto & App	
M279_FileGrpSpaceFree	Space free (MB) per filegroup per database	Space	D	15 min	Min	150 MB 100 MB 50 MB	W/O	Minor Major Critical	A	Auto & App	
M080_ReportsFailed	Number of Reports (Reporting Services) Failed	Reports	D	N/A	Max	1.0	W/O	Minor	A	Auto	
M280_ReportsFailed	Number of Reports (Reporting Services) Failed (drill-down)	Reports	D	N/A	Max	1.0	W/O	Minor	A	Auto & App	

MS SQL Server 7.0 Metric	Description	Area	Type	Interval	Min/Max	Threshold	Reset	Severity	A or G	Rpt Access	Graph
M081_RepnAgentStatus	Replication agents status	Database	D	5 m	Max	0.5	Cont	Major	A	Auto, Opt & App	
M082_RepnLatency	Replication Latency	Database	D	15 m	Max	60.0	Cont	Warning	A	Auto, Opt & App	
M083_DelLatency	Delivery Latency	Database	D	15 m	Max	60.0	Cont	Warning	A	Auto, Opt & App	

MS SQL Server 7, 2000, & 2005 Metrics

Metric Numbe	The identification number assigned to the metric. All SQL Server metrics are in the range 3000 to 3999. 3001 to 3099 : Standard Metrics 3201 to 3299 : Drill Down Metrics 3700 to 3799 : UDM Metrics
Name	The name assigned to the metric. All SQL Server metrics start with MXXX, where XXX are the last 3 digits of the metric number.
Severity	The severity of the metric (Critical, Major, Minor, Warning, Normal)
Description	What the metric means.
Alarming and/or Graphing metric	Is the metric an alarming metric (A) or a graphing metric (G) or both (A & G)? (A, G, or A & G)
Collection Interval	How often the metric is collected and analyzed. (5 min, 15 min, 1 hour, 1 time daily)
Min/Max Threshold	Designates the threshold as: Minimum or Maximum, minimum thesholds are violated when the value falls below the setting; maximum thesholds are violated when the value rises above the setting.
Threshold	The default OVO threshold (if any). (*=Threshold value is really 0, but OVO alarms occur at <= or >= values. Since a 0 value would trigger an alarm, the threshold is set to 0.5)
Reset (value)	Does the threshold generate a message/alarm once (without reset), again when another value is detected (with reset) or when the original, exceeded threshold value continues at every collection interval (continuous)? (Without reset, With reset, Continuous)
Message Text	The messages (if any) that may be displayed for each condition.
Instruction Text	Problem-solving information. (Probable causes, Potential impact, Suggested actions, and Reports)
Report Type	If a report is available, how it is generated. (Operator, Automatic, Application Bank, N/A) Note: All the reports that are automatic actions or operator actions are also in the Application Bank in OVO. However, metrics that are Graphing only metrics (no alarms, just graphs) do not have an OVO template for Operator or Auto actions, so they are ONLY in the Application Bank. N/A means that no report is planned.

Area	The logical area (if any) that the metric belongs. (Database Status, Space Management, Performance, Errors, Archive/ Trace, Rollback Segments, PQO (Parallel Query Option), MTS (Multi-threaded Server), MISC)

Metric M001_CacheHitPct

Metric Number	3001
Name	CacheHitPct
Severity	Warning
Description	Percentage of times a data page was found in the cache.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Minimum
Threshold	70%
Reset (value)	Reset at 80%
Message Text	DBSPI-3001.1: Cache hit percentage *Value* too low (*Threshold*).

Metric Number	3001
Instruction Text	**Probable Cause(s):** Percentage of read requests that read information from memory rather than disk. Microsoft SQL Server 7.0: A low value for the Cache Hit Ratio is an indication of high physical reads. * Increasing the cache can have a positive effect. However over allocation of the cache may lead to excessive paging by the operating system. * Data cache may be too small or configured inefficiently; inefficient SQL or SQL not supported by indexes is causing too much data to be looked at. * If SQL Server has just been restarted and data cache is being loaded, this value will be low, which is normal. MS SQL Server 6.5: Less data pages are found in data cache and therefor more pages get fetched from disk. **Potential Impact:** **Suggested Action(s):** MS SQL Server 7.0: This may mean you are starting to measure I/O when the server is starting to load cache, or it may mean that cache is not of sufficient size to contain frequently used data pages. Investigate running SQL and correct if bad SQL. If inaccurate index statistics, etc. are causing excess table scans, then remedying bad SQL will improve the cache hit ratio as well as overall server performance. The server data cache size can be automatically set by SQL 7.0 (which is the default behavior) in which case adding RAM could be the only remedy. However, this may not be the case when SQL Server is sharing its hardware with other memory-intensive NT processes, such as other server processes, not an uncommon occurrence, or if the amount of memory configured for SQL Server to use (maximum server memory) has been set (as per the recommendations for Microsoft Full-Text Search, for example). The automatic action report for this metric will show 'Least Recently Used' statistics and which users are connected to SQL Server.The operator action for the metric generates a LRUStats graph. MS SQL Server 6.5: Most cache hit ratio studies indicate a fairly flat curve beyond several megabytes. For this reason, whether 14 MB, 16 MB, or 18 MB is given to SQL Server on a 32 MB computer will rarely make a significant difference in SQL performance. Conversely, attempting to crowd Windows NT by giving excessive memory to SQL Server can result in poor performance because of excessive paging. The implication is that you should add physical memory to the machine insignificant amounts before allocating this to SQL Server. Whether adding memory will be beneficial should be studied beforehand. Check the SQL Server cache hit ratio while the system is under a typical load. If the hit ratio is relatively high (over 90%), adding more memory will usually not be beneficial. This is because additional memory can mainly be used for additional SQL Server data cache, thereby increasing the hit ratio. In this case, the hit ratio is already high and the maximum available improvement quite small. If the hit ratio is consistently lower than this, adding more memory may improve the hit ratio (and thereby performance) if the locality of reference is such that it can be bracketed by economically or technically feasible amounts of memory.

Metric Number	3001
Instruction Text (contd.)	Another way to improve this statistic is to lower the value of the 'procedure cache' parameter thus allocating more space to the data cache at the expense of procedure cache. The automatic action report for this metric will show SQLServer:Cache Manager - Control Value for Procedure Plans, Prepared SQL Plans, Adhoc SQL Plans, Replication Procedure Plans, Misc. Normalized Trees, 'Least Recently Used' statistics and which users are connected to SQL Server. The operator action for the metric generates a LRUStats graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Less Recently Used Stats (LRUStats)

Metric M007_ReadsOutstdRate

Metric Number	3007
Name	ReadsOutstdRate
Severity	Warning
Description	Number of read requests issued to the operating system that have not been completed.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	2/min
Reset (value)	Without reset
Message Text	DBSPI-3007.1: Reads outstanding rate *Value*/min too high >=*Threshold*/min).

Metric Number	3007
Instruction Text	**Probable Cause(s):** Number of SQL Server 'read' requests to the Windows NT I/O subsystem that have not completed. MS SQL Server 7.0: Lots of physical I/O MS SQL Server 6.5: Lots of physical io **Potential Impact:** **Suggested Action(s):** MS SQL Server 7.0: This will help identify I/O as a bottleneck. As I/O increases, disk speed will limit performance. If this is a problem, it may be necessary to replace disks with faster ones. It may be thought that adding RAM (presumably to increase the cache hit ratio) would be more efficient than upgrading to a faster disk I/O subsystem. This can be true, but also depends on the types of queries being issued and on how much RAM is already present in the system. If the system handles mostly DSS-type queries, which need to scan large amounts of data that are typically not held in cache, then the disk subsystem's throughout speed becomes a major factor in the overall performance of the server; increasing SQL Server's cache size typically does not benefit performance that much in these situations. Also, beyond a certain point (that is, beyond a certain total amount of RAM in the system), adding more RAM does not provide as much of a benefit, because the time required to search that much cache RAM begins to approach the time required to simply read the data from disk. The break-even point, of course, depends on the relative speed of the CPU(s) in the system versus disk I/O time, but can occur at 1GB or less of total cache memory, and thus is something to be considered. To put it in simple terms, upgrading from 512MB RAM to 1GB may have much more positive effect on performance than upgrading from 2GB to 2.5GB, so if your server is already at 2GB of RAM, you may need to look at other options. Finally, another possible cause/solution to investigate here is SQL 7's background maintenance operations, which can cause extra I/O to occur; these include shrinking of databases and device files, and automatic execution of UPDATE STATISTICS on tables. These may be disabled if it is determined that they are causing performance hits on a production system. The automatic action report for this metric will show 'Input/Output' statistics and which users are connected to SQL Server. The operator action for the metric generates an IOStats graph. MS SQL Server 6.5: If consistently above 0, this metric indicates that SELECT activity on this server is too heavy for the existing hardware configuration. While an increase in cache may alter the performance, the best possible remedies are to add more RAM or install a faster, more effective I/O system. The automatic action report for this metric will show 'Input/Output' statistics and which users are connected to SQL Server. The operator action for the metric generates an IOStats graph.
Report Type	Automatic, operator initiated, and application bank.
Area	I/O Stats

Metric M008_WritsOutstdRate

Metric Number	3008
Name	WritsOutstdRate
Severity	Warning
Description	Number of SQL Server 'write' requests to the Windows NT I/O subsystem that have not completed.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	1/min
Reset (value)	Without reset
Message Text	DBSPI-3008.1: Writes outstanding rate *Value* /min) too high (>=*Threshold*/min).
Instruction Text	**Probable Cause(s):** Number of SQL Server 'write' requests to the Windows NT I/O subsystem that have not completed. MS SQL Server 7.0: A large number of outstanding writes indicates that the I/O subsystem may be a bottle neck. MS SQL Server 6.5: A large number of outstanding writes indicates that the I/O subsystem may be a bottle neck. **Potential Impact:** **Suggested Action(s):** * Add more RAM * Install a faster IO system, * Review the application's transaction management. The automatic action report for this metric will show 'Input/Output' statistics and which users are connected to SQL Server. The operator action for the metric generates an IOStats graph.MS SQL Server 6.5: This metric usually indicates that the I/O subsystem is a bottleneck. An increase in RAM on the system and configured cache may improve the performance. A more expensive solution would be to replace the I/O subsystem with a faster one (i.e. SCSI and faster disks). The automatic action report for this metric will show 'Input/Output' statistics and which users are connected to SQL Server. The operator action for the metric generates an IOStats graph.
Report Type	Automatic, operator initiated, and application bank.
Area	I/O Stats

Metric M009_TransactionRate

Metric Number	3009
Name	TransactionRate
Severity	Minor
Description	Number of single page writes performed per second by logging and cache flushes.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Threshold	Maximum
Threshold	100/sec
Reset (value)	Continuous
Message Text	DBSPI-3009.1: Transaction rate *Value*/sec too high >=*Threshold*/sec.
Instruction Text	**Probable Cause(s):** Rate of transactions for the entire server. This number increases with server modification statements. **Potential Impact:** **Suggested Action(s):** As this increases, you need to determine whether you are CPU or IO bound. If you are CPU bound, add more processors. If you are IO bound, it's time to revisit the I/O subsystem or add RAM. If this corresponds with a new release, consider optimizing queries. You can consider replication (allocate data between two or more servers.) Also check to see if the procedure cache is stressed. The automatic action report for this metric shows I/O statistics and which users are connected to SQL Server. The operator action for the metric generates a Trans graph
Report Type	Automatic, operator initiated, and application bank.
Area	Server

Metric M209_TransactionRate

Metric Number	3209
Name	TransactionRate
Severity	Minor
Description	Database transactions rate
Alarming and/or Graphing metric	A

Metric Number	3209
Collection Interval	1 hour
Threshold	Maximum
Threshold	100/sec
Reset (value)	Continuous
Message Text	DBSPI-3009.1: Transaction rate *Value*/sec too high >=*Threshold*/sec.
Instruction Text	**Probable Cause(s):** Rate of transactions for each database. This number increases with server modification statements **Potential Impact:** **Suggested Action(s):** As this increases, you need to determine whether you are CPU or IO bound. If you are CPU bound, add more processors. If you are IO bound, it's time to revisit the I/O subsystem or add RAM. If this corresponds with a new release, consider optimizing queries. You can consider replication (allocate data between two or more servers.) Also check to see if the procedure cache is stressed. The automatic action report for this metric shows I/O statistics and which users are connected to SQL Server.
Report Type	Automatic.
Area	Database

Metric M011_UserConnectPct

Metric Number	3011
Name	UserConnectPct
Severity	Major Critical
Description	Percentage of the current user connections to the total number of user connections configured for SQL Server.
Alarming and/or Graphing metric	A & G
Collection Interval	5 min
Min/Max Threshold	Maximum
Threshold	90% 98%
Reset (value)	Without reset
Message Text	DBSPI-3011.1: % of current users connected *Value* too high (>=*Threshold*).

