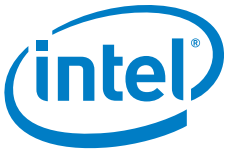

Intel® 900 Mailbox Exchange Server 2007 Storage Solution

Intel® Server Chassis SC5400 and Server Board S5000PSL

Tested with: ESRP – Storage Version 2.1, Windows Server 2003 R2

Tested Date: February 20, 2009

Publish Date: September 7, 2009

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Contents

Hardware Components

Quantity	Item	Manufacturer	Model
One	Intel® Server Board	Intel	S5000PSL. Additional information is available at: http://www.intel.com/products/server/motherboards/s5000psl/s5000psl-overview.htm.
One	Intel® Server Chassis	Intel	SC5400. Additional information is available at: http://www.intel.com/products/server/chassis/sc5400/sc5400-overview.htm.
One (Select one)	Intel® RAID Controller	Intel	SRCSASJV. Additional information is available at: http://www.intel.com/products/server/raid-controllers/srcsasjv/srcsasjv-overview.htm.
	Intel® RAID Controller	Intel	SRCSASRB. Additional information is available at: http://www.intel.com/products/server/raid-controllers/srcsasrb/srcsasrb-overview.htm.
Two	Intel® Xeon® Processors	Intel	Please refer to the Supported Processor List at http://www.intel.com/support/motherboards/server/sb/CS-022346.htm. Processors must support Intel® EM64T.
4 GB minimum	Memory	Any supported	Please refer to the Tested Memory List at http://www.intel.com/support/motherboards/server/s5000psl/sb/CS-022924.htm.
One (60 GB minimum)	SAS or SATA 3.5-inch hard drives	Any supported	Please refer to the Server Hard Drive Validation Test Report at http://www.intel.com/support/motherboards/server/sb/CS-025416.htm.

Table 1 - Intel® Server Board S5000PSL Hardware Configuration

Software Components

Item	Version	Manufacturer	Comment
1	Windows Server 2003 R2	Microsoft	Any 64-bit edition
1	Exchange Server 2007	Microsoft	Available in 64-bit only

Table 2 - Installation Software BOM

Introduction

This document provides information on Intel's storage solution for Microsoft Exchange Server 2007, based the Microsoft Exchange Solution Reviewed Program (ESRP) – Storage program*.

*The ESRP – Storage program was developed by Microsoft Corporation to provide a common storage testing framework for vendors to provide information on its storage solutions for Microsoft Exchange Server 2007 software. For more details on the Microsoft ESRP – Storage program, please view: http://www.microsoft.com/technet/prodtechnol/exchange/2007/esrp.mspx.

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Features

This document describes an Exchange storage solution for 900 users on the Intel® Server Chassis SC5400 storage system. The tested user profile was 0.50 IOPS per user with a mailbox limit of 250 MB.

Solution Description

The tested solution consists of one Intel® server chassis and server board with an Intel® SRCSASJV RAID controller and 6 146GB SAS-interface enterprise-class disk drives installed into the 4-drive and 6-drive cages in the Intel® SC5400 system chassis. This configuration includes 5TB of raw capacity. The Intel® SRCSASJV controller supports SAS and SATA interfaces to disk drives, and can support a mixture of SAS and SATA interface disk drives.

The ESRP-Storage program focuses on storage solution testing to address performance and reliability issues with storage design. However, storage is not the only factor to take into consideration when designing a scale up Exchange solution. Other factors which affect the server scalability are: server processor utilization, server physical and virtual memory limitations, resource requirements for other applications, directory and network service latencies, network infrastructure limitations, replication and recovery requirements, and client usage profiles. All these factors are beyond the scope for ESRP-Storage. Therefore, the number of mailboxes hosted per server as part of the tested configuration may not necessarily be viable for some customer deployment.

For more information on identifying and addressing performance bottlenecks in an Exchange system, please refer to Microsoft's Troubleshooting Microsoft Exchange Server Performance, available at http://go.microsoft.com/fwlink/?LinkId=23454.

