

Hitachi Adaptable Modular Storage 2300 7,600 User Exchange 2007 RAID-5 Storage Solution

Tested with: ESRP – Storage Version 2.1

Test Date: June 2009

Notices and Disclaimer

Copyright © 2009 Hitachi Data Systems Corporation. All rights reserved.

The performance data contained herein was obtained in a controlled isolated environment. Actual results that may be obtained in other operating environments may vary significantly. While Hitachi Data Systems Corporation has reviewed each item for accuracy in a specific situation, there is no guarantee that the same results can be obtained elsewhere.

All designs, specifications, statements, information and recommendations (collectively, "designs") in this manual are presented "AS IS," with all faults. Hitachi Data Systems Corporation and its suppliers disclaim all warranties, including without limitation, the warranty of merchantability, fitness for a particular purpose and non-infringement or arising from a course of dealing, usage or trade practice. In no event shall Hitachi Data Systems Corporation or its suppliers be liable for any indirect, special, consequential or incidental damages, including without limitation, lost profit or loss or damage to data arising out of the use or inability to use the designs, even if Hitachi Data Systems Corporation or its suppliers have been advised of the possibility of such damages.

This document has been reviewed for accuracy as of the date of initial publication. Hitachi Data Systems Corporation may make improvements and/or changes in product and/or programs at any time without notice.

Table of Contents

Overview	4
Disclaimer	4
Features	4
Solution Description	5
Targeted Customer Profile	11
Test Deployment	12
Streaming Backup	13
Replication	13
Best Practices	14
Core Storage.....	14
Backup Strategy	14
Test Result Summary	14
Reliability.....	14
Primary Storage Performance Results.....	15
Streaming Backup Performance.....	17
Conclusion	18
Appendix A – RAID-5 Drive Failure and Rebuild	19
Appendix B – Test Reports	20
Performance Test Result: SUN21	20
Performance Test Database Checksums Result: SUN21	25
Stress Test Database Performance Result: SUN21.....	29
Stress Test Database Checksums Result: SUN21.....	34
Streaming Backup Test Result: SUN21	38
Soft Recovery Test Result: SUN21	41
Soft Recovery Test Performance Result: SUN21.....	46

Hitachi Adaptable Modular Storage 2300 7,600 User Exchange 2007 RAID-5 Storage Solution

Tested with: ESRP – Storage Version 2.1

Test Date: June 2009

Overview

This document provides information on a Hitachi Adaptable Modular Storage 2300 storage solution for Microsoft Exchange Server 2007, based on the Microsoft® Exchange Solution Reviewed Program (ESRP) – Storage program. For more information about the contents of this document or Hitachi Data Systems' best practice recommendations for Microsoft Exchange Server 2007 storage design, see <http://www.hds.com/solutions/microsoft/exchange.html>.

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 information about the Microsoft ESRP – Storage program, see <http://www.microsoft.com/technet/prodtechnol/exchange/2007/esrp.mspx>.

Disclaimer

This document has been produced independently of Microsoft Corporation. Microsoft Corporation expressly disclaims responsibility for, and makes no warranty, express or implied, with respect to, the accuracy of the contents of this document.

The information contained in this document represents the current view of Hitachi Data Systems on the issues discussed as of the date of publication. Due to changing market conditions, it should not be interpreted to be a commitment on the part of Hitachi Data Systems, and Hitachi Data Systems cannot guarantee the accuracy of any information presented after the date of publication.

Features

The purpose of this testing was to measure the ESRP 2.1 results on a Microsoft Exchange 2007 environment with 7600 mailboxes and four servers. This testing used the Hitachi Adaptable Modular Storage 2300 storage system. These results help answer questions about the kind of performance capabilities to expect with a large-scale Exchange deployment on the 2300.

The test configuration was capable of supporting 7,600 mailboxes with a 0.576 IOPS per user profile and user mailbox size of 2048MB. A Hitachi Adaptable Modular Storage 2300 model with 240 300GB 15K RPM disks, 16GB of cache and eight 4Gb/s paths was used for these tests. Testing used four Sun Fire 4600 M2 servers with 64GB of RAM, four quad-core Opteron 2.8GHz CPUs, four Emulex 4Gb/s Fibre Channel adapters, and Windows Server 2008 Enterprise with Service Pack 1.