Metric Number	3011
Instruction Text	**Probable Cause(s):** The number of current user connections to the total number of user connections configured for SQL Server. MS SQL Server 7.0: The number of users currently connected to SQL Server is close to the maximum number of connections MS SQL Server 6.5: The number of users currently connected to SQL Server is close to the maximum number of connections. **Potential Impact:** **Suggested Action(s):** MS SQL Server 7.0: If the 'user connections' parameter is configured manually, then increase the configuration parameter and buy additional licenses if necessary. In most cases, the number of user connections will be automatically increased by MS SQL Server 7.0. In this case, if the value is consistently high, try to re-configure front end applications (e.g.: MS Access, Cold Fusion, etc.) to close idle connections. Also, over time, understand what the load is on your system, an application may be leaving connections open. The meaning and usefulness of this metric has changed somewhat from SQL 6.5 to 7.0. It may be thought that in 7.0, you would not need to alarm on this metric if the current number of user connections grows close to the maximum, because SQL Server will increase the maximum as necessary since SQL 7.0 automatically reconfigures user connections as needed. This is somewhat true, but is a case of the 'ideal situation' versus the real world situation. Ideally, a DBA could let SQL Server allocate connections as needed so as to best utilize available resources. However, in a production system, a DBA would not want the number of connections to grow indefinitely-each connection ties up a certain amount of resources (memory, and a slight amount of CPU and network bandwidth) on the server. If a buggy application is not closing connections (not an uncommon thing to occur) then the DBA would certainly want to be made aware of this. So, a DBA should set a 'max'-type threshold for this metric based on a number of user connections that is normally not exceeded, so any 'connection leaks' in applications can be found before they begin to affect server performance. This metric determines open connections, not ones that are working (processing queries, DML , etc.). See metric 3026 for percentage of connections that are active. The automatic action report for this metric will show the maximum number of user connections allowed and which users are connected to SQL Server. The operator action for the metric generates a Users graph. MS SQL Server 6.5: Increase the 'user connections' configuration parameter. Buy additional licenses if necessary. The automatic action report for this metric will show the maximum number of user connections allowed and which users are connected to SQL Server. The operator action for the metric generates a Users graph.
Report Type	Automatic, operator initiated, and application blank.

Metric Number	3011
Area	Process

Metric M013_LocksInUsePct

Metric Number	3013
Name	LocksInUsePct
Severity	Major
Description	Percentage total locks currently held to the total number of locks configured for SQL Server.
Alarming and/or Graphing metric	A & G
Collection Interval	5 min
Min/Max Threshold	Maximum
Threshold	80%
Reset (value)	70%
Message Text	DBSPI-3013.1: % locks in use *Value* too high (>=*Threshold*).

Metric Number	3013
Instruction Text	**Probable Cause(s):** Percentage total locks currently held to the total number of locks configured for SQL Server. MS SQL Server 7.0: Transactions modifying large amounts of data, possibly using many SQL commands. MS SQL Server 6.5: SQL Server will not execute queries if the number of required locks exceeds the number of locks configured. Transactions modifying large amounts of data, possibly using many SQL commands. **Potential Impact:** **Suggested Action(s):** MS SQL Server 7.0: The number of locks configured is fixed at server start-up. When the number of locks is met, other processes requesting locks abort, and new users can not connect. You should evaluate why this is occurring, then increase number of available locks (sp_configure 'locks') and reboot server for change to take effect. Note: this uses memory. The automatic action report for this metric will show all outstanding locks and which users are connected to SQL Server. The operator action for the metric generates a Locks graph. MS SQL Server 6.5: The number of locks configured is fixed at server start-up. When the number of locks is met, other processes requesting locks abort, and new users cannot connect. You should evaluate why this is occurring, then increase number of available locks (sp_configure 'locks') and reboot server for change to take effect. Note: this uses memory. This parameter should not be too high, however, because every lock configured occupies 32 bytes of RAM. The automatic action report for this metric will show all outstanding locks and which users are connected to SQL Server. The operator action for the metric generates a Locks graph
Report Type	Automatic, operator initiated, and application blank.
Area	Server

Metric M014_BlckdProcessCnt

Metric Number	3014
Name	BlckdProcessCnt
Severity	Warning
Description	Number of blocked processes
Alarming and/or Graphing metric	A & G
Collection Interval	5 min
Min/Max Threshold	Maximum
Threshold	3 for 1 min
Reset (value)	Without reset
Message Text	DBSPI-3014.1: # of blocked processes *Value* too high (>=*Threshold*).

Metric Number	3014
Instruction Text	**Probable Cause(s):** Number of blocked processes in the server greater than the threshold for more than one collection interval (usually 5 minutes). MS SQL Server 7.0: Readers and writers wanting same data/index page, or page locks have escalated to table lock. Potential impact is performance since blocked processes will wait until block is cleared. MS SQL Server 6.5: Blocked processes will wait until block is cleared. Readers and writers wanting same data/index page, or page locks have escalated to table lock. SQL Server will not execute queries if a number of required locks exceeds the number of locks configured. **Potential Impact:** **Suggested Action(s):** MS SQL Server 7.0: Blocked processes are an indication of contention, which occurs frequently in OLTP and mixed use systems. Action depends on the situation. You may need to restructure indexes; or reschedule load processes when readers are not running, or change page lock promotion thresholds. It is also an indication of a poorly designed application process. The automatic action report for this metric will show processes that are the source of interlocking and which users are connected to SQL Server. The operator action for the metric generates a Server graph. MS SQL Server 6.5: Blocked processes are an indication of contention, which occurs frequently in OLTP and mixed use systems. Action depends on the situation. You may need to restructure indexes; or reschedule load processes when readers are not running, change page lock promotion thresholds or increase value of locks configuration parameter (sp_configure 'locks') . This parameter should not be too high, however, because every lock configured occupies 32 bytes of RAM. The automatic action report for this metric will show processes that are the source of interlocking and which users are connected to SQL Server. The operator action for the metric generates a Server graph.
Report Type	Automatic, operator initiated, and application blank.
Area	Server

Metric M215_VirtDevSpUsdPct

Metric Number	3215
Name	VirtDevSpUsdPct
Severity	Minor Major Critical
Description	Percentage of space used on a specific virtual device. Allocated storage is approaching total storage.
Alarming and/or Graphing metric	A
Collection Interval	1 hour
Threshold	Maximum
Threshold	90% 95% 99%
Reset (value)	Without reset
Message Text	DBSPI-3215.1: Percentage of space used *Value* on virtual device <*virtual_device*> too high >=*Threshold*.

Metric Number	3215
Instruction Text	**Probable Cause(s):** Allocated storage is approaching total storage. MS SQL Server 7.0: Allocated storage is approaching total storage with the potential impact the inability to extend databases. MS SQL Server 6.5: Allocated storage is approaching total storage. When virtual devices fill up, the impact will be the inability to extend databases. **Potential Impact:** **Suggested Action(s):** MS SQL Server 7.0: If you are approaching the device size limit, reevaluate your initial space estimation. If it looks like you were off, allocate more disk. Otherwise, analyze why the disk filled up unexpectedly. With SQL 7's autogrow feature to automatically manage device space allocation to databases, this metric takes on a different role than with 6.5. Autogrow is a useful feature that prevents databases from stopping dead in their tracks when the device is used up. However, most administrators will prefer a certain level of control in being able to plan for a database's next level of growth rather than letting SQL Server 'just do it.' In other words, as a DBA, when databases are going to allocate their own resources (i.e., take new disk space) , you need to know about it. Besides, if the autogrow settings are becoming inadequate (causing the database to autogrow more and more often), if database usage is expected to change, or if remaining disk space changes, this alarm allows an administrator to act. For instance, if the database is about to autogrow and completely fill up a disk drive, it might be more efficient to plan on creating new file devices on which to store the database. You should always plan database Systems and their device usages based on the amount of data being stored and the amount of load expected for the database, in order to plan its size and expected growth. In other words, growth should be a planned event. Since there is always the unexpected to be dealt with, autogrow becomes a great assist in preventing a potential problem (the database stopping). However, it is possible that a database can grow so fast that the log will autogrow before anyone intended it to happen. This could be the result of just an unexpected increase in usage of the database; or, it could be someone running a query that has gotten out of control (e.g., a bad ad-hoc query). In the worst case, this could cause autogrow to execute not once but repeatedly until the disk fills up. Another potential problem is that if device files get grown and shrunk many times, disk fragmentation can result, thereby slowing performance, so this is another argument in favor of preallocating databases to the desired size once, so that autogrow is only triggered rarely, if at all. So, if using autogrow on a database, this metric becomes one that would not necessarily trigger a major alarm, but would still be one you'd want to be informed of so you can keep an eye on it. The automatic action report for this metric will show all virtual devices assigned to each database and the percentage of space used. MS SQL Server 6.5: Allocate more disks. The automatic action report for this metric will show all virtual devices assigned to each database and the percentage of space used.

Metric Number	3215
Report Type	Automatic and application blank.
Area	Space

Metric M017_CmdQueueLenPct

Metric Number	3017
Name	CmdQueueLenPct
Severity	Warning
Description	Percentage of command queue length used
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour‘
Min/Max Threshold	Maximum
Threshold	10%
Reset (value)	Without reset
Message Text	DBSPI-3017.1: % of command queue length used *Value* too high (>=*Threshold*).

Metric Number	3017
Instruction Text	**Probable Cause(s)**: When SQL Server does not have a worker thread immediately available to execute a command, it place this command into Command Queue. MS SQL Server 7.0: Value of this metric running above 0 indicates that the number of user connection exceeds the max number of worker threads so that the SQL Server activated its thread pooling mechanism. Too much of thread swapping may negatively affect SQL Server performance. MS SQL Server 6.5: Cause: Value of this metric running above 0 indicates that the number of user connection exceeds the max number of worker threads so that the SQL Server activated its thread pooling mechanism. Too much of thread swapping may negatively affect SQL Server performance. **Potential Impact:** **Suggested Action(s)**: MS SQL Server 7.0: Consider increasing the number of available worker threads via 'max worker threads' configuration parameter and increase memory allocated to SQL Server. However, you may wish to restrict user connections via 'user connections' configuration parameter in order to decrease the workload on the SQL Server. User connections and worker threads are counted as overhead against the SQL Server memory allocation. Thus, plan accordingly when adjusting these values. The automatic action report for this metric shows network statistics and the maximum configured worker threads.The operator action for the metric generates a Server graph. MS SQL Server 6.5: Consider increasing the number of available worker threads via 'max worker threads' configuration parameter and increase memory allocated to SQL Server. However, you may wish to restrict user connections via 'user connections' configuration parameter in order to decrease the workload on the SQL Server. User connections and worker threads are counted as overhead against the SQL Server memory allocation. Thus, plan accordingly when adjusting these values. The automatic action report for this metric shows network statistics and the maximum configured worker threads. The operator action for the metric generates a Server graph
Report Type	Automatic, operator initiated, and application blank.
Area	Server

Metric M218_DBSpaceUsedPct

Metric Number	3218
Name	DBSpaceUsedPct
Severity	Critical
Description	Percentage database space used
Alarming and/or Graphing metric	A
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	95%
Reset (value)	Without reset
Message Text	DBSPI-3218.1: % database space used *Value* in database <*database_name*> too high (>=<*Threshold*>).
Instruction Text	**Probable Cause(s):** Percentage of space used in a database to the total database size. Database is getting filled up. **Potential Impact:** **Suggested Action(s):** The following actions can be executed to remedy the situation: Use ALTER DATABASE to increase the size of the data segment. Drop objects from the database. Delete rows from tables in the database. The most natural action is, obviously, to add space to the database by executing ALTER DATABASE command. If there is no free space available on the existing database devices, a new device has to be created by DISK INIT command, or an exiting device has to be extended by executing DISK RESIZE command. The automatic action report for this metric for 7.0 shows other database statistics via sp_helpdb. The automatic action report for this metric for 6.5 shows other database statistics via sp_helpdb; virtual device space report which shows which virtual devices have space remaining; a virtual device space report grouped by database and virtual device and a virtual device space report showing all details by database which shows fragmentation.
Report Type	Automatic and application blank.
Area	Space

Metric M022_BufChainAvgLen

Metric Number	3022
Name	BufChainAvgLen

Metric Number	3022
Severity	Warning
Description	Buffer chain average length.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	4
Reset (value)	Without reset
Message Text	DBSPI-3022.1: Buffer chain average length *Value* too high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** HASH BUCKETS are an array of pointers to linked lists of buffers pointing to pages in cache. Each page in cache has a structure used to manage it known as a 'buffer.' 'HASH BUCKETS' is configurable from 4999 to 265003 and is the actual number of entries. If chains of buffers become too long, then performance can suffer. **Potential Impact:** **Suggested Action(s):** Below is a table of suggested values for HASH BUCKETS based on the SP_CONFIGURE MEMORY configuration value. These values are rough suggestions, and this metric should be used to make sure your system is configured correctly. MEMORY HASH BUCKETS ========= ============ 25600 8192 51200 15000 102400 25000 204800 40000 409600 75000 Note that the actual runtime value will be the nearest prime number to the configured value.The automatic action report for this metric will show buffer chain information and which users are connected to SQL Server.The operator action for the metric generates a Cache graph
Report Type	Automatic, operator initiated, and application blank.
Area	Cache

