



Sun Microsystems Sun Fire X4150 1000 Mailbox 1RU Exchange 2007 Storage Solution



**Tested with: ESRP – Storage Version 2.0
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Content

Sun Microsystems Sun Fire X4150 1000 Mailbox 1RU Exchange 2007 Storage Solution.....	1
Content.....	2
Features.....	3
Solution Description.....	3
Targeted Customer Profile.....	8
Tested Deployment.....	9
Simulated Exchange Configuration:.....	9
Primary Storage Hardware	9
Primary Storage Software.....	10
Primary Storage Disk Configuration (Mailbox Store Disks).....	10
Primary Storage Disk Configuration (Transactional Log Disks).....	11
Best Practices.....	11
Core Storage.....	11
Contact for Additional Information.....	11
Test Result Summary.....	12
Reliability.....	12
Primary Storage Performance Results.....	12
Streaming Backup/Recovery Performance.....	13
Database Read-only Performance.....	13
Log Read-only Performance.....	13
Conclusion.....	13
Appendix.....	14
Microsoft Exchange Server Jetstress.....	14
Performance Test Result Report.....	14
Microsoft Exchange Server Jetstress.....	16
SoftRecovery Test Result Report.....	16
Microsoft Exchange Server Jetstress.....	18
SoftRecovery Test Result Report.....	18
Microsoft Exchange Server Jetstress.....	20
Streaming backup Test Result Report.....	20

Overview

This document provides information on Sun Microsystem's storage solution for Microsoft Exchange Server, based the *Microsoft Exchange Solution Reviewed Program (ESRP) – Storage* program*. For any questions or comments regarding the contents of this document, see Contact for Additional Information.

*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 software. For more details on the *Microsoft ESRP – Storage* program, please click <http://www.microsoft.com/technet/prodtechnol/exchange/2007/esrp.mspx>

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Features

This document describes a Microsoft Exchange 2007 primary storage solution on the Sun Microsystems Sun Fire X4150 coupled with the SGXPCIESAS-R-INT-Z SAS RAID controller. The targeted number of users in this environment is 1000. The tested user profile was 0.5 IOPS (0.42 + 20%) per mailbox with a limit of 250MB. This solution is unique in that 1RU can accommodate 1000 mailboxes with no external storage and can be scaled by adding additional X4150 servers. The X4150 is an excellent chose for small, medium and large sized businesses. The Sun Fire X4150 server is a new standard in performance, expandability and efficiency all in 1RU.

Solution Description

The tested server configuration included (2) Quad-Core Intel Xeon L5335 (2x4MB L2, 2.0 GHz, 1333MHz FSB, 50W) with 8192MB of PC2-5300 667 MHz ECC Fully Buffered DDR2 DIMMs.

The internal storage configuration consists of (8) 73GB 10,000 RPM (XRA-SS2CF-73G10K) connected via Internal 8-Port SAS RAID HBA, RoHS:Y (SGXPCIESAS-R-INT-Z).

Processor Options	
Processor	<p>One or two Intel Xeon Processors:</p> <ul style="list-style-type: none"> • Dual-Core Intel Xeon 5160 (4MB L2, 3 GHz, 1333 MHz FSB, 80W) • Quad-Core Intel Xeon L5335 (2x4MB L2, 2.0 GHz, 1333 MHz FSB, 50W) • Quad-Core Intel Xeon E5410 (2x6MB L2, 2.33 GHz, 1333 MHz FSB, 80W) • Quad-Core Intel Xeon E5440 (2x6MB L2, 2.83 GHz, 1333 MHz FSB, 80W) • Quad-Core Intel Xeon X5460 (2x6MB L2, 3.16 GHz, 1333 MHz FSB, 120W)
Main Memory	<ul style="list-style-type: none"> • 16 DIMM slots total for PC2-5300 667 MHz ECC Fully Buffered DDR2 DIMMs • System configurations from 2 GB (2x1GB) to 64 GB (16x4GB) of memory
Standard/Integrated Interfaces	
Network	Four 10/100/1000Base-T Ethernet ports
Network management	One dedicated 10/100Base-T Ethernet port
Serial	One TIA/EIA-232-F asynchronous RJ45 Port
SAS	Eight channel SAS interfaces for internal or external drives with add-on SAS Host Bus Adapter
USB	Two USB 2.0 ports (Front), Two USB 2.0 ports (Rear), One USB 2.0 port (Internal)
Expansion bus	Three internal Low Profile 8-lane PCI-Express slots (all with x16 mechanical connector)
Mass Storage and Media	
Hot-swappable, 2.5" Internal disks	Up to eight SAS disk drives with add-on SAS Host Bus Adapter, Or up to six SATA disk