Test Server Configuration

Component	Description
Server Chassis	Intel® SC5400
Server Board	Intel® S500PSL
CPU	2 Intel® Xeon® E5320, quad-core, 1.86 GHz (8 total cores)
Memory	4 GB DDR2 ECC
NIC	Dual Intel® Gigabit Ethernet (Intel® 82563EB)
RAID Controller	Intel® SRCSASJV
Internal Boot Disk	Qty. 1 - Seagate 320GB
Disk Array Disks	Qty. 10 - Seagate Cheetah 15K.5, ST3146855SS, 146GB, 15K RPM

Targeted Customer Profile

This solution is intended for small and medium-sized organization hosting up to 900 mailboxes. The configuration used for testing is:

- Number of mailboxes: 900
- Number of hosts: 1
- User I/O profile: 0.50 I/O per second (IOPS)
- 2 Storage Groups, 2 Databases
- Mailbox size: 250 MB

Tested Deployment

The following tables summarize the testing environment:

Description	Data
Number of Exchange mailboxes simulated	900
Number of hosts	1
Number of storage groups / host	2
Number of mailbox stores / storage group	1
Number of mailboxes / mailbox store	450
Number of mailbox store LUNs / storage group	1
Simulated profile: I/O's per second per mailbox	0.50 IOPS
Database LUN size	272 GB
Log LUN size	136 GB
Backup LUN size / storage group	N/A
Total database size for performance testing	219.8 GB
% storage capacity used by Exchange database	81%

Primary Storage Hardware

Component	Description
Storage Connectivity (Fibre Channel, SAS, SATA, iSCSI)	SAS/SATA
Storage model and OS firmware	
Storage cache	512 MB
Number of storage controllers	1
Number of storage ports	2
Maximum bandwidth of storage	6 Gb/sec (2 x 3 Gb SAS ports)
Adapter model and firmware	Intel® SRCSASJV
Number of adapters / host	1
Host server type	Intel® S5000PSL, 2 Intel® Xeon® E5320 quad-core (1.86 GHz), 8 total cores
Total number of disks tested in solution	6
Maximum number of spindles can be hosted in the storage	10

Primary Storage Software

Component	Description
HBA driver	Intel SRCSASJV
HBA Queue Target Setting	N/A
HBA Queue Depth Setting	N/A
Multi-Pathing	N/A
Host OS	MS Windows Server 2003 R2 Enterprise x64 Edition w/ Service Pack 1
ESE.dll file version	08.00.0685.024
Replication solution name / version	N/A

Primary Storage Disk Configuration (Mailbox Store Disks)

Component	Description
Disk type, speed and firmware revision	Seagate SAS, 15K RPM, 0002 (ST3146855SS)
Raw capacity per disk (GB)	136.7
Number of physical disks in test	4
Total raw storage capacity (GB)	546.8
Number of slices per LUN or number of disks per LUN	2
RAID level	RAID 10
Total formatted capacity	272

Primary Storage Disk Configuration (Transactional Log Disks)

Component	Description
Disk type, speed and firmware revision	Seagate SAS, 15K RPM, 0002 (ST3146855SS)
Raw capacity per disk (GB)	136.7
Number of physical disks in test	2
Total raw storage capacity (GB)	273.4
Number of slices per LUN or number of disks per LUN	2
RAID level	RAID 1
Total formatted capacity	136.0

Best Practices

Exchange Server is a disk-intensive application. Based on the testing runs using the ESRP framework, we recommend the following Microsoft best practices for storage system design for Exchange Server 2007, available at: http://technet.microsoft.com/en-us/library/bb124518.aspx.

Contact for Additional Information

Consult the *Certified Intel RAID Configurations for Microsoft Exchange Servers* document available at: http://www.intelraid.com/tech.php.

Test Result Summary

This section provides a high level summary of the test data from ESRP and the link to the detailed HTML reports which are generated by ESRP testing framework. Please click on the underlined headings below to view the HTMLreport for each test.

Reliability

A number of tests in the framework are to check Reliability tests runs for 24 hours. The goal is to verify the storage can handle high I/O load for a long period of time. Both log and database files will be analyzed for integrity after the stress test to ensure no database/log corruption.

The following list provides an overview: (click on the underlined word will show the HTML report after the reliability tests run)

- No errors reported in the saved eventlog file.
- No errors reported in during the database and log checksum process.