Metric M023_ReadWriteErrCnt

Metric Number	3023
Name	ReadWriteErrCnt
Severity	Warning
Description	Number of SQL Server read/write errors since the last probing.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	0.5
Reset (value)	Without reset
Message Text	DBSPI-3023.1: # of SQL Server read/write errors since the last probing *Value* too high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** This metric represents the number of disk I/O errors encountered by SQL Server since the last probing. Disk I/O failure. **Potential Impact:** **Suggested Action(s):** If persistent, disk hardware has to be examined. The automatic action report for this metric shows SQL Server information via the 'sp_monitor' command. The operator action for the metric generates a Error graph
Report Type	Automatic, operator initiated, and application blank.
Area	Error

Metric M024_PacketErrorCnt

Metric Number	3024
Name	PacketErrorCnt
Severity	Warning
Description	Number of packet errors while reading or writing packets.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour

Metric Number	3024
Min/Max Threshold	Maximum
Threshold	0.5
Reset (value)	Without reset
Message Text	DBSPI-3024.1: *Value* packet errors while reading or writing packets.
Instruction Text	**Probable Cause(s):** This metric shows the number of network errors encountered by SQL Server since the last reading. This metric allows a DBA to monitor current user activity for SELECT queries. **Potential Impact:** **Suggested Action(s):** The automatic action report for this metric shows SQL Server information via the 'sp_monitor' command. The operator action for the metric generates a Error graph.
Report Type	Automatic, operator initiated, and application blank.
Area	Error

Metric M025_CPUUsedPct

Metric Number	3025
Name	CPUUsedPct
Severity	Warning
Description	Percentage CPU time used by SQL Server. The percentage reported is the number of seconds of CPU time used by SQL Server in ratio to the total amount of elapsed time since the last probing. This percentage is aggregated for all CPUs in the system.
Alarming and/or Graphing metric	A & G
Collection Interval	5 min
Min/Max Threshold	Maximum
Threshold	95% for 15 min
Reset (value)	Without reset
Message Text	DBSPI-3025.1: % CPU time used by SQL Server *Value* too high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** The percentage reported is the number of seconds of CPU time used by SQL Server in ratio to the total amount of elapsed time since the last probing. SQL Server CPU load running at 100% indicates a problem. Either SQL Server has excessive load or a thread is in the endless CPU loop. This percentage is aggregated for all CPUs in the system. **Potential Impact:** **Suggested Action(s):** For Excessive load: Add CPUs to the server. For Runaway process: Detect a thread causing a CPU loop and use the KILL command to kill it. If it does not help--restart SQL Server. The automatic action report for this metric shows SQL Server information via the 'sp_monitor' command and which users are connected to SQL Server. The operator action for the metric generates a Server graph.
Report Type	Automatic, operator initiated, and application blank.
Area	Server

Metric M026_ActiveConntnPct

Metric Number	3026
Name	ActiveConntnPct
Severity	Warning

Metric Number	3026
Description	Server percentage of total connections that are active versus sleeping. The number of current active connections as a percentage of total connections.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Minimum
Threshold	20%
Reset (value)	Without reset
Message Text	DBSPI-3026.1: % of total connections that are active versus sleeping *Value* too low (<=*Threshold*).
Instruction Text	**Probable Cause(s):** The number of current active connection as a percent of total connections. If this metric's value is consistently low, SQL Server resources may be tied up by a large number of idle, 'sleeping' connections. **Potential Impact:** **Suggested Action(s):** If this metric is consistently low, you may want to adjust your 'front end' applications so that they do not keep idle connections for too long. Example: MSAccess keeps idle connections for 10 minutes by default. This value may be adjusted to 5 or 3 minutes. The automatic action report for this metric shows which users are connected to SQL Server. The operator action for the metric generates a Users graph.
Report Type	Automatic, operator initiated, and application blank.
Area	Server

Metric M227 PhysIOByUsrPct

Metric Number	3227
Name	PhysIOByUsrPct
Severity	Warning
Description	Percentage of physical I/O used by process. Number of cumulative physical reads and writes by a process as a percentage of all physical reads and writes performed by all the SQL Server users.
Alarming and/or Graphing metric	A
Collection Interval	5 min
Min/Max Threshold	Maximum
Threshold	95% for 10 minutes.
Reset (value)	Without reset
Message Text	DBSPI-3227.1: % of physical I/O used by process (*process_id*). *(Value)* too high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** Number of cumulative physical reads and writes by a process as a percentage of all physical reads and writes performed by all the SQL Server users. This metric excludes SQLAgent processes. A process performs heavy I/O activity. This may cause performance problems for other users trying to run their queries. **Potential Impact:** **Suggested Action(s):** If this situation causes significant performance degradation, this connection should be closed. The automatic action report for this metric shows which users are connected to SQL Server.
Report Type	Automatic and application blank.
Area	Server

Metric M028_SuspectDBCnt

Metric Number	3028
Name	SuspectDBCnt
Severity	Critical
Description	Number of databases marked as suspect. If SQL Server can not access a database device or recover a database at startup, it marks this database as 'suspect'. The 'suspect' status prevents users from accessing the database.

Metric Number	3028
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	0.5
Reset (value)	Without reset
Message Text	DBSPI-3028.1: *Value* databases marked as suspect.
Instruction Text	**Probable Cause(s):** If SQL Server can not access a database device or recover a database at startup, it marks this database as 'suspect'. The 'suspect' status prevents users from accessing the database. One or more databases on SQL Server have been marked as 'suspect'. **Potential Impact:** **Suggested Action(s):** Use the sp_resetstatus stored procedure to turn off the suspect flag on a database leaving all other database options intact. Caution: Use sp_resetstatus only when directed by your primary support provider or this manual. Otherwise, you might damage your database. If the suspect database is damaged and can not be recovered, remove the database using DBCC DBREPAIR: dbcc dbrepair(database_name,dropdb) The automatic action report for this metric shows other database statistics via sp_helpdb.The operator action for the metric generates a Error graph.
Report Type	Automatic, operator initiated, and application blank.
Area	Error

Metric M030_ServerConnect

Metric Number	3030
Name	ServerConnect
Severity	Critical
Description	Ability to connect to a server
Alarming and/or Graphing metric	A
Collection Interval	5 minute
Min/Max Threshold	Maximum
Threshold	0.5
Reset (value)	Without reset
Message Text	DBSPI-3030.1: Cannot connect to MS SQL Server <$OPTION(dbserv)>.
Instruction Text	**Probable Cause(s):** DB-SPI failed to connect to the master database of a MS SQL Server instance. This error will prevent other metrics from running. This could be caused by any of the following: * Incorrect information in the DB-SPI configuration * The user id or password that is used to connect has changed * The server is not running * The transaction log for the tempdb is full, so DB-SPI cannot build temporary tables **Potential Impact:** **Suggested Action(s):** * If the server is just busy and the connection attempt is timing out, you can use a variable MSSQL_LOGINTIME in the dbspi defaults file (please see Appendix A of the Database SPI Configuration Guide for details about the defaults file). After you add 'MSSQL_LOGINTIME ON', the following command is run: EXEC SQL SET OPTION LOGINTIME 30 or * If the server is actually down, use the server name in the message to determine which server connection is failing. Verify that the server is running. Try to connect to the server and the master database using the configured user andpassword. Check the transaction log for tempdb. An automatic action report shows the configured number of open databases allowed among all users and which users are connected to SQL Server.
Report Type	N/A
Area	Server

Metric M230_DBConnect

Metric Number	3230
Name	DBConnect
Severity	Warning
Description	Ability to connect to a database.
Alarming and/or Graphing metric	A
Collection Interval	15 min
Min/Max Threshold	Maximum
Threshold	0.5
Reset (value)	Continuous
Message Text	DBSPI-3230.1: Cannot connect to database (*database_name*).
Instruction Text	**Probable Cause(s):** Unable to connect to database The database may be corrupt, or the 'single user' database option may be turned on. **Potential Impact:** **Suggested Action(s):** Check database configuration options using sp_helpdb, and, reconfigure if that's the problem. If the database is corrupt, reload the database from a backup. The automatic action report for this metric shows other database statistics via sp_helpdb.
Report Type	Automatic and application blank.
Area	Database

Metric M032_RunableContnPct

Metric Number	3032
Name	RunableContnPct
Severity	Warning
Description	The number of current runnable connections as a percentage of total connections.
Alarming and/or Graphing metric	A
Collection Interval	1 hour

Metric Number	3032
Min/Max Threshold	Maximum
Threshold	50%
Reset (value)	Without reset
Message Text	DBSPI-3032.1: % of total connections that are runnable <*value*>% too high (>=<*threshold*>%).
Instruction Text	**Probable Cause(s):** The number of current runnable connections as a percent of total connections. If the percentage of runnable connections is too high, then it means that there is too much contention for MS SQL Server resources and the overall performance of the system is negatively impacted. **Potential Impact:** **Suggested Action(s)**: Analyze the applications that are running by looking at the automatic action report and determine if the application needs to be corrected. The automatic action report for this metric shows which users are connected to SQL Server. The operator action for the metric generates a Users graph.
Report Type	Automatic and operator initiated.
Area	Server

Metric M233_DatabaseBackup

Metric Number	3233
Name	DatabaseBackup
Severity	Major Minor Warning
Description	# of hours since last database backup.
Alarming and/or Graphing metric	A
Collection Interval	1 day
Min/Max Threshold	Maximum
Threshold	Condition 3233.1: 876000 (hours) Condition 3233.2: 168 (hours) Condition 3233.1: 72 (hours)
Reset (value)	Continuous
Message Text	DBSPI-3233.1: Database <$OPTION(database_name)> has not been backup up for <$VALUE> hours (>=<$THRESHOLD> hours) for <$OPTION(dbserv)>.
Instruction Text	**Probable Cause(s):** Database backup has exceeded the threshold. **Potential Impact:** **Suggested Action(s):** Perform a complete database backup on the indicated database.
Report Type	N/A
Area	Backup

Metric M234_TransactionLogBackup

Metric Number	3234
Name	TransLogBackup
Severity	Major Minor Warning
Description	# of hours since last database transaction log backup
Alarming and/or Graphing metric	A

Metric Number	3234
Collection Interval	1 day
Min/Max Threshold	Max
Threshold	Condition 3233.1: 876000 (hours) Condition 3233.2: 48 (hours) Condition 3233.1: 24 (hours)
Reset (value)	Continuous
Message Text	DBSPI-3234.2: The transaction log for database <$OPTION(database_name)> has not been backup up for <$VALUE> hours (>=<$THRESHOLD> hours) for <$OPTION(dbserv)>.
Instruction Text	**Probable Cause(s):** Database Transaction Log backup has exceeded the threshold. The Transaction log for the indicated database does not have the 'Truncate on checkpoint' option set and has exceeded the backup threshold. **Potential Impact:** **Suggested Action(s):** Perform a backup of the Transaction Log for the indicated database.
Report Type	N/A
Area	Backup

Metric M035_LongTransaction

Metric Number	3035
Name	LongTransaction
Severity	Major
Description	Longest running transaction. This metric will alarm if the longest running transaction has been running longer than the threshold (in seconds). The message text identifies the longest running transaction.
Alarming and/or Graphing metric	A & G
Collection Interval	5 min
Min/Max Threshold	Max
Threshold	60
Reset (value)	Without reset
Message Text	DBSPI-3032.1: % of total connections that are runnable <*value*>% too high (>=<*threshold*>%).

Metric Number	3035
Instruction Text	**Probable Cause(s)**: This metric will alarm if the longest running transaction has been running longer than the threshold (in seconds). The message text will identify the longest running transaction. There can be a variety of reasons for transactions taking a long time to execute, one of the most common reasons is blocking. Blocking occurs when one process (identified by SPID) holds a lock on a specific resource that a second process attempts to acquire, causing a conflicting lock type on the same resource. **Potential Impact:** **Suggested Action(s)**: Using the SPID in the message, follow the steps below to gather information about the process/transaction: 1. Identify the SPID at the head of the blocking chain. Use the SQL Enterprise Manager as follows: a. Expand the server group; then expand the server. b. Expand 'Management'; then expand 'Current Activity' c. Expand 'Locks/Process ID.' In the details pane, the SPIDs, along with their blocking information, are displayed. The SPIDs that are blocking others will appear as '(Blocking).' Note, however, that it is sometimes necessary to use direct queries instead of Enterprise Manager, because some types of tempdb blocking problems may prevent you from running queries through Enterprise Manager, which uses temporary table operations. Using direct queries gives you the control necessary to avoid this problem. 2. Find the query that the blocking SPID is running. Use the following command to determine the command issued by a particular SPID: DBCC INPUTBUFFER(<spid>) Alternately, you can use SQL Enterprise Manager as follows: a. Expand the server group; then expand the server. b. Expand 'Management'; then expand 'Current Activity'. c. Click 'Process Info.' The SPIDs are displayed in the details pane. d. Double-click the SPID to see the last Transact-SQL command the SPID executed.