	drives (offering in CY2008)
Removable Media	One EIDE DVD+/-RW drive
Software	
Operating environment	Solaris, Linux, Windows and VMware Click here to see complete details
Sun Java Enterprise System	<ul style="list-style-type: none"> • Solaris 10 on X64 Operating System • Standard Linux distributions
Languages	C/C++, FORTRAN, Java programming language, all other standard Sun-supported languages
Networking Software	ONC, ONC+, NFS, WebNFS, TCP/IP, SunLink, OSI, MHS, IPX/SPX, SMB technologies, and XML
Management	Local and remote KVM, remote media (DVD, CD, floppy, USB) capability, browser GUI, DMTF style CLI, IPMI, SNMP
Power Supply	
	Dual redundant, hot -swappable power supply
UL Maximum (AC Input)	8.2 Amps RMS at 100 VAC
Power Supply Rating (DC output)	650 W
Environment	
AC power	90–264 V AC (47–63 Hz)
Operating temperature/humidity (single, non-rack system)	5 °C to 35 °C (41 °F to 95 °F), 10% to 90% relative humidity, non-condensing
Nonoperating temperature/humidity (single, non-rack system)	-40 °C to 70 °C (-40 °F to 158 °F), up to 93% relative humidity, non-condensing

Altitude (operating) (single, non-rack system)	Up to 3048 m, maximum ambient temperature is derated by 1 degree C per 300 m above 900 m
Altitude (nonoperating) (single, non-rack system)	15kPa
Acoustic Noise Emissions	
	Declared noise emissions in accordance with ISO 9296, A-weighted, operating and idling:
LwAd (1B = 10dB) at max ambient	7.7 B
LpAm bystander at max ambient	65.8 dB
Regulations	
	Meets or exceeds the following requirements:
Safety	IEC 60950, UL/CSA 60950, EN60950, CB Scheme with all country differences
RFI/EMI	FCC CFR 47 Part 15 Class A, EN 55022 Class A, EN 61000-3-2, EN 61000-3-3, EN 300-386
Immunity	EN55024, EN300-386
Certifications Safety EMC	UL/cUL, UL DEMKO, CE, BSMI, CCC, GOST-R, S-Mark CE, FCC, VCCI, ICES, C-Tick, MIC, CCC, GOST-R, BSMI Class A
Other	Complies with WEEE Directive (2002/96/EC) and RoHS Directive (2002/95/EC)
Dimensions and Weight	
Height	44 mm (1.73 in.)
Width	425.5 mm (16.75 in.)
Depth	711.2 mm (28 in.)
Weight	18.4 kg (40.66 lb.) maximum assuming PCI-Express card weighs 0.12 kg (0.25 lb) each and without rack mounting slide rail kit



<http://www.windowservercatalog.com/item.aspx?idItem=09f4d631-1ed4-7285-4626-f9f35674ffd3>

<http://www.windowservercatalog.com/item.aspx?idItem=5dcb83ab-9862-184f-00b5-13f1981ea2b7>