The Hitachi Adaptable Modular Storage 2300 is a medium-sized, high-performance, highly reliable midrange storage system that can scale to 240 disks while maintaining 99.999% availability. It is highly suitable for a variety of applications and host platforms and is modular in scale. With the option of in-system and cross-system replication functionality, the 2300 is fully capable of being used as the core underlying storage platform for high-performance Exchange Server 2007 architectures.

Solution Description

Deploying Microsoft Exchange Server 2007 requires careful consideration of all aspects of the solution architecture. Host servers need to be configured so that they are robust enough to handle the required Exchange load. The storage solution must be designed to provide the necessary performance while also being reliable and easy to administer. Of course, an effective backup and recovery plan should be incorporated into the solution as well. The aim of this solution report is to provide a tested configuration that utilizes the Adaptable Modular Storage 2300 to meet the needs of a large Exchange Server deployment.

For the targeted 7,600-user Exchange environment, a 2300 configured with 240 disks (the maximum) and four host servers was used. Table 1 illustrates how the 2300's disks were organized into RAID groups for use by either databases or logs. Each set of colored disks represents a RAID-5 (4D+1P) or RAID-1 (1+1) group. Except for RKA-0 (internal disks), each RKA is an external disk enclosure with 15 SAS disks. For the 40 RAID-5 groups, two 200GB LUs were created per RAID group, and for the RAID-1 groups, four 20GB LUs were created per RAID group.

Table 1. Adaptable Modular Storage 2300 RAID Group Layout

Drive Slot	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
RKA 15	52	53	53	54	54	55	55	56	56	57	57	58	58	59	59
RKA 14	45	45	46	46	47	47	48	48	49	49	50	50	51	51	52
RKA 13	39	39	39	39	39	40	40	41	41	42	42	43	43	44	44
RKA 12	36	36	36	36	36	37	37	37	37	37	38	38	38	38	38
RKA 11	33	33	33	33	33	34	34	34	34	34	35	35	35	35	35
RKA 10	30	30	30	30	30	31	31	31	31	31	32	32	32	32	32
RKA 9	27	27	27	27	27	28	28	28	28	28	29	29	29	29	29
RKA 8	24	24	24	24	24	25	25	25	25	25	26	26	26	26	26
RKA 7	21	21	21	21	21	22	22	22	22	22	23	23	23	23	23
RKA 6	18	18	18	18	18	19	19	19	19	19	20	20	20	20	20
RKA 5	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17
RKA 4	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14
RKA 3	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11
RKA 2	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8
RKA 1	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5
RKA 0	0	0	0	0	0	1	1	1	1	1	2	2	2	2	2





		RAID-5 (4D+1P) for Databases
		RAID-1 (1D+1D) for Logs

Table 2 provides the detailed logical unit (LU) layout and RAID group allocation for the tested storage configuration.

Table 2. Adaptable Modular Storage 2300 LU Layout for Databases

RAID Group	LU Number	
0	0	1
1	2	3
2	4	5
3	6	7
4	8	9
5	10	11
6	12	13
7	14	15
8	16	17
9	18	19
10	20	21
11	22	23
12	24	25
13	26	27
14	28	29
15	30	31
16	32	33
17	34	35
18	36	37
19	38	39
20	40	41
21	42	43
22	44	45
23	46	47
24	48	49
25	50	51
26	52	53
27	54	55
28	56	57
29	58	59
30	60	61
31	62	63
32	64	65
33	66	67
34	68	69
35	70	71

36	72	73
37	74	75
38	76	77
39	78	79

Table 3 provides the detailed LU layout and RAID group allocation for the tested storage configuration for logs.