Metric Number	3035
Instruction Text (contd.)	3. Find the type of locks the SPID is holding. You can determine this information by executing the sp_lock system stored procedure. Alternatively you can use Enterprise Manager as follows: * Expand the server group; then expand the server. * Expand 'Management'; then expand 'Current Activity'. * Expand 'Locks/Process ID.' In the details pane, the SPIDs, along with the information on the locks they are holding, are displayed. 4. Find the transaction nesting level and process status of the blocking SPID. The transaction nesting level of a SPID is available in the @@TRANCOUNT global variable. However, it can be determined from outside the SPID by querying the sysprocesses table as follows: select open_tran from sysprocesses where spid=<blocking spid number> The value returned is the @@TRANCOUNT value for the SPID. This value shows the transaction nesting level for the blocking SPID, which in turn can explain why it is holding locks. For example, if the value is greater than zero, the SPID is in the midst of a transaction (in which case it is expected to retain certain locks it has acquired, depending on the transaction isolation level).
Report Type	N/A
Area	Databases

Metric M051_FullScansRate

Metric Number	3051
Name	FullScansRatet
Severity	Minor
Description	Number of unrestricted full scans per second. These can be either base-table or full-index scans
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	20/sec
Reset (value)	Continuous
Message Group	MSQL_Perf
Message Text	DBSPI-3051.1: Full scan rate *Value*/sec too high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** Number of unrestricted full scans per second. These can be either base-table or full-index scans Full Scans occur when there are no restrictions placed on queries, or when the optimizer determines that a table scan is the most efficient way to this can be a heavy performance drain. However there may be also be many small tables that don't have indexes at all. NOTE - A high scans rate does not necessarily indicate a big performance problem, since small table scans may account for most of the scans being performed. However, this metric can still be useful as an overall indicator of either an increased level of activity in the database, or a change in the types of users or the way they are using the database. So it can indicate that things are out of the ordinary with respect to the type or amount of activity going on. Also, this metric coupled with other such as #3007 (Reads Outstanding) may indicate that too many table scans on large tables are being performed, which warrants further investigation. **Potential Impact:** **Suggested Action(s):** Find the queries or procedures that are causing the unrestricted scans. And/or build new indexes and update statistics. The automatic action report for this metric shows which users are connected to SQL Server. The operator action for the metric generates an Access graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Access Methods

Metric M052_IndxSearchsRate

Metric Number	3052
Name	IndxSearchsRate
Severity	Minor
Description	Number of index searches per second. These are used to start range scans and single index record fetches and to reposition an index.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	1000/sec
Reset (value)	Continuous
Message Text	DBSPI-3052.1: Index searches rate *Value*/sec too high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** Number of index searches per second. These are used to start range scans and single index record fetches and to reposition an index. In general the number of Index is recommended to be high. This means that more searches are being performed thru the use of indexes rather than full scans. This is preferable. However on large databases where the data is constantly changing, if this value starts to decrease and the full scan value starts to increase. It is possible that the statistics for the tables and indexes need to be updated. **Potential Impact:** **Suggested Action(s):** Update the statistics for the affected tables. Use Enterprise Manager to reschedule when statistics samples are updated. They may not be occurring frequently enough, or they may not be scheduled at all. In this case set 'auto update statistics' database option on all your databases. The automatic action report for this metric shows which users are connected to SQL Server. The operator action for the metric generates an Access graph
Report Type	Automatic, operator initiated, and application bank.
Area	Access Methods

Metric M053_PgesAlloctdRate

Metric Number	3053
Name	PgesAlloctdRate
Severity	Minor

Metric Number	3053
Description	Number of pages allocated per second to database objects used for storing index or data records.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	1000/sec
Reset (value)	Continuous
Message Text	DBSPI-3053.1: Pages allocated rate *Value*/sec too high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** Number of pages allocated per second to database objects used for storing index or data records. A large amount of data is being added to the database, or data is being moved in an unfortunate manner causing page splitting. The relationship between this metric and #3054 (Extents allocated rate) can be informative. If existing tables are growing, then 8 pages will tend to be allocated for each extent allocated. On the other hand, if smaller tables are being created, only one or two pages may be allocated for each extent allocated. So an increase in one or both of these metrics can indicate a change in the type of activity being performed on a database. **Potential Impact:** **Suggested Action(s):** This may be normal, but watch the trends here, as it will help you determine how busy your I/O subsystem is. Query optimization probably would not help much here, unless the problem is that temp tables are being created unnecessarily. Applying a fill factor to tables might help in the short term, if pages are being allocated due to page splits. Unfortunately, there is no known method of accurately tracking page splitting, short of analyzing the entire transaction log. The automatic action report for this metric shows which users are connected to SQL Server. The operator action for the metric generates an Access graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Access Methods

Metric M054_ExtntsAllocRate

Metric Number	3054
Name	ExtntsAllocRate
Severity	Minor
Description	Number of extents allocated per second to database objects used for storing index or data records
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	300/sec
Reset (value)	Continuous
Message Text	DBSPI-3054.1: Extents allocated rate *Value*/sec too high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** Number of extents allocated per second to database objects used for storing index or data records This should be an indication of table creation such as the creation oftemporary tables. If many new rows are added to indexed database tables. The index may have more than a usual rate of Extents allocated. The relationship between this metric and #3053 (Pages allocated rate) can be informative. If existing tables are growing, then 8 pages will tend to be allocated for each extent allocated. On the other hand, if smaller tables are being created, only one or two pages may be allocated for each extent allocated. So an increase in one or both of these metrics can indicate a change in the type of activity being performed on a database. **Potential Impact:** **Suggested Action(s):** If this is an indexing problem and a regular one, the addition of new index pages may be reduced by implementing a fill factor of the indexes. If the problem is frequent and related to the creation of tables, an alternative to using temporary tables may need to be found in SQL. - Query optimization and using fill factor is one suggestion. However, query optimization might not help much here, unless the problem is that temp tables are being created unnecessarily. Applying a fill factor to tables might help in the short term, if pages are being allocated due to page splits. Unfortunately, there is no known method of accurately tracking page splitting, short of analyzing the entire transaction log. The automatic action report for this metric shows which users are connected to SQL Server.The operator action for the metric generates an Access graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Access Methods

Metric M055_PageSplitsRates

Metric Number	3055
Name	PageSplitsRates
Severity	Minor
Description	Number of page splits per second that occur as the result of overflowing index pages.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	1000/sec
Reset (value)	Without reset
Message Text	DBSPI-3055.1: Page splits rate *Value*/sec) too high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** Number of page splits per second that occur as the result of overflowing index pages. Heavy table inserts or updates that change the positions of rows. If the index pages are full, they will need to be split which produces excessive IO. **Potential Impact:** **Suggested Action(s):** Use fillfactors on the indexes to decrease the number of Page Splits, periodically rebuild indexes to enforce the fillfactors. The automatic action report for this metric shows which users are connected to SQL Server. The operator action for the metric generates an Access graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Access Methods

Metric M056_TblLckEscalRate

Metric Number	3056
Name	TblLckEscalRate
Severity	Minor
Description	Number of times locks on a table were escalated.
Alarming and/or Graphing metric	A & G

Metric Number	3056
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	0.5
Reset (value)	Continuous
Message Text	DBSPI-3056.1: Table lock escalation rate *Value*/sec) too high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** Number of times locks on a table were escalated Large numbers of locks being placed by a process on a table. According to Microsoft, 'Lock escalation is the process of converting many fine-grain locks into fewer coarse-grain locks, reducing system overhead. Microsoft? SQL Server? automatically escalates row locks and page locks into table locks when a transaction exceeds its escalation threshold ?thresholds are determined dynamically by SQL Server and require no configuration.' While this is true, the major problem to be addressed is not when the table escalations occur, but that they occur at all. In other words, even if you could alter the lock escalation threshold, it would be addressing the symptoms, not the cause. Increased table locks may lead to increased blocking and/or deadlocks. **Potential Impact:** **Suggested Action(s):** Analyze and tune queries, run UPDATE STATISTICS, make sure you have useful indexes on the table. The automatic action report for this metric shows which users are connected to SQL Server. The operator action for the metric generates an Access graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Access Methods

Metric M064_DBActivTransCnt

Metric Number	3064
Name	DBActivTransCnt
Severity	Warning
Description	Number of active transactions for the entire server.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	5
Reset (value)	Without reset
Message Text	DBSPI-3064.1: # of active transactions for the entire server *Value too* high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** Number of active transactions for the entire server. Increased server workload. **Potential Impact:** **Suggested Action(s):** If the server slows down: optimize queries, upgrade server hardware or migrate part of the data to a separate server. The automatic action report for this metric shows which users are connected to SQL Server. The operator action for the metric generates a Server graph.
Report Type	Automatic, oprator initiated, and application bank.
Area	Server

Metric M264_DBActivTransCnt

Metric Number	3264
Name	DBActivTransCnt
Severity	Warning
Description	Number of active transactions for each database in the server.
Alarming and/or Graphing metric	A
Collection Interval	1 hour

Metric Number	3264
Min/Max Threshold	Maximum
Threshold	5
Reset (value)	Without reset
Message Text	DBSPI-3264.1: # of active transactions for the database (*database_name*) *Value* too high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** Number of active transactions for each database in the server. Increased server workload. **Potential Impact:** **Suggested Action(s):** If the server slows down: optimize queries, upgrade server hardware or migrate part of the data to a separate server. The automatic action report for this metric shows active transactions by database and which users are connected to SQL Server.
Report Type	Automatic.
Area	Databases

Metric M066_DBLogGrowthsCnt

Metric Number	3066
Name	DBLogGrowthsCnt
Severity	Major
Description	# of transaction log expansions for server
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	4
Reset (value)	Continuous
Message Text	DBSPI-3066.1: # of transaction log expansions for the entire server *Value* too high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** Number of times the transaction log has been expanded for the entire server. SQL Server has run out of space for the transaction log and expanded it, or a system administrator has expanded the log to provide more space. **Potential Impact:** **Suggested Action(s)**: This depends on whether expansion is a desirable event. If the expansion is because of increased activity on the database, they will continue. The changes may be kept or the frequency of backup tran commands may need to be increased. If the changes are due to a single unique event, an administrator may consider truncating the log and shrinking it back to its original size. The automatic action report for this metric shows which users are connected to SQL Server. The operator action for the metric generates a Trans graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Server

Metric M266_DBLogGrowthsCnt

Metric Number	3266
Name	DBLogGrowthsCnt
Severity	Major
Description	Number of times the transaction log for each database has been expanded.

Metric Number	3266
Alarming and/or Graphing metric	A
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	4
Reset (value)	Continuous
Message Text	DBSPI-3266.1: # of transaction log expansions for (*database_name) Value* too high (>=*Threshold*).
Instruction Text	**Probable Cause(s)**: Number of times the transaction log for each database has been expanded. SQL Server has run out of space for the transaction log and expanded it.Or a system administrator has expanded the log to provide more space **Potential Impact:** **Suggested Action(s):** This depends on whether expansion is a desirable event. f the expansion is because of increased activity on the database, they will continue. The changes may be kept or the frequency of backup tran commands may need to be increased . If the changes are due to a single unique event, an administrator may consider truncating the log and shrinking back to its original size. The automatic action report for this metric shows which users are connected to SQL Server.
Report Type	Automatic
Area	Databases

Metric M067_DBLogShrinksCnt

Metric Number	3067
Name	DBLogShrinksCnt
Severity	Major
Description	# of server transaction log shrinks for server
Alarming and/or Graphing metric	A
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	4
Reset (value)	Continuous
Message Text	DBSPI-3267.1: # of transaction log shrinks for (*database_name*) *Value* too high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** Number of times the transaction log for each database has been shrunk. SQL Server 7 has automated processes for many administration tasks. Among them are tasks to shrink a database is a specified percent of the allocated space is unused. **Potential Impact:** **Suggested Action(s):** This depends on whether expansion is a desirable event. If the shrinkage was not intended, the administrator will have to disable the automated process and expand the log back to its original size. The automatic action report for this metric shows which users are connected to SQL Server.
Report Type	Automatic and application bank.
Area	Server

Metric M267_DBLogShrinksCnt

Metric Number	3267
Name	DBLogShrinksCnt
Severity	Major
Description	# of database transaction log shrinks per database
Alarming and/or Graphing metric	A