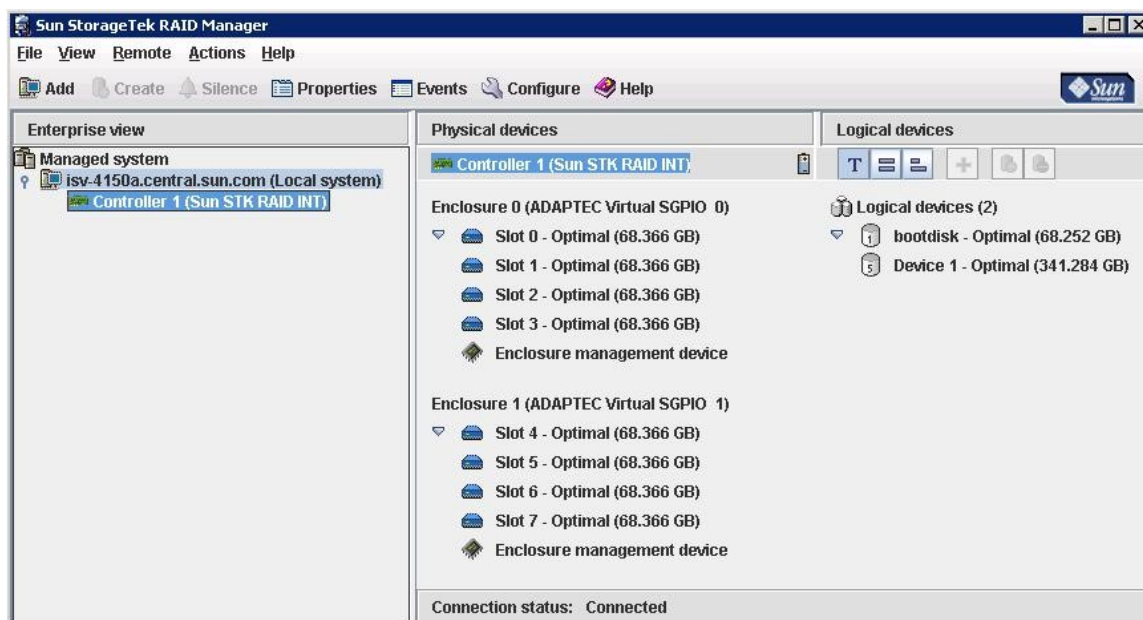
RAID LUNs

The internal disks are managed via Sun StorageTek RAID Manager. RAID 0, 1, 1E, 5, 5EE, 6, 10, 50, 60, simple or spanned volumes are allowed.

Tested Configuration

In this test a 5+1 RAID5 volume was created with a 64k stripe size. Diskpart was used to create a formatted volume, aligned at 64k and formatted with a 64k allocation size. The boot disk was mirrored and the remainder was used for the log volume. The I/O activity to the log is 100% small sequential writes. The I/O activity to the database is mostly random. By separating the two distinct I/O characteristics to different LUNs, performance will increase.

The RAID HBA has a 256MB battery backed cache.



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>.

Targeted Customer Profile

This solution is targeted towards the small to medium organizations with the potential for use in large organizations with the addition of multiple X4150s.

- A single host controls the internal storage
- .42 IOPS + 20% headroom User I/O profile (0.5 tested)
- 250MB mailbox quota

Tested Deployment

The following tables summarize the testing environment:

Simulated Exchange Configuration:

Number of Exchange mailboxes simulated	1000
Number of hosts	1
Number of mailboxes/host	1000
Number of storage groups/host	2
Number of mailbox stores/storage group	1
Number of mailboxes/mailbox store	500
Number of mailbox store LUNs/storage group	1
Simulated profile: I/O's per second per mailbox (IOPS, include 20% headroom)	.5
Database LUN size	341.28GB
Log LUN size	58.25GB
Total database size for performance testing	314GB
% storage capacity used by Exchange database**	57%

**Storage performance characteristics change based on the percentage utilization of the individual disks. Tests that use a small percentage of the storage (~25%) may exhibit reduced throughput if the storage capacity utilization is significantly increased beyond what is tested in this paper.

Primary Storage Hardware

Storage Connectivity (Fiber Channel, SAS, SATA, iSCSI)	SAS
Storage model and OS/firmware revision	http://www.windowsservercatalog.com/item.aspx?idItem=09f4d631-1ed4-7285-4626-f9f35674ffd3 5.2-0 (15800)
Storage cache	256MB
Number of storage controllers	1
Number of storage ports	8

Maximum bandwidth of storage connectivity to host	3Gbit 8 port (2x4)
Switch type/model/firmware revision	N/A
HBA model and firmware	SGXPCIESAS-R-INT-Z 5.2-0 (15800)
Number of HBA's/nost	1
Host server type	Sun Microsystems, Inc. Sun Fire X4150 (2) Quad-Core Intel Xeon L5335 (2x4MB L2, 2.0 GHz, 1333 MHz FSB, 50W) 8192MB RAM
Total number of disks tested in solution	8
Maximum number of spindles can be hosted in the storage	8

Primary Storage Software

HBA driver	5.2-0 (15800)
HBA QueueTarget Setting	N/A
HBA QueueDepth Setting	N/A
Multi-Pathing	N/A
Host OS	Microsoft Windows Server 2003, Enterprise Edition x64 SP2
ESE.dll file version	08.01.0112.00
Replication solution name/version	N/A