Table 3. Adaptable Modular Storage 2300 LU Layout for Logs

<i>RAID Group</i>	<i>LU Number</i>
40	80-83
41	84-87
42	88-91
43	92-95
44	96-99
45	100-103
46	104-107
47	108-111
48	112-115
49	116-119
50	120-123
51	124-127
52	128-131
53	132-135
54	136-139
55	140-143
56	144-147
57	148-151
58	152-155
59	156-159

Table 4 outlines the port layout with LU assignments for the storage configuration.

Table 4. Adaptable Modular Storage 2300 Port Layout

<i>Server</i>	<i>Port</i>	<i>LU Number</i>				
SUN21	0A	0	1	2	3	4
		5	6	7	8	9
		10	11	12	13	14
		15	16	17	18	19
		80	81	82	83	84

		85	86	87	88	89
		90	91	92	93	94
		95	96	97	98	99
SUN22	0B	20	21	22	23	24
		25	26	27	28	29
		30	31	32	33	34
		35	36	37	38	39
		100	101	102	103	104
		105	106	107	108	109
		110	111	112	113	114
		115	116	117	118	119
SUN23	0C	40	41	42	43	44
		45	46	47	48	49
		50	51	52	53	54
		55	56	57	58	59
		120	121	122	123	124
		125	126	127	128	129
		130	131	132	133	134
		135	136	137	138	139
SUN24	0D	60	61	62	63	64
		65	66	67	68	69
		70	71	72	73	74
		75	76	77	78	79
		140	141	142	143	144
		145	146	147	148	149
		150	151	152	153	154
		155	156	157	158	159
SUN21	1A	0	1	2	3	4
		5	6	7	8	9
		10	11	12	13	14
		15	16	17	18	19
		80	81	82	83	84
		85	86	87	88	89
		90	91	92	93	94
		95	96	97	98	99
SUN22	1B	20	21	22	23	24
		25	26	27	28	29
		30	31	32	33	34
		35	36	37	38	39
		100	101	102	103	104
		105	106	107	108	109
		110	111	112	113	114
		115	116	117	118	119
SUN23	1C	40	41	42	43	44
		45	46	47	48	49
		50	51	52	53	54
		55	56	57	58	59

		120	121	122	123	124
		125	126	127	128	129
		130	131	132	133	134
		135	136	137	138	139
SUN24	1D	60	61	62	63	64
		65	66	67	68	69
		70	71	72	73	74
		75	76	77	78	79
		140	141	142	143	144
		145	146	147	148	149
		150	151	152	153	154
		155	156	157	158	159

Databases		
Logs		

Table 5 provides the detailed specifications for the storage configuration.

Table 5. Adaptable Modular Storage 2300 Configuration Details

<i>Host</i>	<i>RAID Group</i>	<i>Port</i>	<i>LU</i>	<i>Size (GB)</i>	<i>RAID Level</i>	<i>RAID Type</i>	<i>Disk Spec</i>	<i>Description</i>
SUN21	0	0A/1A	0-1	200	RAID-5	4+1	300GB 15K	Storage Groups 1-2
	1	0A/1A	2-3	200	RAID-5	4+1	300GB 15K	Storage Groups 3-4
	2	0A/1A	4-5	200	RAID-5	4+1	300GB 15K	Storage Groups 5-6
	3	0A/1A	6-7	200	RAID-5	4+1	300GB 15K	Storage Groups 7-8
	4	0A/1A	8-9	200	RAID-5	4+1	300GB 15K	Storage Groups 9-10
	5	0A/1A	10-11	200	RAID-5	4+1	300GB 15K	Storage Groups 11-12
	6	0A/1A	12-13	200	RAID-5	4+1	300GB 15K	Storage Groups 13-14
	7	0A/1A	14-15	200	RAID-5	4+1	300GB 15K	Storage Groups 15-16
	8	0A/1A	16-17	200	RAID-5	4+1	300GB 15K	Storage Groups 17-18
9	0A/1A	18-19	200	RAID-5	4+1	300GB 15K	Storage Groups 19-20	
SUN22	10	0B/1B	20-21	200	RAID-5	4+1	300GB 15K	Storage Groups 21-22
	11	0B/1B	22-23	200	RAID-5	4+1	300GB 15K	Storage Groups 23-24
	12	0B/1B	24-25	200	RAID-5	4+1	300GB 15K	Storage Groups 25-26
	13	0B/1B	26-27	200	RAID-5	4+1	300GB 15K	Storage Groups 27-28
	14	0B/1B	28-29	200	RAID-5	4+1	300GB 15K	Storage Groups 29-30
	15	0B/1B	30-31	200	RAID-5	4+1	300GB 15K	Storage Groups 31-32
	16	0B/1B	32-33	200	RAID-5	4+1	300GB 15K	Storage Groups 33-34
	17	0B/1B	34-35	200	RAID-5	4+1	300GB 15K	Storage Groups 35-36
	18	0B/1B	36-37	200	RAID-5	4+1	300GB 15K	Storage Groups 37-38
	19	0B/1B	38-39	200	RAID-5	4+1	300GB 15K	Storage Groups 39-40