Metric Number	3267
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	4
Reset (value)	Continuous
Message Text	DBSPI-3267.1: # of transaction log shrinks for (*database_name*)> *Value* too high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** Percentage of space available in each filegroup for each database. Database filegroup is getting filled up. **Potential Impact:** **Suggested Action(s):** The following actions can be executed to remedy the situation: Use ALTER DATABASE to increase the size of the filegroup, or add a new filegroup. Drop objects from the database. Delete rows from tables in the database. The most natural action is, obviously, to add space to the database by executing the ALTER DATABASE command. If there is no free space available on the existing database devices, a new device has to be created by the DISK INIT command, or an exiting device has to be extended by executing the DISK RESIZE command.The automatic action report for this metric will show statistics for each filegroup in the database.
Report Type	Automatic
Area	Databases

Metric M068_LatchWaitsRate

Metric Number	3068
Name	LatchWaitsRate
Severity	Minor
Description	Number of latch requests that could not be granted immediately and had to wait before being granted.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	10/sec
Reset (value)	Continuous
Message Text	DBSPI-3068.1: Latch waits rate *Value*/sec) too high (>=*Threshold*sec).
Instruction Text	**Probable Cause(s):** Number of latch requests that could not be granted immediately and had to wait before being granted. Many users are trying to access the same row at the same time. This is a performance bottleneck. **Potential Impact:** **Suggested Action(s):** This may require analysis of the database design, process design, and coding. The automatic action report for this metric shows which users are connected to SQL Server.
Report Type	Automatic, operator initiated, and application bank.
Area	Latches

Metric M069_AvgLatchWaitTim

Metric Number	3069
Name	AvgLatchWaitTim
Severity	Minor
Description	Average latch wait time (in milliseconds) for latch requests that had to wait since the server started. See M076 for current average latch wait time.
Alarming and/or Graphing metric	A & G

Metric Number	3069
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	500 ms
Reset (value)	Continuous
Message Text	DBSPI-3069.1: Average latch wait time *Value* milliseconds too high (>=*Threshold* milliseconds).
Instruction Text	**Probable Cause(s):** Average latch wait time (in milliseconds) for latch requests that had to wait since the server started. See M076 for current average latch wait time.Many users are trying to access the same row at the same time. This is a performance bottleneck. **Potential Impact:** **Suggested Action(s):** This may require analysis of the database design, process design, and coding. The automatic action report for this metric shows which users are connected to SQL Server. The operator action for the metric generates a Latches graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Latches

Metric M070_LockTimeoutRatet

Metric Number	3070
Name	LockTimeoutRate
Severity	Minor
Description	Number of lock requests per second that timed out, including internal requests for NOWAIT locks for each object type: Extent, Key, Page, Table, RID, Database.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	10/sec
Reset (value)	Continuous
Message Text	DBSPI-3070.1: Lock timeout rate *Value*/sec too high >=*Threshold*/sec.
Instruction Text	**Probable Cause(s):**Number of lock requests per second that timed out, including internal requests for NOWAIT locks for all objects combined. Locks are being held too long, which usually indicates a locking contention problem. The performance impact is that processes will not complete properly and will abort. **Potential Impact:** **Suggested Action(s):** The SQL code will need to be analyzed. Look for unnecessary exclusive locks, holdlocks or overly long transactions. Often a process design problem. The automatic action report for this metric shows which users are connected to SQL Server. The operator action for the metric generates a Locks graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Locks

Metric M270_LockTimeoutRate

Metric Number	3270
Name	LockTimeoutRate
Severity	Minor
Description	Number of lock requests per second that timed out, including internal requests for NOWAIT locks for each object type: Extent, Key, Page, Table, RID, Database.

Metric Number	3270
Alarming and/or Graphing metric	A
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	10/sec
Reset (value)	Continuous
Message Text	DBSPI-3270.1: Lock timeout rate for object (*instance_name*) *Value*/sec too high (>=*Threshold*/sec).
Instruction Text	**Probable Cause(s):** Number of lock requests per second that timed out, including internal requests for NOWAIT locks for each object type: Extent, Key, Page, Table, RID, Database. Locks are being held too long, which usually indicates a locking contention problem. The performance impact is that processes will not complete properly and will abort. **Potential Impact:** **Suggested Action(s):** The SQL code will need to be analyzed. Look for unnecessary exclusive locks, holdlocks or overly long transactions. Often a process design problem. The automatic action report for this metric shows which users are connected to SQL Server.
Report Type	Automatic
Area	Locks

Metric M071_DeadlocksRate

Metric Number	3071
Name	DeadlocksRate
Severity	Major
Description	Number of lock requests per second that resulted in a deadlock for all objects combined.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	3/sec
Reset (value)	Continuous
Message Text	DBSPI-3071.1: Deadlocks rate *Value*/sec) too high (>=*Threshold*/sec).
Instruction Text	**Probable Cause(s):** Number of lock requests per second that resulted in a deadlock for all objects combined. Two or more processes are accessing data in different orders, or size of transaction is too large. In any multi-use environment, occasional lock collisions are normal. Excessive lock collisions are a performance hit. Performance will be impacted since one of the deadlocked processes will become the victim and will be terminated by the server. **Potential Impact:** **Suggested Action(s):** Deadlocks are a performance hit for two reasons. First, because all of the work of the deadlocked process needs to be rolled back. Second, because it probably has to be done again anyway. Action depends on situation. You may need to restructure indexes; or reschedule load processes when readers are not running, or make transactions shorter/smaller. In other words: optimize queries. Also often a process design problem. The automatic action report for this metric shows which users are connected to SQL Server. The operator action for the metric generates a Locks graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Locks

Metric M271_DeadlocksRate

Metric Number	3271
Name	DeadlocksRate

Metric Number	3271
Severity	Major
Description	Number of lock requests per second that resulted in a deadlock for each object type: Extent, Key, Page, Table, RID, Database.
Alarming and/or Graphing metric	A
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	3/sec
Reset (value)	Continuous
Message Text	DBSPI-3271.1: Deadlocks rate for object (*instance_name*) *Value*/sec too high (>=*Threshold*/sec).
Instruction Text	**Probable Cause(s):** Number of lock requests per second that resulted in a deadlock for each object type: Extent, Key, Page, Table, RID, Database. Two or more processes are accessing data in different orders, or size of transaction is too large. In any multi-use environment, occasional lock collisions are normal. Excessive lock collisions are a performance hit. Performance will be impacted since one of the deadlocked processes will become the victim and will be terminated by the server. **Potential Impact:** **Suggested Action(s):** Deadlocks are a performance hit for two reasons. First, because all of the work of the deadlocked process needs to be rolled back. Second, because it probably has to be done again anyway. Action depends on situation. You may need to restructure indexes; or reschedule load processes when readers are not running, or make transactions shorter/smaller. In other words: optimize queries. Also often a process design problem. The automatic action report for this metric shows which users are connected to SQL Server.
Report Type	Automatic
Area	Locks

Metric M072_LocksWaitRate

Metric Number	3072
Name	LocksWaitRate
Severity	Minor
Description	Locks wait rate.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	10/sec
Reset (value)	Continuous
Message Text	DBSPI-3072.1: Locks wait rate *Value*/sec) too high (>=*Threshold*/sec).
Instruction Text	**Probable Cause(s):** Number of lock requests per second that could not be satisfied immediately and required the caller to wait, for all object types combined: Extent, Key, Page, Table, RID, Database.Many users are trying to access the same row at the same time or there is a performance bottleneck due to increased activity. **Potential Impact:** **Suggested Action(s)**: This is normal unless you are experiencing excessive lock timeouts (as measured by user complaints). Then this becomes a very useful metric for understanding volumes. This may require analysis of the database design and coding. The automatic action report for this metric shows a lock count for each object and which users are connected to SQL Server. The operator action for the metric generates a Locks graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Locks

Metric M272_LocksWaitRate

Metric Number	3272
Name	LocksWaitRate
Severity	Minor
Description	Locks wait rate per object type.

Metric Number	3272
Alarming and/or Graphing metric	A
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	10/sec
Reset (value)	Continuous
Message Text	DBSPI-3272.1: Locks wait rate for object (*instance_name*) *Value*/sec) too high (>=*Threshold*/sec).
Instruction Text	**Probable Cause(s):** Number of lock requests per second that could not be satisfied immediately and required the caller to wait for each object type: Extent, Key, Page, Table, RID, Database.Many users are trying to access the same row at the same time or there is a performance bottleneck due to increased activity. **Potential Impact:** **Suggested Action(s):** This is normal unless you are experiencing excessive lock timeouts (as measured by user complaints). Then this becomes a very useful metric for understanding volumes. This may require analysis of the database design and coding.The automatic action report for this metric shows a lock count for each object and which users are connected to SQL Server.
Report Type	Automatic.
Area	Locks

Metric M073_LockAvgWaitTime

Metric Number	3073
Name	LockAvgWaitTime
Severity	Minor
Description	Average amount of wait time (in milliseconds) for each lock request that resulted in a wait for all objects combined.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	500 millisecond
Reset (value)	Without reset
Message Text	DBSPI-3073.1: Average lock wait time *Value* milliseconds too high (>=*Threshold* milliseconds).
Instruction Text	**Probable Cause(s):** Average amount of wait time (in milliseconds) for each lock request that resulted in a wait for all objects combined. Many users are trying to access the same row at the same time, or there is a performance bottleneck preventing latches from being released. **Potential Impact:** **Suggested Action(s):** This may require analysis of the database design and coding for locking issues. Quick fixes include getting faster CPUs. The automatic action report for this metric shows which users are connected to SQL Server.The operator action for the metric generates a Locks graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Locks

Metric M273_LockAvgWaitTime

Metric Number	3273
Name	LockAvgWaitTime
Severity	Minor
Description	Average lock wait time for each object type: Extent, Key, Page, Table, RID, Database.

Metric Number	3273
Alarming and/or Graphing metric	A
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	500 milliseconds
Reset (value)	Without reset
Message Text	DBSPI-3273.1: Average lock wait time for object (*instance_name*) *Value* milliseconds too high (>=*Threshold* milliseconds).
Instruction Text	**Probable Cause(s):** Average amount of wait time (in milliseconds) for each lock request that resulted in a wait for each object type: Extent, Key, Page, Table, RID,Database Many users are trying to access the same row at the same time, or there is a performance bottleneck preventing latches from being released. **Potential Impact:** **Suggested Action(s)**: This may require analysis of the database design and coding for locking issues. Quick fixes include getting faster CPUs. The automatic action report for this metric shows which users are connected to SQL Server.
Report Type	Automatic
Area	Locks

Metric M074_BatchReqstsRate

Metric Number	3074
Name	BatchReqstsRate
Severity	Minor
Description	Batch requests rate.
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	500/sec
Reset (value)	Without reset
Message Text	DBSPI-3074.1: Batch requests rate *Value*/sec too high (>=<*Threshold*/sec).
Instruction Text	**Probable Cause(s):** Number of Transact-SQL command batches received per second. More users are making more and more requests of the Server. Increased load. **Potential Impact:** **Suggested Action(s):** Test to see if the Server is stressed. In general the higher the number of batches the better, provided the Server can keep up. The automatic action report for this metric shows which users are connected to SQL Server.The operator action for the metric generates a Server graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Server

Metric M075_LockMemoryPct

Metric Number	3075
Name	M075_LockMemoryPct
Severity	Warning
Description	% of lock memory in use.
Alarming and/or Graphing metric	A & G

Metric Number	3075
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	37%
Reset (value)	Continuous
Message Text	DBSPI-3075.1: % of lock memory in use *Value* too high (>=*Threshold*).
Instruction Text	**Probable Cause(s):** SQL Server lock memory is approaching reconfiguration threshold. In SQL Server 7, lock memory and total memory are 'autoconfiguring' by default. However SQL Server will not allocate more than 40% of total memory to locking. **Potential Impact:** **Suggested Action(s):** Manually modify the 'Number of locks available' to a specified value using sp_configure. The automatic action report for this metric shows which users are connected to SQL Server.The operator action for the metric generates a Locks graph.
Report Type	Automatic, operator initiated, and application bank.
Area	Server

Metric M076_CurAvgLatchWait

Metric Number	3076
Name	CurAvgLatchWait
Severity	Minor
Description	Current average latch wait time .
Alarming and/or Graphing metric	A & G
Collection Interval	1 hour
Min/Max Threshold	Maximum
Threshold	500 milliseconds
Reset (value)	Continuous
Message Text	DBSPI-3076.1: Current average latch wait time *Value* milliseconds too high (>=*Threshold* milliseconds).
Instruction Text	**Probable Cause(s):** Average latch wait time (in milliseconds) for latch requests that had to wait during the current collection interval (default is 1 hour). See M069 for the average latch wait time since the server was started. Many users are trying to access the same row at the same time. This is a performance bottleneck. **Potential Impact:** **Suggested Action(s)**: This may require analysis of the database design, process design, and coding. The automatic action report for this metric shows which users are connected to SQL Server. The operator action for the metric generates a Latches graph.
Report Type	Automatic and operator initiated.
Area	Latches

Metric M277_CompletedJobs

Metric Number	3277
Name	CompletedJobs
Description	Report on all jobs, successful, failed & canceled.
Collection Interval	5 mins
Min/Max Threshold	Maximum