Primary Storage Disk Configuration (Mailbox Store Disks)

Disk type, speed and firmware revision	SAS 10,000 -rpm 3Gb/sec - 0400
Raw capacity per disk (GB)	68.252
Number of physical disks in test	6
total raw storage capacity (GB)	409.512
Disk slice size (GB)	N/A
Number of slices per LUN or number of disks per LUN	6
Raid level	RAID 5

Total formatted capacity	341.284
Storage capacity utilization	83%
Database capacity utilization	77%

Primary Storage Disk Configuration (Transactional Log Disks)

Disk type, speed and firmware revision	SAS 10,000 -rpm 3Gb/sec - 0400
Raw capacity per disk (GB)	68.252
Number of Spindles in test	2
total raw storage capacity (GB)	136.504
Disk slice size (GB)	58
Number of slices per LUN or number of disks per LUN	2
Raid level	RAID 10
Total formatted capacity	58GB

Best Practices

Exchange server is a disk-intensive application. Based on the testing run using the ESRP framework, we would recommend the following to improve the storage performance.

For Exchange 2007 best practices on storage design, please visit <http://technet.microsoft.com/en-us/library/bb124518.aspx>

Core Storage

1. Use the Microsoft Diskpart utility to align the sectors of all Exchange 2007 storage volumes before formatting. The Diskpart value should be set to 64.
2. Do not share Exchange 2007 disks with any other applications that are I/O intensive. This will have a negative effect on your disk subsystem performance.
3. When possible, separate the sequential writes of logs from the random access of database volumes.
4. Primary focus should be on the speed of the disks and not size.

Contact for Additional Information

<http://www.sun.com/exchange>

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 html report 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 IO 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:

- No errors were reported in the saved eventlog file.
- No errors were reported 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 IO for 2 hours. The test is to show how long it takes for the storage to respond to an IO 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.

Database I/O	
Average Database Disk Transfers/sec	589.032
Average Database Disk Reads/sec	309.700
Average Database Disk Writes/sec	279.332
Average Database Disk Read Latency (ms)	18
Average Database Disk Write Latency (ms)	1
Transaction Log I/O	
Average Log Disk Writes/sec	195.379
Average Log Disk Write Latency (ms)	1

Streaming Backup/Recovery Performance

For the Version 1.0 release, only streaming backup type is supported for testing in the framework. There are two tests in this section. First one is to measure the read IO performance metrics by running checksum on all the databases and log files. The second test is to measure the end to end performance when the databases are backed up to disks.

Database Read-only Performance

The test is to measure the maximum rate at which databases could be streaming backed up. The following table shows the average rate for a single database file.

MB read/sec per storage group_	94.92
MB read/sec total	189.84

Log Read-only Performance

The test is to measure the maximum rate at which the log files can be played against the databases. The following table shows the average rate for 500 log files played in a single storage group. Each log file is 1 MB in size.

Average time to play one Log file (sec)	.43
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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

Microsoft Exchange Server **Jetstress**

Performance Test Result Report

Test Summary

Overall Test Result **Pass**

Machine Name ISV-4150A

Test Description

Test Start Time 1/17/2008 3:20:05 PM

Test End Time 1/17/2008 6:36:41 PM

Jetstress Version 08.01.0112.000

Ese Version 08.00.0685.024

Operating System Microsoft Windows Server 2003 Service Pack 2 (5.2.3790.131072)

Performance Log I:\Program Files\Exchange2007\Performance_2008_1_17_16_31_41.blg
I:\Program Files\Exchange2007\DBChecksum_2008_1_17_18_36_41.blg

Database Sizing and Throughput

Achieved I/O per Second 589.032

Planned I/O per Second 500

Initial database size 314583580672

Final database size 320055050240

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	Avg. Disk	Disk	Disk	Avg. Disk
-------------	-----------	-----------	------	------	-----------

	sec/Read	sec/Write	Reads/sec	Writes/sec	Bytes/Write
Database (G:)	0.018	0.001	309.700	279.332	(n/a)
Log (F:)	0.000	0.000	0.000	195.379	10296.423

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.691	0.352	1.497
Available MBytes	6696.850	6679.000	6722.000
Free System Page Table Entries	16760928.000	16760928.000	16760928.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	51870566.400	51863552.000	51937280.000
Pool Paged Bytes	38775278.933	38621184.000	39161856.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log1/17/2008 3:20:05 PM -- Jetstress testing begins ...