SUN23	20	0C/1C	40-41	200	RAID-5	4+1	300GB 15K	Storage Groups 41-42
	21	0C/1C	42-43	200	RAID-5	4+1	300GB 15K	Storage Groups 43-44
	22	0C/1C	44-45	200	RAID-5	4+1	300GB 15K	Storage Groups 45-46
	23	0C/1C	46-47	200	RAID-5	4+1	300GB 15K	Storage Groups 47-48
	24	0C/1C	48-49	200	RAID-5	4+1	300GB 15K	Storage Groups 49-50
	25	0C/1C	50-51	200	RAID-5	4+1	300GB 15K	Storage Groups 51-52
	26	0C/1C	52-53	200	RAID-5	4+1	300GB 15K	Storage Groups 53-54
	27	0C/1C	54-55	200	RAID-5	4+1	300GB 15K	Storage Groups 55-56
	28	0C/1C	56-57	200	RAID-5	4+1	300GB 15K	Storage Groups 57-58
SUN24	29	0C/1C	58-59	200	RAID-5	4+1	300GB 15K	Storage Groups 59-60
	30	0D/1D	60-61	200	RAID-5	4+1	300GB 15K	Storage Groups 61-62
	31	0D/1D	62-63	200	RAID-5	4+1	300GB 15K	Storage Groups 63-64
	32	0D/1D	64-65	200	RAID-5	4+1	300GB 15K	Storage Groups 65-66
	33	0D/1D	66-67	200	RAID-5	4+1	300GB 15K	Storage Groups 67-68
	34	0D/1D	68-69	200	RAID-5	4+1	300GB 15K	Storage Groups 69-70
	35	0D/1D	70-71	200	RAID-5	4+1	300GB 15K	Storage Groups 71-72
	36	0D/1D	72-73	200	RAID-5	4+1	300GB 15K	Storage Groups 73-74
	37	0D/1D	74-75	200	RAID-5	4+1	300GB 15K	Storage Groups 75-76
SUN21	38	0D/1D	76-77	200	RAID-5	4+1	300GB 15K	Storage Groups 77-78
	39	0D/1D	78-79	200	RAID-5	4+1	300GB 15K	Storage Groups 79-80
	40	0A/1A	80-83	20	RAID-1	1+1	300GB 15K	Logs 1-4
	41	0A/1A	84-87	20	RAID-1	1+1	300GB 15K	Logs 5-8
	42	0A/1A	88-91	20	RAID-1	1+1	300GB 15K	Logs 9-12
SUN22	43	0A/1A	92-95	20	RAID-1	1+1	300GB 15K	Logs 13-16
	44	0A/1A	96-99	20	RAID-1	1+1	300GB 15K	Logs 17-20
	45	0B/1B	100-103	20	RAID-1	1+1	300GB 15K	Logs 21-24
	46	0B/1B	104-107	20	RAID-1	1+1	300GB 15K	Logs 25-28
	47	0B/1B	108-111	20	RAID-1	1+1	300GB 15K	Logs 29-32
SUN23	48	0B/1B	112-115	20	RAID-1	1+1	300GB 15K	Logs 33-36
	49	0B/1B	116-119	20	RAID-1	1+1	300GB 15K	Logs 37-40
	50	0C/1C	120-123	20	RAID-1	1+1	300GB 15K	Logs 41-44
	51	0C/1C	124-127	20	RAID-1	1+1	300GB 15K	Logs 45-48
	52	0C/1C	128-131	20	RAID-1	1+1	300GB 15K	Logs 49-52
SUN24	53	0C/1C	132-135	20	RAID-1	1+1	300GB 15K	Logs 53-56
	54	0C/1C	136-139	20	RAID-1	1+1	300GB 15K	Logs 57-60
	55	0D/1D	140-143	20	RAID-1	1+1	300GB 15K	Logs 61-64
	56	0D/1D	144-147	20	RAID-1	1+1	300GB 15K	Logs 65-68
	57	0D/1D	148-151	20	RAID-1	1+1	300GB 15K	Logs 69-72