Metric Number	3277
Thresholds	2: Fail 3: Cancelled
Reset (value)	Continuous
Message Text	DBSPI-3277.1: Job cancelled. Job name = <$OPTION(job_name)>, Job id = <$OPTION(job_id)>, run date = <$OPTION(run_date)>, runtime = <$OPTION(run_time) for <$OPTION(dbserv)>>" AUTOACTION "dbspimjh.bat <$OPTION(job_id)> <$OPTION(run_date)> <$OPTION(run_time)> <$OPTION(dbserv)>
Instruction Text	**Probable Cause(s):** An MS SQL Server job has failed or been cancelled. A job was cancelled or failed to complete successfully. **Potential Impact:** **Suggested Action(s):** Check the annotations for the steps completed. If successful, all steps will have completed. If failed or cancelled, then it will show the steps completed before the failure or cancellation. The automatic action for the metric generates a report on the completed steps for this job. The operator action for this metric shows the status of all jobs running.
Condition	DBSPI-3277.1
Default Threshold	3=Cancelled
Severity	Warning
Message Text	DBSPI-3277.1:Job Canceled. Job name - job_name, Job id-*job_id*, run date = *run_date*, runtime = *run_time*
Condition	DBSPI-3277.2
Default Threshold	2=Fail
Message Text	DBSPI-3277.2: Job failed. Job name = *job_name*, Job id = *job_id*, run date = *run_date*, runtime = *run_time*
Severity	Major Warning
Condition	DBSPI-3277.3
Default Threshold	1=Success
Message Text	DBSPI-3277.3: Job succeeded. Job name = *job_name*, Job id = *job_id*, run date = *run_date*, runtime = *run_time*
Report Type	Automatic and operator initiated.
Area	Jobs

Metric M278_FileGrpUsedSpacePct

Metric Number	3278
Name	FileGrpUsedSpacePct
Severity	Minor Major Critical
Description	Space used per filegroup per database
Alarming and/or Graphing metric	A
Collection Interval	15 Minute
Min/Max Threshold	Maximum
Default OVO Threshold	90% 95% 99%
Reset (value)	Without reset
Message Text	DBSPI-3278.1.1: % filegroup space used (<$VALUE>%) for transaction log filegroup in database <$OPTION(database_name)> too high (>=<$THRESHOLD>%) for <$OPTION(dbserv)>.
Instruction Text	**Probable Cause(s):** Percentage of space available in each filegroup for each database. Database filegroup is getting filled up. **Potential Impact:** **Suggested Action(s):** The following actions can be executed to remedy the situation: Use ALTER DATABASE to increase the size of the filegroup, or add a new filegroup. Drop objects from the database. Delete rows from tables in the database. The most natural action is, obviously, to add space to the database by executing the ALTER DATABASE command. If there is no free space available on the existing database devices, a new device has to be created by the DISK INIT command, or an exiting device has to be extended by executing the DISK RESIZE command. The automatic action report for this metric will show statistics for each filegroup in the database.
Report Type	Automatic and application bank.
Area	Space

Metric M279_FileGrpSpaceFree

Metric Number	3279
Name	FileGrpSpaceFree

Metric Number	3279
Severity	150MB 100MB 50MB
Description	Free space in MB available in each filegroup for each database.
Alarming and/or Graphing metric	A
Collection Interval	15 min
Min/Max Threshold	Min
Threshold	Minor Major Critical
Reset (value)	Without reset
Message Text	DBSPI-3279.1.1: filegroup space MB free (<$VALUE> MB) for transaction log filegroup in database <$OPTION(database_name)> too low (\ \<=<$THRESHOLD> MB) for <$OPTION(dbserv)>.
Instruction Text	**Probable Cause(s):** Free space in MB available in each filegroup for each database. Database filegroup is getting filled up. **Potential Impact:** **Suggested Action(s):** The following actions can be executed to remedy the situation: Use ALTER DATABASE to increase the size of the filegroup, or add a new filegroup. Drop objects from the database. Delete rows from tables in the database. The most natural action is, obviously, to add space to the database by executing the ALTER DATABASE command. If there is no free space available on the existing database devices, a new device has to be created by the DISK INIT command, or an exiting device has to be extended by executing the DISK RESIZE command. The automatic action report for this metric will show statistics for each filegroup in the database.
Report Type	Automatic and application bank.
Area	Space

Metric M080_FailedReports

Metric Number	3080
Name	Failed Reports (summary)
Description	Report executions failed (summary). To work correctly requires SQL Server 2000 Reporting Services Service Pack 1; downloadable from http://www.microsoft.com/downloadsdetails.aspx?familyid=580febf7-2972-40e7-bccf-6cd90ac2f464&displaylang=en
Min/Max Threshold	Max
Threshold	1.0
Reset (value)	W/O
Message Text	DBSPI-3080.1:Number of Reports Failed <$VALUE> above <$THRESHOLD> for <$OPTION(dbname)>.
Instruction Text	**Probable Cause(s):** * DataSource is not configured properly. * Report took too long to execute. * Schedule used to trigger the report has expired. * The report is undeliverable (it is too big). * The delivery extension specified in the subscription has been uninstalled or disabled. * The credential settings changed from integrated to stored or prompted values. * Parameter name or datatype changed in the report definition and the report was republished. If the subscription includes a parameter that is no longer valid, the subscription becomes invalid. **Potential Impact:** **Suggested Action(s)**: * Check the Application Log for errors related to Reporting Service. * Ensure that the subscription is active. * The credentials used to run the report are valid. * Datasource used to connect to the DB is working. The operator action for the metric generates a report of failed reports
Report Type	Automatic (in message details); Manual (using DatabaseSPI Reports tool)
Area	Reports

Metric M280_FailedReports

Metric Number	3280
Name	Failed Reports (drill-down)
Description	Report executions failed (drill-down). To work correctly requires SQL Server 2000 Reporting Services Service Pack 1; downloadable from http://www.microsoft.com/downloadsdetails.aspx?familyid=580febf7-2972-40e7-bccf-6cd90ac2f464&displaylang=en
Min/Max Threshold	Max
Threshold	1.0
Reset (value)	W/O
Message Text	DBSPI-3080.1:Number of Reports Failed <$VALUE> above <$THRESHOLD> for <$OPTION(dbname)>.
Instruction Text	**Probable Cause(s)**: * DataSource is not configured properly. * Report took too long to execute. * Schedule used to trigger the report has expired. * The report is undeliverable (it is too big). * The delivery extension specified in the subscription has been uninstalled or disabled. * The credential settings changed from integrated to stored or prompted values. * Parameter name or datatype changed in the report definition and the report was republished. If the subscription includes a parameter that is no longer valid, the subscription becomes invalid. **Potential Impact:** **Suggested Action(s)**: * Check the Application Log for errors related to Reporting Service. * Ensure that the subscription is active. * The credentials used to run the report are valid. * Datasource used to connect to the DB is working. The operator action for the metric generates a report of failed reports.
Report Type	Automatic (in message details); Manual (using DatabaseSPI Reports tool)
Area	Reports

Metric M081_RepnAgentStatus

Metric Number	3081
Name	Repn Agent Status
Severity	Major
Description	Replication agents status. This metric checks the status of the snapshot agent, logreader agent, distribution agent, and merge agent for each distribution database in a particular Microsoft SQL Server replication environment. A message is sent to the management server if any of the agents fail. This metric generates an annotation text report that contains details of all failed replication agents.
Alarming and/or Graphing metric	A
Collection Interval	5 minute
Min/Max Threshold	Maximum
Threshold	0.5
Reset (value)	Continuous
Message Text	One or more replication agents failed.
Instruction Text	**Probable Cause(s)**: One or more Replication agents failed.Server not available, deadlock, connection failure or time-out failure. **Potential Impact:** **Suggested Action(s)**: Check the agent history and job history for other issues occurred around the same time, Verify the basic connectivity is working between the computers accessed by the agent. The automatic action report for this metric will show the list of agents which are failed.
Report Type	Automatic, operator initiated, and application bank.
Area	Database

Metric M082_RepnLatency

Metric Number	3082
Name	Replication Latency
Severity	Warning

Metric Number	3082
Description	Status of replication latency. This metric monitors the replication latency, that is, the time between transactions marked for replication being added to the log file of the publication database and being added to the log file of the distribution database, for each distribution database in a particular Microsoft SQL Server replication environment. A message is sent to the management server when a distribution database has a replication latency that is more than the threshold value. This metric generates an annotation text report that contains the replication latency details for all distribution databases.
Alarming and/or Graphing metric	A
Collection Interval	15 minutes
Min/Max Threshold	Maximum
Threshold	60.0
Reset (value)	Continuous
Message Text	One or more replication agents failed.
Instruction Text	**Probable Cause(s):** Replication latency for one or more publisher is high.Delay in distribution of commands which are marked for replication. May be there are some issues for the log reader or distribution agent. Potential Impact: **Suggested Action(s):** Check for the distribution of commands which are marked for replication
Report Type	Automatic, operator initiated, and application bank.
Area	Database

Metric M083_DelLatency

Metric Number	3083
Name	Delivery Latency
Severity	Warning
Description	Status of replication latency. This metric monitors the delivery latency, that is, the time between a transaction being inserted in the distribution database and being executed against the destination database (subscriber), for each distribution database in a particular Microsoft SQL Server replication environment. A message is sent to the management server when a distribution database has a delivery latency that is more than the threshold value. This metric generates an annotation text report that contains the delivery latency details for all distribution databases.
Alarming and/or Graphing metric	A
Collection Interval	15 minutes
Min/Max Threshold	Maximum
Threshold	60.0
Reset (value)	Continuous
Message Text	Delivery Latency <$VALUE> for the Distribution Agent with agent_id <$OPTION(agent_id)> too high (>=<$THRESHOLD>) for the publisher <$OPTION(publisher)>
Instruction Text	**Probable Cause(s):** Delivery latency for one or more publisher is high.Delay in distribution of commands which are marked for replication. May be there are some issues for the distribution agent. **Potential Impact:** **Suggested Action(s)**: Check for the distribution of commands which are waiting in the distribution database.
Report Type	Automatic, operator initiated, and application bank.
Area	Database

Microsoft SQL Server 7, 2000, and 2005 Reporting Metrics

The reports listed in the following table are generated by the respective metrics and are available through HP OpenView Reporter.

Report Category	Description	Interval	Metric
SQL Server Availability	Reports uptime information	5-minute	M243_Inst.UptimeM
SQL Server Database Size	Database size in MB allocated and free	daily	M240_DBSize
SQL Server Table Size	Table size in MB allocated and free	daily	M241_TableSize
SQL Server Virtual Device Size	Virtual device size in MB allocated	daily	M242_VirtDeSize
SQL Server Workload Sybase I/O	Number of physical reads and writes to the disk since the last collection for each tablespace.	daily	M244_InstIO
*SQL Server Sessions	Number of maximum number of sessions	5-minute	M031_ NumUsersCnt
*SQL Server Transactions	Number of transactions	5-minute	M009_ TransactionRate

**Session* and *transaction reports* derive from metrics collected for graphing templates (as well as Reporter reports). If you did not enable reports and graphs when you saved your configuration file (answering [yes] to the prompt), to generate these reports, run the *Enable Graphs* application against the managed node:
Admin→Enable Graphs [UNIX managed nodes];
Admin Windows→Enable Graphs [Windows managed nodes]).

Reporter Metric Data Specifications (OSM metrics)

The following table gives a description of each metric and the table column contents as they appear in tables used by Reporter.

Table 1 Metrics in Reporter table **MSSQLOSM_Metrics**

Metric	Description	metricid	objectid	valueid	value
M240_DBSize	Database Size	3240	Database Name	1	Megabytes Allocated
"	'	"	"	2	Megabytes Free
M241_TableSize	"Table Size	""3241	Table Name	1	Megabytes Allocated

Table 1 Metrics in Reporter table **MSSQLOSM_Metrics**

Metric	Description	metricid	objectid	valueid	value
"	'	"	"	2	Megabytes Free
M242_VirtDe Size (1)	Virtual Device Size	""3242	Virtual Device Name	1	Megabytes Allocated
				2	Megabytes Free
M243_InstUp time	Availability metric	""3243	Server Instance Name	1	Up=5 Down=0
M244_InstIO	Server Instance I/O	""3244	Server Instance Name	1	Delta of physical reads+writes since last collection

3 MS SQL Server Logfile Text

This chapter provides detailed information about the text contained in the DB-SPI SQL Server logfile templates. This information is meant to cover a range of messages for two of the errors as indicated by their titles.

Catch all errors in the agent file

Description	Catch all errors in the agent file
Severity	Warning
Message Group	MSS_Fault
Help Text	Probable Cause: A message with a warning indicator '!' was detected in the SQL Server Agent logfile. Suggested Action: Examine the error and use the SQL Server reference manuals to determine the exact cause and action to take.

SQL Server is terminating...