Primary Storage Performance Results

The Primary Storage performance testing is designed to exercise the storage with maximum sustainable Exchange type of I/O for 2 hours. The test is to show how long it takes for the storage to respond to an I/O under load. The data below is the sum of all of the logical disk I/O's and average of all the logical disks I/O latency in the 2 hours test duration. Each server is listed separately and the aggregate numbers across all servers is listed as well.

Individual Server Metrics:

The sum of I/O's across Storage Groups and the average latency across all Storage Groups on a per server basis.

I/O Component	Metric
Database I/O	
Average Database Disk Transfers/sec	270.628
Average Database Disk Reads/sec	281.798
Average Database Disk Writes/sec	259.457
Average Database Disk Read Latency (ms)	0.015
Average Database Disk Write Latency (ms)	0.036
Transaction Log I/O	
Average Log Disk Writes/sec	120.559
Average Log Disk Write Latency (ms)	0.003

Conclusion

This document is developed by storage solution providers, and reviewed by Microsoft Exchange Product team. The test results/data presented in this document is based on the tests introduced in the ESRP test framework. Customer should not quote the data directly for his/her pre-deployment verification. It is still necessary to go through the exercises to validate the storage design for a specific customer environment.

ESRP program is not designed to be a benchmarking program; tests are not designed to getting the maximum throughput for a giving solution. Rather, it is focused on producing recommendations from vendors for Exchange application. So the data presented in this document should not be used for direct comparisons among the solutions.

Appendix A - Test Results

Microsoft Exchange Server Jetstress 24 Hour Reliability

Microsoft Exchange Server Jetstress

Stress Test Result Report

Test Summary

Overall Test Result	**Pass**
Machine Name	DMRTK-SRVR-I2
Test Description	Intel® SRCSASJV 6-SAS drives, mailboxes=900, size=250, IOPS=0.5, threads=Auto, DB=RAID10(2+2), Log=RAID1(1+1), SG=2
Test Start Time	2/19/2009 10:13:29 PM
Test End Time	2/20/2009 10:23:27 PM
Jetstress Version	08.02.0060.000
Ese Version	08.00.0685.024
Operating System	Microsoft Windows Server 2003 R2 Service Pack 2 (5.2.3790.131072)
Performance Log	C:\Data\Jetstress\Tuning_2009_2_19_22_17_44.blg C:\Data\Jetstress\Stress_2009_2_19_22_22_47.blg C:\Data\Jetstress\DBChecksum_2009_2_20_22_23_27.blg

Database Sizing and Throughput

Achieved I/O per Second	541.255
Target I/O per Second	450
Initial database size	241887379456
Final database size	291923951616
Database files (count)	2

Jetstress System Parameters

Thread count	8 (per-storage group)
Log buffers	9000
Minimum database cache	64.0 MB
Maximum database cache	512.0 MB

Insert operations	25%
Delete operations	10%
Replace operations	50%
Read operations	15%
Lazy commits	80%

Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (M:)	0.015	0.036	281.798	259.457	(n/a)
Log (L:)	0.000	0.003	0.000	120.559	12984.184

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.876	0.130	3.568
Available MBytes	2878.335	2856.000	2889.000
Free System Page Table Entries	4170276.000	4170276.000	4170276.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	33260595.911	33247232.000	33325056.000
Pool Paged Bytes	44468149.333	43569152.000	46247936.000
Database Page Fault Stalls/sec	0.000	0.000	1.067