1/17/2008 3:20:05 PM -- Prepare testing begins ...

1/17/2008 3:20:05 PM -- Creating G:\sg1\Jetstress1.edb.

1/17/2008 3:20:05 PM -- Database cache settings: (minimum: 32.0 MB, maximum: 256.0 MB)

1/17/2008 3:20:05 PM -- Database flush thresholds: (start: 2.6 MB, stop: 5.1 MB)

1/17/2008 3:39:52 PM -- 60.0% of 146.5 GB complete (5355793 records inserted).

1/17/2008 3:59:56 PM -- 100.0% of 146.5 GB complete (8593786 records inserted).

1/17/2008 3:59:59 PM -- Duplicating 1 databases:

1/17/2008 4:31:40 PM -- 100.0% of 146.5 GB complete (146.5 GB duplicated).

1/17/2008 4:31:40 PM -- Attaching databases ...

1/17/2008 4:31:40 PM -- Prepare testing ends.

1/17/2008 4:31:40 PM -- Dispatching transactions begins ...

1/17/2008 4:31:40 PM -- Database cache settings: (minimum: 64.0 MB, maximum: 512.0 MB)

1/17/2008 4:31:40 PM -- Database flush thresholds: (start: 5.1 MB, stop: 10.2 MB)

1/17/2008 4:31:41 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

1/17/2008 4:31:41 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

1/17/2008 4:31:41 PM -- Operation mix: Sessions 8, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.

1/17/2008 4:31:41 PM -- Performance logging begins (interval: 15000 ms).

1/17/2008 4:31:41 PM -- Attaining prerequisites:

1/17/2008 4:36:27 PM -- \Database(JetstressWin)\Database Cache Size, Last: 485703700.0 (lower bound: 483183800.0, upper bound: none)

1/17/2008 6:36:30 PM -- Performance logging ends.

1/17/2008 6:36:30 PM -- JetInterop batch transaction stats: 66294, and 66355.

1/17/2008 6:36:30 PM -- Dispatching transactions ends.

1/17/2008 6:36:30 PM -- Shutting down databases ...

1/17/2008 6:36:41 PM -- Instance2248.1 (complete), and Instance2248.2 (complete)

1/17/2008 6:36:42 PM -- Performance logging begins (interval: 15000 ms).

1/17/2008 6:36:42 PM -- Verifying database checksums ...

1/17/2008 7:00:11 PM -- G: (100% processed)

1/17/2008 7:00:12 PM -- Performance logging ends.

1/17/2008 7:00:12 PM -- [I:\Program](#)

[Files\Exchange2007\DBChecksum 2008 1 17 18 36 41.blg](#) has 93 samples.

1/17/2008 7:00:13 PM -- [I:\Program](#)

[Files\Exchange2007\DBChecksum_2008_1_17_18_36_41.html](#) is saved.
 1/17/2008 7:00:13 PM -- Verifying log checksums ...
 1/17/2008 7:00:16 PM -- F:\sg1 (22 logs passed), and F:\sg2 (22 logs passed)
 1/17/2008 7:00:16 PM -- [I:\Program](#)
[Files\Exchange2007\Performance_2008_1_17_16_31_41.blg](#) has 499 samples.
 1/17/2008 7:00:16 PM -- Creating test report ...
 1/17/2008 7:00:19 PM -- Volume G: has 0.0183 for Avg. Disk sec/Read.
 1/17/2008 7:00:19 PM -- Volume F: has 0.0002 for Avg. Disk sec/Write.
 1/17/2008 7:00:19 PM -- Volume F: has 0.0000 for Avg. Disk sec/Read.
 1/17/2008 7:00:20 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.
 1/17/2008 7:00:20 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
 1/17/2008 7:00:20 PM -- [I:\Program](#)
[Files\Exchange2007\Performance_2008_1_17_16_31_41.xml](#) has 479 samples queried.