58	0D/1D	152-155	20	RAID-1	1+1	300GB 15K	Logs 73-76
59	0D/1D	156-159	20	RAID-1	1+1	300GB 15K	Logs 77-80

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. These factors also affect server scalability:

- 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
- Client usage profiles

These factors are all beyond the scope of the ESRP – Storage program. Therefore, the number of mailboxes hosted per server as part of the tested configuration might not necessarily be viable for some customer deployments.

For more information about identifying and addressing performance bottlenecks in an Exchange system, see Microsoft's [Troubleshooting Microsoft Exchange Server Performance](#).

Targeted Customer Profile

This solution is designed for medium to large organizations that plan to consolidate their Exchange Server 2007 storage on high-performance, high-reliability storage systems. This configuration supports 7,600 Exchange users with the following specifications:

- 4 Exchange Servers
- 1,900 users on a single Exchange Server
- 0.576 IOPS per user
- 2048MB mailbox size
- 80 storage groups
- 2 database per storage group (160 total)

Test Deployment

The following tables summarize the testing environment.

Table 6. Simulated Exchange Configuration

<i>Number of Exchange mailboxes simulated</i>	7,600
<i>Number of hosts</i>	4
<i>Number of mailboxes per host</i>	1,900
<i>Number of storage groups per host</i>	20
<i>Number of mailbox stores per storage group</i>	2
<i>Number of mailboxes per mailbox store</i>	47.5
<i>Number of mailbox store LUs per storage group</i>	1
<i>Simulated profile: I/Os per second per mailbox (IOPS, include 20% headroom)</i>	0.576
<i>Database LU size</i>	200GB
<i>Log LU size</i>	20GB
<i>Total database size for performance testing</i>	15564.8GB
<i>% storage capacity used by Exchange database**</i>	97.28%

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

Table 7. Primary Storage Hardware

<i>Storage type (SAN, DAS, iSCSI, NAS, iSCSI)</i>	SAN
<i>Storage connectivity (Fibre Channel, SAS, SATA, iSCSI)</i>	Fiber Channel
<i>Storage model and OS/firmware revision</i>	1 Hitachi Adaptable Modular Storage 2300 Firmware: 0860/A-M WHQL listing: Hitachi Adaptable Modular Storage 2300
<i>Storage cache</i>	16GB
<i>Number of storage controllers</i>	2
<i>Number of storage ports</i>	8
<i>Maximum bandwidth of storage connectivity to host</i>	32Gb/s (8x4Gb/s ports)
<i>Switch type/model/firmware revision</i>	Brocade 5320, Fabric OS v6.1.1c
<i>HBA model and firmware</i>	Emulex LPe11002-M4-H, FW 2.80A4
<i>Number of HBAs/host</i>	2 dual-ported HBA per host, 1 4Gb/s port used per HBA
<i>Host server type</i>	Sun Fire 4600M2 4 2.8GHz dual-core AMD Opteron CPUs, 64GB memory
<i>Total number of disks tested in solution</i>	240
<i>Maximum number of spindles can be hosted in the storage</i>	240