Test Log

2/19/2009 10:13:29 PM -- Jetstress testing begins ...
2/19/2009 10:13:29 PM -- Prepare testing begins ...
2/19/2009 10:13:32 PM -- Attaching databases ...
2/19/2009 10:13:32 PM -- Prepare testing ends.
2/19/2009 10:13:32 PM -- Dispatching transactions begins ...
2/19/2009 10:13:32 PM -- Database cache settings: (minimum: 64.0 MB, maximum: 512.0 MB)
2/19/2009 10:13:32 PM -- Database flush thresholds: (start: 5.1 MB, stop: 10.2 MB)
2/19/2009 10:13:35 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.1 seconds/read).
2/19/2009 10:13:35 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.1 seconds/write).
2/19/2009 10:13:35 PM -- Attaining prerequisites:
2/19/2009 10:17:44 PM -- \Database(JetstressWin)\Database Cache Size, Last: 483254300.0 (lower bound: 483183800.0, upper bound: none)
2/19/2009 10:17:45 PM -- Performance logging begins (interval: 5000 ms).
2/19/2009 10:17:45 PM -- Automatic tuning begins ...
2/19/2009 10:18:15 PM -- Volume M: has 0.00036 for read latency slope.
2/19/2009 10:20:15 PM -- 303 batch transactions/sec and 16 sessions have 657 IOPS.
2/19/2009 10:20:15 PM -- 16 sessions have actual 657 IOPS (target IOPS: 450)
2/19/2009 10:20:15 PM -- Volume M: has 0.0236 for Avg. Disk sec/Read.
2/19/2009 10:20:15 PM -- Process has average database read latencies higher than 0.020.
2/19/2009 10:20:15 PM -- Volume L: has 0.0032 for Avg. Disk sec/Write.
2/19/2009 10:20:15 PM -- Volume L: has 0.0000 for Avg. Disk sec/Read.
2/19/2009 10:20:15 PM -- Operation mix: Sessions 8, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.

2/19/2009 10:20:45 PM -- Volume M: has 0.00001 for read latency slope.
2/19/2009 10:22:45 PM -- 271 batch transactions/sec and 8 sessions have 590 IOPS.
2/19/2009 10:22:45 PM -- 8 sessions have actual 590 IOPS (target IOPS: 450)
2/19/2009 10:22:45 PM -- Volume M: has 0.0183 for Avg. Disk sec/Read.
2/19/2009 10:22:45 PM -- Volume L: has 0.0031 for Avg. Disk sec/Write.
2/19/2009 10:22:45 PM -- Volume L: has 0.0000 for Avg. Disk sec/Read.
2/19/2009 10:22:47 PM -- Performance logging ends.
2/19/2009 10:22:47 PM -- Automatic tuning succeeded.
2/19/2009 10:22:47 PM -- Operation mix: Sessions 8, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
2/19/2009 10:22:47 PM -- Performance logging begins (interval: 15000 ms).
2/19/2009 10:22:47 PM -- Attaining prerequisites:
2/19/2009 10:22:47 PM -- \Database(JetstressWin)\Database Cache Size, Last: 536870900.0 (lower bound: 483183800.0, upper bound: none)
2/20/2009 10:22:49 PM -- Performance logging ends.
2/20/2009 10:22:49 PM -- JetInterop batch transaction stats: 637661, and 638577.
2/20/2009 10:22:55 PM -- Dispatching transactions ends.
2/20/2009 10:22:55 PM -- Shutting down databases ...
2/20/2009 10:23:27 PM -- Instance2892.1 (complete), and Instance2892.2 (complete)
2/20/2009 10:23:28 PM -- Performance logging begins (interval: 15000 ms).
2/20/2009 10:23:28 PM -- Verifying database checksums ...
2/20/2009 10:44:59 PM -- M: (100% processed)
2/20/2009 10:45:00 PM -- Performance logging ends.
2/20/2009 10:45:00 PM -- C:\Data\Jetstress\DBChecksum_2009_2_20_22_23_27.blg has 86 samples.
2/20/2009 10:45:03 PM -- C:\Data\Jetstress\DBChecksum_2009_2_20_22_23_27.html is saved.
2/20/2009 10:45:03 PM -- Verifying log checksums ...
2/20/2009 10:45:05 PM -- L:\01 (21 logs passed), and L:\02 (22 logs passed)
2/20/2009 10:45:05 PM -- C:\Data\Jetstress\Stress_2009_2_19_22_22_47.blg has 5760 samples.
2/20/2009 10:45:05 PM -- Creating test report ...
2/20/2009 10:45:59 PM -- Volume M: has 0.0148 for Avg. Disk sec/Read.
2/20/2009 10:45:59 PM -- Volume L: has 0.0030 for Avg. Disk sec/Write.
2/20/2009 10:45:59 PM -- Volume L: has 0.0000 for Avg. Disk sec/Read.
2/20/2009 10:45:59 PM -- Test has 1.06678572476612 Maximum Database Page Fault Stalls/sec.
2/20/2009 10:45:59 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
2/20/2009 10:45:59 PM -- C:\Data\Jetstress\Stress_2009_2_19_22_22_47.xml has 5759 samples queried.