Microsoft Exchange Server **Jetstress**

SoftRecovery Test Result Report

Test Summary

Overall Test Result **Pass**

Machine Name ISV-4150A

Test Description

Test Start Time 1/18/2008 10:14:02 AM

Test End Time 1/18/2008 10:33:56 AM

Jetstress Version 08.01.0112.000

Ese Version 08.00.0685.024

Operating System Microsoft Windows Server 2003 Service Pack 2 (5.2.3790.131072)

Performance Log [I:\Program](#)
[Files\Exchange2007\Performance_2008_1_18_10_14_3.blg](#)
[I:\Program](#)
[Files\Exchange2007\DBChecksum_2008_1_18_10_33_56.blg](#)

Database Sizing and Throughput

Achieved I/O per Second 576.972

Planned I/O per Second 500

Initial database size 320055050240

Final database size 320862453760

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 (G:)	0.018	0.002	314.642	262.330	(n/a)
Log (F:)	0.001	0.000	0.206	187.389	10140.482

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.738	0.365	1.615
Available MBytes	6739.538	6672.000	7136.000
Free System Page Table Entries	16759758.000	16759758.000	16759758.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	53852475.077	53825536.000	53927936.000
Pool Paged Bytes	41280275.692	40951808.000	41869312.000
Database Page Fault Stalls/sec	0.001	0.000	0.067

Test Log1/18/2008 9:43:14 AM -- Jetstress testing begins ...
 1/18/2008 9:43:14 AM -- Prepare testing begins ...
 1/18/2008 9:43:14 AM -- Attaching databases ...
 1/18/2008 9:43:14 AM -- Prepare testing ends.
 1/18/2008 9:43:15 AM -- Performance logging begins (interval: 15000 ms).
 1/18/2008 9:43:15 AM -- Streaming backup databases ...
 1/18/2008 10:10:15 AM -- Performance logging ends.
 1/18/2008 10:10:15 AM -- Instance2248.1 (100% processed), and Instance2248.2 (100% processed)
 1/18/2008 10:10:15 AM -- [I:\Program Files\Exchange2007\StreamingBackup_2008_1_18_9_43_14.blg](#) has 107 samples.
 1/18/2008 10:10:15 AM -- Creating test report ...
 1/18/2008 10:10:16 AM -- [I:\Program Files\Exchange2007\StreamingBackup_2008_1_18_9_43_14.html](#) is saved.
 1/18/2008 10:10:16 AM -- Jetstress testing ends.
 1/18/2008 10:14:02 AM -- Jetstress testing begins ...
 1/18/2008 10:14:02 AM -- Prepare testing begins ...
 1/18/2008 10:14:02 AM -- Attaching databases ...
 1/18/2008 10:14:02 AM -- Prepare testing ends.
 1/18/2008 10:14:02 AM -- Dispatching transactions begins ...
 1/18/2008 10:14:02 AM -- Database cache settings: (minimum: 64.0 MB, maximum: 512.0 MB)
 1/18/2008 10:14:02 AM -- Database flush thresholds: (start: 5.1 MB, stop: 10.2 MB)
 1/18/2008 10:14:03 AM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).
 1/18/2008 10:14:03 AM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

1/18/2008 10:14:03 AM -- Operation mix: Sessions 8, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
 1/18/2008 10:14:03 AM -- Performance logging begins (interval: 15000 ms).
 1/18/2008 10:14:03 AM -- Generating log files ...
 1/18/2008 10:33:43 AM -- F:\sg1 (100.2% generated), and F:\sg2 (100.8% generated)
 1/18/2008 10:33:44 AM -- Performance logging ends.
 1/18/2008 10:33:44 AM -- JetInterop batch transaction stats: 9777, and 9804.
 1/18/2008 10:33:44 AM -- Dispatching transactions ends.
 1/18/2008 10:33:44 AM -- Shutting down databases ...
 1/18/2008 10:33:56 AM -- Instance2248.1 (complete), and Instance2248.2 (complete)
 1/18/2008 10:33:57 AM -- Performance logging begins (interval: 15000 ms).
 1/18/2008 10:33:57 AM -- Verifying database checksums ...
 1/18/2008 10:57:52 AM -- G: (100% processed)
 1/18/2008 10:57:53 AM -- Performance logging ends.
 1/18/2008 10:57:53 AM -- [I:\Program Files\Exchange2007\DBChecksum_2008_1_18_10_33_56.blg](#) has 95 samples.
 1/18/2008 10:57:53 AM -- [I:\Program Files\Exchange2007\DBChecksum_2008_1_18_10_33_56.html](#) is saved.
 1/18/2008 10:57:53 AM -- Verifying log checksums ...
 1/18/2008 10:58:03 AM -- F:\sg1 (100 logs passed), and F:\sg2 (100 logs passed)
 1/18/2008 10:58:03 AM -- [I:\Program Files\Exchange2007\Performance_2008_1_18_10_14_3.blg](#) has 78 samples.
 1/18/2008 10:58:03 AM -- Creating test report ...
 1/18/2008 10:58:04 AM -- Volume G: has 0.0181 for Avg. Disk sec/Read.
 1/18/2008 10:58:04 AM -- Volume F: has 0.0002 for Avg. Disk sec/Write.
 1/18/2008 10:58:04 AM -- Volume F: has 0.0006 for Avg. Disk sec/Read.
 1/18/2008 10:58:04 AM -- Test has 0.0666100876642202 Maximum Database Page Fault Stalls/sec.
 1/18/2008 10:58:04 AM -- Test has 1 Database Page Fault Stalls/sec samples higher than 0.
 1/18/2008 10:58:04 AM -- [I:\Program Files\Exchange2007\Performance_2008_1_18_10_14_3.xml](#) has 77 samples queried.