Table 8. Primary Storage Software

<i>HBA driver</i>	STOR Miniport 9.1.7.16
<i>HBA QueueTarget setting</i>	1
<i>HBA QueueDepth setting</i>	254
<i>Multipathing</i>	Hitachi Dynamic Link Manager v6.1
<i>Host OS</i>	Windows Server 2008 Enterprise Service Pack 1
<i>ESE.dll file version</i>	08.01.0240.005
<i>Replication solution name/version</i>	N/A

Table 9. Primary Storage Disk Configuration (Mailbox Store Disks)

<i>Disk type, speed and firmware revision</i>	SAS Disk 300GB 15K D06A
<i>Raw capacity per disk (GB)</i>	300GB
<i>Number of physical disks in test</i>	200
<i>Total raw storage capacity (GB)</i>	60,000GB
<i>Disk slice size (GB)</i>	2 200GB LUs per RAID group
<i>Number of slices per LU or number of disks per LU</i>	2 LUs per 5 disks
<i>RAID level</i>	RAID-5 (4+1) at storage level
<i>Total formatted capacity</i>	16,000GB
<i>Storage capacity utilization</i>	26.67%
<i>Database capacity utilization</i>	25.94%

Table 10. Primary Storage Disk Configuration (Transaction Log Disks)

<i>Disk type, speed and firmware revision</i>	SAS Disk 300GB 15K D06A
<i>Raw capacity per disk (GB)</i>	300GB
<i>Number of spindles in test</i>	40
<i>Total raw storage capacity (GB)</i>	12,000GB
<i>Disk slice size (GB)</i>	2 20GB LUs per RAID group
<i>Number of slices per LU or number of disks per LU</i>	2 LUs per 2 disks
<i>RAID level</i>	RAID-1 at storage level
<i>Total formatted capacity</i>	1600GB

Streaming Backup

N/A

Replication

N/A

Best Practices

Microsoft Exchange Server 2007 is a very disk-intensive application. It presents two distinct workload patterns to the storage, with 8KB random read/write operations to the databases, and sequential write operations of varying size (between 512 bytes up to the log buffer size) to the transaction logs. For this reason, designing an optimal storage configuration can prove challenging in practice. Based on the testing run using the ESRP framework, Hitachi Data Systems recommends these best practices to improve the performance of the Adaptable Modular Storage 2300 running Exchange.

For more information about Exchange 2007 best practices for storage design, see the Microsoft TechNet article [Planning Storage Configurations](#).

Core Storage

1. Use Microsoft's diskpar or diskpart to create track-aligned disk partitions. For the 2300, using an offset of 64KB is optimal. This is optional in the case of using Windows Server 2008.
2. Keep the Exchange workload isolated from other applications. Mixing another I/O intensive application whose workload differs from Exchange can cause the performance for both applications to degrade.
3. Due to the difference in I/O patterns, isolate the Exchange database storage groups from the log groups. Create dedicated RAID groups for the databases and separate RAID groups for the logs.
4. Hitachi Data Systems recommends RAID-5 or RAID-1+0 for the database RAID groups and RAID-1 for the log RAID groups. Hitachi Data Systems does not recommend LU concatenation.
5. Size storage solutions for Exchange based primarily on performance criteria. The number of disks, RAID level and percent utilization of each disk directly affect the level of achievable performance. Factor in capacity requirements only after performance is addressed.
6. Spindle size is unrelated to performance with regards to IOPS or throughput rates. Spindle size is related to the usable capacity of all of the LUs from a RAID group, which is a choice users make.
7. The number of spindles, coupled with the RAID level, determines the physical IOPS capacity of the RAID group and all of its LUs. If the disk has too few spindles, the response times grow to large values very quickly.
8. For more information about RAID-5 drive failure and rebuild, see Appendix A.

Backup Strategy

N/A

Test Result Summary

This section provides a high-level summary of the test data from ESRP and the link to the detailed HTML reports that are generated by ESRP testing framework.