Microsoft Exchange Server Jetstress

Test Result Report

Checksum Statistics - All

Database	Seen pages	Bad pages	Correctable pages	Wrong page no pages	File length / seconds taken
M:\01\Jetstress1.edb	17815960	0	0	0	139187 MBytes / 634 seconds
M:\02\Jetstress1.edb	17819288	0	0	0	139213 MBytes / 655 seconds
(Sum)	35635248	0	0	0	278400 MBytes / 1290 seconds

Disk Subsystem Performance (of checksum)

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec
M:	0.065	0.000	3447.257	0.002

Memory System Performance (of checksum)

Counter	Average	Minimum	Maximum
% Processor Time	3.814	2.565	4.727
Available MBytes	3393.430	3386.000	3396.000
Free System Page Table Entries	4170276.000	4170276.000	4170276.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	33941456.372	33914880.000	33980416.000
Pool Paged Bytes	46563375.628	46235648.000	47316992.000

Test Log

2/19/2009 10:13:29 PM -- Jetstress testing begins ...
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2/19/2009 10:13:35 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.1 seconds/read).
2/19/2009 10:13:35 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.1 seconds/write).
2/19/2009 10:13:35 PM -- Attaining prerequisites:
2/19/2009 10:17:44 PM -- \Database(JetstressWin)\Database Cache Size, Last: 483254300.0 (lower bound: 483183800.0, upper bound: none)
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2/19/2009 10:20:15 PM -- Volume L: has 0.0032 for Avg. Disk sec/Write.
2/19/2009 10:20:15 PM -- Volume L: has 0.0000 for Avg. Disk sec/Read.
2/19/2009 10:20:15 PM -- Operation mix: Sessions 8, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
2/19/2009 10:20:45 PM -- Volume M: has 0.00001 for read latency slope.
2/19/2009 10:22:45 PM -- 271 batch transactions/sec and 8 sessions have 590 IOPS.
2/19/2009 10:22:45 PM -- 8 sessions have actual 590 IOPS (target IOPS: 450)
2/19/2009 10:22:45 PM -- Volume M: has 0.0183 for Avg. Disk sec/Read.
2/19/2009 10:22:45 PM -- Volume L: has 0.0031 for Avg. Disk sec/Write.
2/19/2009 10:22:45 PM -- Volume L: has 0.0000 for Avg. Disk sec/Read.
2/19/2009 10:22:47 PM -- Performance logging ends.
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2/19/2009 10:22:47 PM -- Operation mix: Sessions 8, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
2/19/2009 10:22:47 PM -- Performance logging begins (interval: 15000 ms).
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2/19/2009 10:22:47 PM -- \Database(JetstressWin)\Database Cache Size, Last: 536870900.0 (lower bound: 483183800.0, upper bound: none)
2/20/2009 10:22:49 PM -- Performance logging ends.
2/20/2009 10:22:49 PM -- JetInterop batch transaction stats: 637661, and 638577.
2/20/2009 10:22:55 PM -- Dispatching transactions ends.
2/20/2009 10:22:55 PM -- Shutting down databases ...
2/20/2009 10:23:27 PM -- Instance2892.1 (complete), and Instance2892.2 (complete)
2/20/2009 10:23:28 PM -- Performance logging begins (interval: 15000 ms).
2/20/2009 10:23:28 PM -- Verifying database checksums ...
2/20/2009 10:44:59 PM -- M: (100% processed)
2/20/2009 10:45:00 PM -- Performance logging ends.
2/20/2009 10:45:00 PM -- C:\Data\Jetstress\DBChecksum_2009_2_20_22_23_27.blg has 86 samples.