Description	Server is terminating
Severity	Warning
Message Group	MSS_Fault
Help Text	Probable Cause: The server is terminating. This could be a normal shutdown via the Service Control Manager. Suggested Action: Look at the tail end of the MS SQL Server logfile located in the Annotations of this browser message for more details. The Annotations will contain the last 200 lines of the logfile. If this is a normal shutdown via the Service Control Manager, then this message can likely be ignored unless the shutdown is unexpected.

SQL Server is starting...

Description	Server is starting
Severity	Warning
Message Group	MSS_Admin
Help Text	The server is starting. This could be a normal startup via the Service Control Manager. Suggested Action: If this is a normal startup, no action is necessary.

MSS-Error601

Description	Error 601
Severity	Critical
Message Group	MSS_Fault
Help Text	Probable Cause: This error indicates that the in-memory structure used by SQL Server to access a system table has been reused. Usually, only user-table descriptors are reused; system table descriptors are always in memory. Suggested Action: To work around this problem, shut down and restart SQL Server. This should temporarily alleviate error 601; however, an underlying problem may still exist. To troubleshoot this problem, do the following: Examine the error logs and the parameters of sp_configure for additional information. Look for warnings indicating that open objects and open databases may be set too low. Look at the settings for memory, open objects, and open databases; increase them if they are not appropriate for the amount of physical memory, number of databases, and number of objects. For more information on how to determine the memory overhead for connections, objects, locks and databases, see the following article in the Microsoft Knowledge Base: Q160234 INF: Memory Overhead for Connections, Objects, Locks, and DBs Also run DBCC CHECKDB, DBCC NEWALLOC, and DBCC CHECKCATALOG to verify that there are no structural problems in the database that may have caused the error.

MSS-Error 602

Description	Error 602
Severity	Critical
Message Group	MSS_Fault
Help Text	Probable Cause: When running an application that uses FORWARD ONLY or DYNAMIC server-side cursors, you may receive error 602 in the error log: Msg 602, Level 2, State 15 Could not find row in Sysindexes for dbid '11', object '80003316', index '1'. Run DBCC CHECKTABLE on Sysindexes. The SQL Server is terminating this process. This does not cause problems with the execution of SQL Server, but the client is disconnected from the server as stated in the message. This problem occurs when all of the following conditions are true: * The query contains an equal join on two or more tables. * A search argument is applied to the join column on the inner table. * An ORDER BY clause is used on two or more columns. * The statement is being used as the record source for a cursor. The cursor is defined as either a DYNAMIC or FORWARD ONLY cursor. If the cursor is called by the Transact-SQL syntax (for example, a DECLARE CURSOR statement) the problem does not occur.
Help Text (contd.)	Suggested Action: To work around the problem, modify the query to not use one of the required conditions that cause this behavior, as noted in the CAUSE section of this article. For example, use a STATIC cursor instead of a DYNAMIC cursor or apply the search argument to the outer table and not the inner table. As an additional workaround, you can do the following: 1. Run showplan on the query you are basing the cursor on. 2. Find the index that the query uses on the table listed in the message 602. 3. Put an index hint in the query to force that index.

MSS-Error 604

Description	Error 604
Severity	Critical
Message Group	MSS_Fault
Help Text	Probable Cause: Under the following conditions, error messages 602, 604 and 618 might appear in the SQL Server errorlog with a severity level of 21, which terminates the client connection: A stored procedure is run repeatedly while SET FMTONLY is enabled and disabled. The stored procedure creates and selects from temporary tables. Suggested Action: Minimize the use of temporary tables in stored procedures that are run on a frequent basis. Microsoft has confirmed this situation to be a problem in SQL Server 7.0. The problem has been corrected in U.S. Service Pack 3 for Microsoft SQL Server 7.0. For information about how to download and install the latest SQL Server Service Pack, see the following Microsoft Web site: http://support.microsoft.com/highlights/sql.asp For more information, contact your primary support provider. Additional Information: Here is the expected text from the errorlog for the three possible error messages:

MSS-Error 605

Description	Error 605
Severity	Critical
Message Group	MSS_Fault

Description	Error 605
Help Text	Probable Cause: This error occurs when Microsoft SQL Server detects database corruption. The second object specified in the text next to object '%.*ls' is probably corrupt. Because this error can mask the existence of other errors, execute DBCC CHECKDB to determine the extent of the damage. If DBCC CHECKDB does not reportadditional errors, the first object mentioned is not corrupt. SQL Server detects database corruption when it traverses the pages of an object and finds a page in the chain whose object ID does not match that of the object being accessed. There is probably a damaged page chain, a corrupt Index Allocation Map (IAM), or an invalid entry in the sysobjects system tablefor that object. A clustered table has one doubly-linked page chain for the table data as well as one for each index level. A nonclustered index has a page chain for each level of the index. Pages in a heap are not linked. The IAM is used to find the pages of a heap. Although error 605 usually displays two object names, other variations can occur: If instead of an object name the error displays a number greater than 0, it means that an attempt was made to reference an object ID that does not exist in a system table for that object. If the error reports the first object ID as 0, an unallocated page was probably encountered. (There is no object ID equal to 0.)

Description	Error 605
Help Text	If the error states that a page belongs to object ALLOCATION, some of the allocation structures used by the database might be corrupted. Usually this error occurs after the corruption has been written to the database on disk, but it can also occur entirely in the cache without the damage ever being written to the disk. This is known as a transient 605 error and is not associated with data corruption. If error 605 occurs during data access, but subsequent DBCC CHECKDB statements complete without error, the 605 error was probably transient. Transient 605 errors can be caused by the operating systemprematurely notifying SQL Server that an I/O operation has completed; the error message is displayed even though no actual data corruption exists. Nontransient 605 errors are often caused by hardware or disk device driver failure. Suggested Action: Execute DBCC CHECKTABLE on the second object specified in the error message. To determine the full extent of the corruption, execute DBCC CHECKDB as soon as possible. Also check the error log for other errors, which often accompany a 605 error. If the 605 error is not transient, the problem is severe and you must run DBCC CHECKDB with one of the repair clauses. If the error involves an index page, use the REPAIR_REBUILD clause. If the error involves a data page, it may be necessary to use the REPAIR_ALLOW_DATA_LOSS clause. In the likely event that you cannot allow the loss of data, you will need to restore from a state of the database at the time of the backup. Important: If running DBCC CHECKDB with one of the repair clauses does notcorrect the index problem, or if you are unsure what effect DBCC CHECKDB with a repair clause has on your data, contact your primary support provider. In addition, run hardware diagnostics and correct any problems. You might find it beneficial to perform a completely new setup on the computer, including reformatting the disk drives and reinstalling the operating system. This eliminates the possibility that a .dll or .exe program is corrupted. You can also examine your operating-system error log to see if the error occurred as a result of hardware failure. Finally, be sure that your system does not have write caching enabled on the disk controller. If you suspect this to be the problem, contact your hardware vendor.

Description	Error 605
Help Text (contd.)	Additional Information: DBCC CHECKDB offers the REPAIR_REBUILD and REPAIR_ALLOW_DATA_LOSS clauses. The REPAIR_REBUILD clause rebuilds corrupt indexes and the REPAIR_ALLOW_DATA_LOSS clause fixes allocation problems. Sometimes, deleting pages is the only way to fix allocation problems. Typically, these pages contain data that was already deleted, but the pages may contain valid data. Therefore, deleting pages is a more risky option than using DBCC CHECKDB with a repair clause. Using DBCC CHECKDB with a repair clause fixes database corruption when a database backup is not available. If your database is a data warehouse, you may be able to continue operating without the lost data for some time before reloading the missing data. In these cases, use DBCC CHECKDB with the REPAIR_ALLOW_DATA_LOSS clause to fix the damaged database. You can prevent problems by following these guidelines: Run SQL Server only on hardware and controllers that are certified for your operating system. Perform regular backups in conjunction with DBCC CHECKDB statements. DBCC CHECKDB performs all checks that DBCC NEWALLOC and DBCC CHECKALLOC previously did, but DBCC CHECKDB is faster. This is the only way to be confident of the state of the database at the time of the backup. If the data is critical, back up the transaction log frequently. This makes it possible to reduce your window of vulnerability, even in the event of a catastrophic hardware problem, to an hour or less. In the most critical situations, use a standby server and a continually running batch job to take transaction backups off the primary computer and continually restore them on the standby computer. If you have persistent data corruption problems, try to swap the computer, thecontrollers, and the disk device drivers for components of a different type. This makes it easier to determine whether the problem is specifically platform-related.

MSS-Error 1105

Description	Error 1105
Severity	Critical
Message Group	MSS_Fault
Help Text	Probable Cause: The specified filegroup has run out of free space. Suggested Action: To gain more space, you can free disk space on any disk drive containing a file in the full filegroup, allowing files in the group to grow. Or you can gain space using a data file with the specified database. Freeing disk space You can free disk space on your local drive or on another disk drive. To free disk space on another drive: 1. Move the data files in the filegroup with an insufficient amount of free disk space to a different disk drive. 2. Detach the database by executing sp_detach_db. 3. Attach the database by executing sp_attach_db, pointing to the moved files. Using a data file Another solution is to add a data file to the specified database using the ADD FILE clause of the ALTER DATABASE statement. Or you can enlarge the data file by using the MODIFY FILE clause of the ALTER DATABASE statement, specifying the SIZE and MAXSIZE syntax. A stress of multiple clients that are all querying sysprocesses with random aborts results in the following error in the error log: Additional Information: Error: 1105, Severity: 17, State: 3 Could not allocate space for object '(SYSTEM table id: -631257169)' in database 'tempdb' because the 'DEFAULT" filegroup is full.

Description	Error 1105
Help Text (contd.)	The error 1105 occurs even though tempdb is set for autogrow and plenty of disk space exists. The error 1105 is 'transient' because it is not a true indication of the actual amount of space available in tempdb. You may also see the following message in the error log as well: Ec Iterator cleaned up a reference This message is benign and can be ignored. Workaround: To work around this problem, reduce the amount and frequency of concurrent queries against the sysprocesses table

MSS-Error 1608

Description	Error 1608
Severity	Warning
Message Group	MSS_Fault
Help Text	Probable Cause: A client process exited abnormally, or a network error was encountered. Unless other errors occurred, continue processing normally. This error occurs when a client process stopped without informing SQL Server and a subsequent attempt by SQL Server to send results to this client fails. Error 1608 is usually not serious and may be viewed as notification that a client process no longer exists. Some of the possible reasons a client process can disappear are: * The client application was killed or ended abnormally * The client machine was powered off or rebooted * There is excessive network traffic * The network connection has been dropped or interrupted Suggested Action: Do not be concerned if this error occurs only sporadically. However, if the error occurs frequently and continuously, or frequently for short periods of time, it may be a result of excessive network traffic or network problems. If it is suspected that there are network problems, contact the network administrator in order to run diagnostics on the network between the client andthe SQL Server machines to isolate the problem.

MSS-Error9002

Description	Error 9002
Severity	
Message Group	MSS_Fault
Help Text	Probable Cause: The specified transaction log file has run out of free space. Suggested Action: To gain more space, you can free disk space on any disk drive containing the transaction log file for the related database. Freeing disk space allows the recovery system to enlarge the log file automatically. Or you can gain space by adding or enlarging a log file for the specified database. Freeing disk space You can free disk space on your local drive or on another disk drive. To free disk space on another drive: 1. Move the transaction log files with an insufficient amount of free disk space to a different disk drive. 2. Detach the database by executing sp_detach_db. 3. Attach the database by executing sp_attach_db, pointing to the moved files. Adding a log file Another solution is to add a log file to the specified database using the ADD FILE clause of the ALTER DATABASE statement. Or you can enlarge the log file using the MODIFY FILE clause of the ALTER DATABASE statement, specifying the SIZE and MAXSIZE syntax. Adding an additional log file allows the existing log to grow.

MSS-Error9004

Description	Error 9004
Severity	Critical
Message Group	MSS_Fault

Description	Error 9004
Help Text	Probable Cause: A STANDBY RESTORE attempt of a database log taken from a source database, with shrink operations enabled and active, may cause the following 9004 error message to occur and a failure to complete the load: Error: 9004 The log for database '%.*ls' is corrupt. Suggested Action: The 9004 error message indicates that the log dump is corrupt. However, for this issue the log is intact and valid. Alternate restore options do complete. Use the the NORECOVERY or RECOVERY option to restore the database. Microsoft has confirmed this to be a problem in SQL Server 7.0. This problem has been corrected in U.S. Service Pack 3 for Microsoft SQL Server 7.0. For information about how to download and install the latest SQL Server Service Pack, see the following Microsoft Web site: http://support.microsoft.com/highlights/sql.asp For more information, contact your primary support provider. Additional Information: The log shrink operation takes place at CHECKPOINT time. Thus, you can have active Shrink requests that do not process until the log backup is complete or normal CHECKPOINT activity occurs.