Microsoft Exchange Server **Jetstress**

SoftRecovery Test Result Report

Soft-Recovery Statistics - All

Database Instance	Log files replayed	Elapsed seconds
Instance2248.1	500	220
Instance2248.2	504	208

Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (G:)	0.050	0.006	1462.387	18.685	(n/a)
Log (F:)	0.001	0.001	152.162	4.264	5215.035

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	1.401	0.586	4.102

Available MBytes	6744.431	6656.000	7195.000
Free System Page Table Entries	16759758.000	16759758.000	16759758.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	54317845.138	54132736.000	54759424.000
Pool Paged Bytes	41945632.881	41648128.000	42217472.000
Database Page Fault Stalls/sec	0.005	0.000	0.500

Test Log1/18/2008 9:43:14 AM -- Jetstress testing begins ...
1/18/2008 9:43:14 AM -- Prepare testing begins ...
1/18/2008 9:43:14 AM -- Attaching databases ...
1/18/2008 9:43:14 AM -- Prepare testing ends.
1/18/2008 9:43:15 AM -- Performance logging begins (interval: 15000 ms).
1/18/2008 9:43:15 AM -- Streaming backup databases ...
1/18/2008 10:10:15 AM -- Performance logging ends.
1/18/2008 10:10:15 AM -- Instance2248.1 (100% processed), and Instance2248.2 (100% processed)
1/18/2008 10:10:15 AM -- [I:\Program Files\Exchange2007\StreamingBackup_2008_1_18_9_43_14.blg](#) has 107 samples.
1/18/2008 10:10:15 AM -- Creating test report ...
1/18/2008 10:10:16 AM -- [I:\Program Files\Exchange2007\StreamingBackup_2008_1_18_9_43_14.html](#) is saved.
1/18/2008 10:10:16 AM -- Jetstress testing ends.
1/18/2008 10:14:02 AM -- Jetstress testing begins ...
1/18/2008 10:14:02 AM -- Prepare testing begins ...
1/18/2008 10:14:02 AM -- Attaching databases ...
1/18/2008 10:14:02 AM -- Prepare testing ends.
1/18/2008 10:14:02 AM -- Dispatching transactions begins ...
1/18/2008 10:14:02 AM -- Database cache settings: (minimum: 64.0 MB, maximum: 512.0 MB)
1/18/2008 10:14:02 AM -- Database flush thresholds: (start: 5.1 MB, stop: 10.2 MB)
1/18/2008 10:14:03 AM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).
1/18/2008 10:14:03 AM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).
1/18/2008 10:14:03 AM -- Operation mix: Sessions 8, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
1/18/2008 10:14:03 AM -- Performance logging begins (interval: 15000 ms).
1/18/2008 10:14:03 AM -- Generating log files ...
1/18/2008 10:33:43 AM -- F:\sg1 (100.2% generated), and F:\sg2 (100.8% generated)
1/18/2008 10:33:44 AM -- Performance logging ends.
1/18/2008 10:33:44 AM -- JetInterop batch transaction stats: 9777, and 9804.
1/18/2008 10:33:44 AM -- Dispatching transactions ends.
1/18/2008 10:33:44 AM -- Shutting down databases ...
1/18/2008 10:33:56 AM -- Instance2248.1 (complete), and Instance2248.2 (complete)
1/18/2008 10:33:57 AM -- Performance logging begins (interval: 15000 ms).
1/18/2008 10:33:57 AM -- Verifying database checksums ...
1/18/2008 10:57:52 AM -- G: (100% processed)
1/18/2008 10:57:53 AM -- Performance logging ends.
1/18/2008 10:57:53 AM -- [I:\Program Files\Exchange2007\DBChecksum_2008_1_18_10_33_56.blg](#) has 95 samples.
1/18/2008 10:57:53 AM -- [I:\Program Files\Exchange2007\DBChecksum_2008_1_18_10_33_56.html](#) is saved.
1/18/2008 10:57:53 AM -- Verifying log checksums ...
1/18/2008 10:58:03 AM -- F:\sg1 (100 logs passed), and F:\sg2 (100 logs passed)
1/18/2008 10:58:03 AM -- [I:\Program Files\Exchange2007\Performance_2008_1_18_10_14_3.blg](#) has 78 samples.