Microsoft Exchange Server Jetstress 2 Hour Performance

Microsoft Exchange Server Jetstress

Performance Test Result Report

Test Summary

Overall Test Result	**Pass**
Machine Name	DMRTK-SRVR-I2
Test Description	Intel SRCSASJV 6-SAS drives, mailboxes=900, size=250, IOPS=0.5, threads=Auto, DB=RAID10(2+2), Log=RAID1(1+1), SG=2
Test Start Time	2/19/2009 5:29:54 PM
Test End Time	2/19/2009 9:27:27 PM
Jetstress Version	08.02.0060.000
Ese Version	08.00.0685.024
Operating System	Microsoft Windows Server 2003 R2 Service Pack 2 (5.2.3790.131072)
Performance Log	C:\Data\Jetstress\Tuning_2009_2_19_19_21_36.blg C:\Data\Jetstress\Performance_2009_2_19_19_27_9.blg C:\Data\Jetstress\DBChecksum_2009_2_19_21_27_27.blg

Database Sizing and Throughput

Achieved I/O per Second	581.053
Target I/O per Second	450
Initial database size	235935662080
Final database size	241887379456
Database files (count)	2

Jetstress System Parameters

Thread count	8 (per-storage group)
Log buffers	9000
Minimum database cache	64.0 MB
Maximum database cache	512.0 MB
Insert operations	25%
Delete operations	10%
Replace operations	50%

Read operations	15%
Lazy commits	80%

Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (M:)	0.014	0.036	297.906	283.147	(n/a)
Log (L:)	0.000	0.003	0.000	140.582	14260.138

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.810	0.428	1.300
Available MBytes	2840.813	2833.000	2843.000
Free System Page Table Entries	4170276.000	4170276.000	4170276.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	32717115.733	32706560.000	32755712.000
Pool Paged Bytes	43624004.267	43147264.000	44933120.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

```
2/19/2009 5:29:54 PM -- Jetstress testing begins ...
2/19/2009 5:29:54 PM -- Prepare testing begins ...
2/19/2009 5:29:54 PM -- Creating M:\01\Jetstress1.edb.
2/19/2009 5:29:54 PM -- Database cache settings: (minimum: 32.0 MB, maximum: 256.0 MB)
2/19/2009 5:29:54 PM -- Database flush thresholds: (start: 2.6 MB, stop: 5.1 MB)
2/19/2009 6:12:57 PM -- 60.0% of 109.9 GB complete (4016812 records inserted).
2/19/2009 6:45:17 PM -- 100.0% of 109.9 GB complete (6431535 records inserted).
2/19/2009 6:45:20 PM -- Duplicating 1 databases:
2/19/2009 7:16:58 PM -- 100.0% of 109.9 GB complete (109.9 GB duplicated).
2/19/2009 7:17:01 PM -- Attaching databases ...
2/19/2009 7:17:01 PM -- Prepare testing ends.
2/19/2009 7:17:01 PM -- Dispatching transactions begins ...
2/19/2009 7:17:01 PM -- Database cache settings: (minimum: 64.0 MB, maximum: 512.0 MB)
2/19/2009 7:17:01 PM -- Database flush thresholds: (start: 5.1 MB, stop: 10.2 MB)
2/19/2009 7:17:03 PM -- Database read latency thresholds: (average: 0.02 seconds/read,
maximum: 0.05 seconds/read).
2/19/2009 7:17:03 PM -- Log write latency thresholds: (average: 0.01 seconds/write,
maximum: 0.05 seconds/write).
2/19/2009 7:17:03 PM -- Attaining prerequisites:
2/19/2009 7:21:36 PM -- \Database(JetstressWin)\Database Cache Size, Last: 485630000.0
(lower bound: 483183800.0, upper bound: none)
2/19/2009 7:21:38 PM -- Performance logging begins (interval: 5000 ms).
2/19/2009 7:21:38 PM -- Automatic tuning begins ...
2/19/2009 7:22:08 PM -- Volume M: has 0.00067 for read latency slope.
2/19/2009 7:22:38 PM -- Volume M: has 0.00025 for read latency slope.
2/19/2009 7:24:38 PM -- 338 batch transactions/sec and 16 sessions have 655 IOPS.
2/19/2009 7:24:38 PM -- 16 sessions have actual 655 IOPS (target IOPS: 450)
2/19/2009 7:24:38 PM -- Volume M: has 0.0202 for Avg. Disk sec/Read.
```