MSS-Error 14151

Description	Error 14151
Severity	Critical
Message Group	MSS_Fault
Help Text	Probable Cause: This error may have different variants as shown below: ERROR 14151 Replication-Distribution: Task xxxx failed ... 24000[Microsoft] [ODBC SQL Server Driver] Invalid Cursor state This error ususally is a result of replication rollback when network traffic is heavy. Normally this wouldn't be a problem, but some of the subscribing tables had triggers for data redistribution. The replication command failed and rolled back, but the trigger did not. This caused integrity problems that appeared to be reported incorrctly by replication when it retried. Suggested Action: 1. Faster connection. 2. Stop the users surfing on the same connection 3. Rewrite the triggers to be integrity friendly 4. Replace trigger functionality with scheduled batch processing 5. Reduce the default replication batch size from 100 to < 10 (reduces no. of transactions tried in one batch, thus reducing the possibility of timeouts). This will reduce replication throughput on a busy system. Open the SQL Agent distribution task for the publication affected and change the -c100 to -c10 (if memory serves me correctly - check in SQL BOL)
Help Text (contd.)	ERROR 14151 Replication-Distribution: Task xxxx failed ... 37000[Microsoft] [ODBC SQL Server Driver] Can't allocate space for object 'Syslogs' in database xxxx because the 'logsegment' segment is full. If you ran out of space in Syslogs, dump the transaction log. Otherwise, use ALTER DA Suggested Action: The log segment was full at the time you got the error. You might consider expanding the file, or moving it to another drive before expanding it, depending on disk space.

MSS-Error 15457

Description	Error 15457
Severity	Warning
Message Group	MSS_Fault
Help Text	Probable Cause: It means that someone ran a sp_configure without RECONFIGURE. Thus the config_value and the run_value do not necessarily have to be equivalent. Suggested Action: Use master RECONFIGURE Enterprise Manager may generate an EXEC sp_configure when you view the server properties. Error 15457 is informational and does not indicate an error.

MSS-Error 1608

Description	Error 1608 - Warning despite Severity = 21
Severity	Warning
Message Group	MSS_Fault
Help Text	Probable Cause: There are many messages that have severity 20 or greater that should be alarmed. These errors range from corrupted databases, to hardware or OS problems. Suggested Action: See the appropriate MS SQL Server manual or CD to look up the error message and follow the explanation to determine the cause and resolution.

MSS-Error 17824

Description	Error 17824
Severity	Warning
Message Group	MSS_Fault

Description	Error 17824
Help Text	Probable Cause: Other relevant errors may follow, depending on the network library used for the connection. In case of Named Pipes connections, errors '232 The pipe is being closed' or '109 The pipe has been ended' may be logged. In case of sockets based connections (TCP/IP or IPX/SPX), errors '10054 Connection reset by peer' or '10053 Software caused connection abort' may be logged. These errors indicate that the connection between the client and SQL Server wasbroken for some reason while SQL Server was writing data to the front end. Depending on the circumstances, a certain number of these errors may be normal, and eliminating them is not always necessary. If you do not receive any end user complaints or experience general connection problems, you can ignore these errors. Suggested Action: Error 17824 'Unable to write to ListenOn connection' indicates that problems have occurred while SQL Server attempted to write to a client connection and failed. These communication problems may be caused by network problems, or if the client computer has stopped responding or been restarted. For more information regarding other communication errors, please refer to the followingarticle in the Microsoft Knowledge Base: Q109787 : INF: SQL Communication Errors 17832, 17824, 1608, 232, and 109 Error 17824 does not always indicate a network problem. The following are the most common situations under which the error 17824 is generated, along with the corresponding troubleshooting procedures.

Description	Error 17824
Help Text (contd.)	This error may occur if the users are restarting their client computers if the application seems have stopped responding, so make sure they don't do that. It may be that the server is taking a longer time to process a long query. Once the client workstation is restarted, the connections are broken ungracefully. Later SQL Server tries to respond to the connection that has been dropped, and logs the message 17824. The network may be unstable; make sure it is stable. You can check this by attempting to copy large files between the computer running Windows NT Server and the client computer. If this test fails, then you are running into problemswith the physical network. Because the above errors indicate a potential network issue, it is recommended that you update the server, both Windows NT Server and SQL Server, to the latest service packs. Please check the knowledge base articles for more information on how to obtain the latest service packs for the Windows NT Server operating system and SQL Server. It is also recommended that you update the client components such as DB-Library, the ODBC driver, and network library to the latest DLLs. In case of client computers running 16-bit Windows 3.1 or Windows for Workgroups on a Novell network, it is necessary to obtain and install the latest MS-DOS and Windows drivers from Novell. Error 17824 'Unable to write to ListenOn connection' may be a consequence of other errors that caused the connection to drop. Check the error logs for othererrors within the same time frame as the 17824 error. If you find other errors, refer to SQL Server Books Online and the Microsoft Knowledge Base for more information on these errors. Use sp_configure or the SQL Server Enterprise Manager to check the Priority Boost and the SMP Concurrency configuration settings. Make sure that these two configuration options are set to the default settings, because deviating from the default settings may cause error 17824 under some conditions. For more information on why these settings may generate error 17824, please refer to the following article in the Microsoft Knowledge Base: Q111405 : INF: SQL Server and Windows NT Thread Scheduling.

Description	Error 17824
Help Text (contd.)	The error 17824 may be generated due to application problems. One major cause is running into a lock or block situation. In this case, a process holds a lock on a page or a table, and that lock is not released right away, due to an uncommitted transaction or a long query. This may cause all other processes requesting the same table to be blocked, and the client application to seem to stop responding. If the user then either uses 'End Task' to close the application or restarts the workstation, you may receive error 17824 on the server. To find out if the application is causing a lock or block problem on the server, use the sp_who and sp_lock stored procedures when the client computers seem to stop responding or when the error 17824 starts to appear in the SQL Server error logs. If the client workstation has stopped responding, open a command-line ISQL connection on the server itself using the local pipe, and use these stored procedures to check for a blocking situation. For more information on detecting and resolving blocking problems, please refer to the following article in the Microsoft Knowledge Base: Q162361 : INF: Understanding and Resolving SQL Server Blocking Problems

MSS-Error 17832

Description	Error 17832
Severity	Critical
Message Group	MSS_Fault
Help Text	Probable Cause: This error occurs if a client starts to connect but never successfully completes the attempt because of a client operating system, application, or network failure. Wide area networks (WANs) are more susceptible than local area networks (LANs) to this type of problem, because such networks often have many routers and other network devices that can delay data packet delivery and/or cause other difficulties in the delivery of data packets due to improper packet fragmentation or misrouting. However, the very occurrence of these errors in the errorlog or event log does not necessarily indicate any real problems with your SQL Server connectivity. Even in normal operations, this error may still occur at times, due to the unreliable nature of networks, especially wide area networks. In addition, improper use of applications (such as restarting the computer in the middle of a login process) can also cause this error to occur. Suggested Action: To determine whether or not you are facing a real problem, you may want to check the following: 1. Check with the end users to see whether they have experienced any difficulties in making connections to SQL Server. If nobody reports any connectivity problems, you can usually ignore these errors. 2. Check the frequency of this error in the errorlog. If it occurs very frequently, it indicates some potential problems, even if no one is complaining about any connectivity problems. If you have determined that you have a real problem, you may want to apply the additional troubleshooting methods described in the remainder of this article.

Description	Error 17832
Help Text (contd.)	Additional Information: Errors of type 17832 can generally be classified into two categories: 1. Frequent, repeated occurrence of these errors. If you examine the timestamps of these errors, you may find that they usually occur in regular intervals, typically one or more occurrences per second. The errorlog typically is full of these errors. This is mostly caused by client-side problems such as operating system or network software. The repeated occurrence of these errors is caused by the connection retries built into the client-side DB-Library or ODBC, which does not stop until the client application times out. 2. Intermittent, random occurrence of these errors. In the errorlog, you will find these errors occurring once in a while without any regularity. If nobody has reported any connectivity problems, you can generally ignore these errors. If someone did report connectivity problems to SQL Server, you need to use the timestamps to determine whether these reported problems correspond to the errors of type 17832 in the errorlog. Because SQL Server does not know the client's address or host name yet when the error occurs, this error message cannot provide any information about which client causes the error. Therefore, it can be very time consuming to troubleshoot this error, especially if it occurs only intermittently. If you cannot identify which client computer is likely causing the error, you may have to use network sniffing tools such as Network General's Sniffer or Microsoft's Network Monitor to capture the sniffer trace for further analysis. The best approach is to check the following known issues first, and contact Microsoft SQL Server Support if none of following causes matches your case. Error 17832 can be caused by: 1. A Windows 95 Winsock issue. A 16-bit Windows application using TCP/IP sockets may encounter this problem under Windows 95 in a slow network environment. The error is repeated numerous times in the errorlog. For more information, see the following article in the Microsoft Knowledge Base: Q164516 : INF: Error 17832 Caused by Blocking Timeout in 16-Bit Sockets

Description	Error 17832
Help Text (contd.)	2. Some anti-virus software on named pipes clients. Typically, when you configure anti-virus software to scan all files, named pipes (which are considered files) may be affected adversely. In this case, named pipes may be opened in invalid mode, causing these errors on the server side. To correct this problem, uninstall the anti-virus software to verify that this is indeed the case, and contact the software vendor for information on how to disable the auto-scanning of named pipes. 3. The use of the 32-bit ODBC driver for 16-bit Windows application under Windows 95. The 32-bit ODBC driver for SQL Server is not supported for use with 16-bit applications under Windows 95. The error occurs repeatedly in the errorlog for the duration of client login. For more information, see the following article in the Microsoft Knowledge Base: Q140697 : INF: Win16 ODBC Applications in a Win32 Environment 4. Insufficient system resources on the client side. If a client's request for opening connections fails due to insufficient resources on the client computer, the open connection function returns with an error status, and no login packets are sent as a result, causing these errors. For more information on this known issue, see the following article in the Microsoft Knowledge Base: Q161169 : BUG: 'Too Many Open File Handles' Error Using Named Pipes 5. Insufficient system resources on the server side. If SQL Server, the Windows NT operating system, or network services cannot allocate enough resources to complete new connections, the connections are reset by server, thereby causing these errors to occur. For more information on this known behavior, see the following article in the Microsoft Knowledge Base: Q154628 : INF: SQL Logs 17832 With Multiple TCP\IP Connection Requests 6. A client interruption in the middle of a login process. If a client application does not wait until the login process finishes, and either the application is stopped or the client computer is restarted, this error may occur each time such an abnormal termination happens.

Description	Error 17832
Help Text (contd.)	7. An ODBC application that times out. There is a small window of opportunity in the SQL Server ODBC driver that may cause these errors when the ODBC application times out. Typically this error occurs when the application's timeout setting is just a small bit longer than the actual time it takes to complete the login process. 8. Some routers' configurations in a routed network not allowing bigger data packets to go through properly. This is often caused by incorrect router configurations, 'black hole' routers, or unreliable networks such as RAS connections. For TCP/IP networks, you can generally use the TCP/IP PING utility with the '-l' parameter to test this case, but more complex issues may require the use of network sniffing tools to analyze the bottleneck. For more information on some relevant issues, see the following articles in the Microsoft Knowledge Base: Q159211 : Diagnoses and Treatment of Black Hole Routers Q136970 : PMTU Black Hole Detection Algorithm Change for Windows NT 3.51 9. The Network being too slow or unreliable. In a WAN or heavily routed network, it may take many retransmissions to deliver a large data packet successfully. If such a delivery of SQL Server login packets takes more than 45 seconds, this error will occur every time. The only solution in this case is to tune or upgrade the network; otherwise, the network is too slow for any meaningful SQL Server applications.

MSS-Error 17-19

Description	MS SQL Server Error Message between severity 17 and 19
Severity	Major
Message Group	MSS_Fault
Help Text	Probable Cause: There are hundreds or thousands of messages that have severity between 17 and 19 that should be alarmed. Suggested Action: Look at the tail end of the MS SQL Server logfile located in the Annotations of this browser message for more details. Then see the manual or CD to look up the error message and follow the explanation to determine the cause and resolution. The Annotations will contain the last 200 lines of the logfile.

MSS-Error Message severity>19

Description	MS SQL Server Error Message above severity 19
Severity	Critical
Message Group	MSS_Fault
Help Text	Probable Cause: There are many messages that have severity 20 or greater that should be alarmed. These errors range from corrupted databases, to hardware or OS problems. Suggested Action: Look at the tail end of the MS SQL Server logfile located in the Annotations of this browser message for more details. Then see the manual or CD to look up the error message and follow the explanation to determine the cause and resolution. The Annotations will contain the last 200 lines of the logfile.

MSS-Error Severity=>20

Description	MS SQL Server Error Message above severity 19.
Severity	Critical

Description	MS SQL Server Error Message above severity 19.
Message Group	MSS_Fault
Help Text	Probable Cause: There are many messages that have severity 20 or greater that should be alarmed. These errors range from corrupted databases to hardware or OS problems. Suggested Action: See the appropriate MS SQL Server manual or CD to look up the error message and follow the explanation to determine the cause and resolution.

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