1/18/2008 10:58:03 AM -- Creating test report ...
 1/18/2008 10:58:04 AM -- Volume G: has 0.0181 for Avg. Disk sec/Read.
 1/18/2008 10:58:04 AM -- Volume F: has 0.0002 for Avg. Disk sec/Write.
 1/18/2008 10:58:04 AM -- Volume F: has 0.0006 for Avg. Disk sec/Read.
 1/18/2008 10:58:04 AM -- Test has 0.0666100876642202 Maximum Database Page Fault Stalls/sec.
 1/18/2008 10:58:04 AM -- Test has 1 Database Page Fault Stalls/sec samples higher than 0.
 1/18/2008 10:58:04 AM -- [I:\Program Files\Exchange2007\Performance_2008_1_18_10_14_3.xml](#) has 77 samples queried.
 1/18/2008 10:58:04 AM -- [I:\Program Files\Exchange2007\Performance_2008_1_18_10_14_3.html](#) is saved.
 1/18/2008 10:58:05 AM -- Performance logging begins (interval: 2000 ms).
 1/18/2008 10:58:05 AM -- Recovering databases ...
 1/18/2008 11:01:46 AM -- Performance logging ends.
 1/18/2008 11:01:46 AM -- Instance2248.1 (220), and Instance2248.2 (208)
 1/18/2008 11:01:46 AM -- [I:\Program Files\Exchange2007\SoftRecovery_2008_1_18_10_58_4.blg](#) has 109 samples.
 1/18/2008 11:01:46 AM -- Creating test report ...

Microsoft Exchange Server **Jetstress**

Streaming backup Test Result Report

Streaming Backup Statistics - All

Database Instance	Database Size (MBytes)	Elapsed Backup Time	MBytes Transferred/sec
Instance2248.1	152625.15	00:26:59	94.26
Instance2248.2	152599.15	00:26:36	95.58

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 (G:)	0.001	3.22667374554167E-06	1519.113	0.038	(n/a)
Log (F:)	0.000	1.62473794549266E-06	0.000	0.025	342.541

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	2.263	0.404	2.982
Available MBytes	7208.477	7201.000	7212.000
Free System Page Table Entries	16759758.000	16759758.000	16759758.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	53930462.505	53911552.000	53989376.000
Pool Paged Bytes	40839646.505	40484864.000	41566208.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log1/18/2008 9:43:14 AM -- Jetstress testing begins ...
1/18/2008 9:43:14 AM -- Prepare testing begins ...
1/18/2008 9:43:14 AM -- Attaching databases ...
1/18/2008 9:43:14 AM -- Prepare testing ends.
1/18/2008 9:43:15 AM -- Performance logging begins (interval: 15000 ms).
1/18/2008 9:43:15 AM -- Streaming backup databases ...
1/18/2008 10:10:15 AM -- Performance logging ends.
1/18/2008 10:10:15 AM -- Instance2248.1 (100% processed), and Instance2248.2 (100% processed)
1/18/2008 10:10:15 AM -- [I:\Program Files\Exchange2007\StreamingBackup_2008_1_18_9_43_14.blg](#) has 107 samples.
1/18/2008 10:10:15 AM -- Creating test report ...