2/19/2009 7:24:38 PM -- Process has average database read latencies higher than 0.020.
2/19/2009 7:24:38 PM -- Volume L: has 0.0032 for Avg. Disk sec/Write.
2/19/2009 7:24:38 PM -- Volume L: has 0.0001 for Avg. Disk sec/Read.
2/19/2009 7:24:38 PM -- Operation mix: Sessions 8, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
2/19/2009 7:25:08 PM -- Volume M: has 0.00006 for read latency slope.
2/19/2009 7:27:08 PM -- 284 batch transactions/sec and 8 sessions have 552 IOPS.
2/19/2009 7:27:08 PM -- 8 sessions have actual 552 IOPS (target IOPS: 450)
2/19/2009 7:27:08 PM -- Volume M: has 0.0168 for Avg. Disk sec/Read.
2/19/2009 7:27:08 PM -- Volume L: has 0.0031 for Avg. Disk sec/Write.
2/19/2009 7:27:08 PM -- Volume L: has 0.0000 for Avg. Disk sec/Read.
2/19/2009 7:27:09 PM -- Performance logging ends.
2/19/2009 7:27:09 PM -- Automatic tuning succeeded.
2/19/2009 7:27:10 PM -- Operation mix: Sessions 8, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
2/19/2009 7:27:10 PM -- Performance logging begins (interval: 15000 ms).
2/19/2009 7:27:10 PM -- Attaining prerequisites:
2/19/2009 7:27:10 PM -- \Database(JetstressWin)\Database Cache Size, Last: 536870900.0 (lower bound: 483183800.0, upper bound: none)
2/19/2009 9:27:12 PM -- Performance logging ends.
2/19/2009 9:27:12 PM -- JetInterop batch transaction stats: 70021, and 69401.
2/19/2009 9:27:12 PM -- Dispatching transactions ends.
2/19/2009 9:27:12 PM -- Shutting down databases ...
2/19/2009 9:27:27 PM -- Instance2968.1 (complete), and Instance2968.2 (complete)
2/19/2009 9:27:28 PM -- Performance logging begins (interval: 15000 ms).
2/19/2009 9:27:28 PM -- Verifying database checksums ...
2/19/2009 9:44:59 PM -- M: (100% processed)
2/19/2009 9:45:00 PM -- Performance logging ends.
2/19/2009 9:45:00 PM -- C:\Data\Jetstress\DBChecksum_2009_2_19_21_27_27.blg has 70 samples.
2/19/2009 9:45:03 PM -- C:\Data\Jetstress\DBChecksum_2009_2_19_21_27_27.html is saved.
2/19/2009 9:45:03 PM -- Verifying log checksums ...
2/19/2009 9:45:05 PM -- L:\01 (22 logs passed), and L:\02 (21 logs passed)
2/19/2009 9:45:05 PM -- C:\Data\Jetstress\Performance_2009_2_19_19_27_9.blg has 480 samples.
2/19/2009 9:45:05 PM -- Creating test report ...
2/19/2009 9:45:10 PM -- Volume M: has 0.0145 for Avg. Disk sec/Read.
2/19/2009 9:45:10 PM -- Volume L: has 0.0031 for Avg. Disk sec/Write.
2/19/2009 9:45:10 PM -- Volume L: has 0.0000 for Avg. Disk sec/Read.
2/19/2009 9:45:10 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.
2/19/2009 9:45:10 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
2/19/2009 9:45:10 PM -- C:\Data\Jetstress\Performance_2009_2_19_19_27_9.xml has 479 samples queried.

Microsoft Exchange Server Jetstress

Test Result Report

Checksum Statistics - All

Database	Seen pages	Bad pages	Correctable pages	Wrong page no pages	File length / seconds taken
M:\01\Jetstress1.edb	14765170	0	0	0	115352 MBytes / 508 seconds
M:\02\Jetstress1.edb	14762098	0	0	0	115328 MBytes / 541 seconds
(Sum)	29527268	0	0	0	230681 MBytes / 1050 seconds

Disk Subsystem Performance (of checksum)

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec
M:	0.065	0.000	3508.864	0.002

Memory System Performance (of checksum)

Counter	Average	Minimum	Maximum
% Processor Time	3.897	2.876	4.569
Available MBytes	3367.086	3361.000	3369.000
Free System Page Table Entries	4170276.000	4170276.000	4170276.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	33674386.286	33648640.000	33726464.000
Pool Paged Bytes	43477343.086	43065344.000	44171264.000

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