Reliability

A number of tests in the framework check reliability spanning a 24-hour window. The goal is to verify the storage can handle high I/O load for a long period of time. Following these stress tests, both log and database files are analyzed for integrity to ensure that no database or log corruption occurs.

- No errors were reported in the event log file for the storage reliability testing
- No errors were reported for the database and log checksum process

Primary Storage Performance Results

The primary storage performance testing exercises the storage with maximum sustainable Exchange type of I/O for two hours. The test shows how long it takes for the storage to respond to an I/O under load. The following data is the sum of all of the logical disk I/Os and average of all the logical disks I/O latency in the two-hour test duration.

Individual Server Metrics

Individual server metrics show the sum of I/Os across storage groups and the average latency across all storage groups.

Table 11. Individual Server Metrics for Exchange Server SUN21

Database I/O	
<i>Database Disk Transfers/sec</i>	1299 IOPS
<i>Database Disk Reads/sec</i>	760 IOPS
<i>Database Disk Writes/sec</i>	539 IOPS
<i>Average Database Disk Read Latency (ms)</i>	8
<i>Average Database Disk Write Latency (ms)</i>	5
Transaction Log I/O	
<i>Log Disk Writes/sec</i>	419 IOPS
<i>Average Log Disk Write Latency (ms)</i>	<1

Table 12. Individual Server Metrics for Exchange Server SUN22

Database I/O	
<i>Database Disk Transfers/sec</i>	1284 IOPS
<i>Database Disk Reads/sec</i>	751 IOPS
<i>Database Disk Writes/sec</i>	534 IOPS
<i>Average Database Disk Read Latency (ms)</i>	8
<i>Average Database Disk Write Latency (ms)</i>	5
Transaction Log I/O	
<i>Log Disk Writes/sec</i>	415 IOPS
<i>Average Log Disk Write Latency (ms)</i>	<1

Table 13. Individual Server Metrics for Exchange Server SUN23

Database I/O	
<i>Database Disk Transfers/sec</i>	1269 IOPS
<i>Database Disk Reads/sec</i>	740 IOPS
<i>Database Disk Writes/sec</i>	529 IOPS
<i>Average Database Disk Read Latency (ms)</i>	8
<i>Average Database Disk Write Latency (ms)</i>	5
Transaction Log I/O	
<i>Log Disk Writes/sec</i>	413 IOPS
<i>Average Log Disk Write Latency (ms)</i>	<1

Table 14. Individual Server Metrics for Exchange Server SUN24

Database I/O	
<i>Database Disk Transfers/sec</i>	1275 IOPS
<i>Database Disk Reads/sec</i>	746 IOPS
<i>Database Disk Writes/sec</i>	528 IOPS
<i>Average Database Disk Read Latency (ms)</i>	8
<i>Average Database Disk Write Latency (ms)</i>	5
Transaction Log I/O	
Log Disk Writes/sec	411 IOPS
Average Log Disk Write Latency (ms)	<1

Aggregate Performance Across All Servers Metrics

The aggregate performance across all server metrics shows the sum of I/Os across all servers in the solution and the average latency across all servers in the solution.

Table 15. Aggregate Performance for Exchange Server 2007

Database I/O	
<i>Database Disk Transfers/sec</i>	5,127 IOPS
<i>Database Disk Reads/sec</i>	2,997 IOPS
<i>Database Disk Writes/sec</i>	2,130 IOPS
<i>Average Database Disk Read Latency (ms)</i>	8
<i>Average Database Disk Write Latency (ms)</i>	5
Transaction Log I/O	
<i>Average Log Disk Writes/sec</i>	1,658 IOPS
<i>Average Log Disk Write Latency (ms)</i>	<1

Streaming Backup Performance

For the ESRP Version 2.1 release, only the streaming backup type is supported for testing in the framework. This section has two tests: The first measures the read I/O performance metrics by running checksums on all of the database and log files and the second measures the end-to-end performance when the databases are backed up to disks.

Database Read-only Performance

This test measures the maximum rate at which databases can be recovered. The following tables show the average rate for a single database file.

Table 16. Database Read-only Performance for Exchange Server SUN21

<i>MB read/sec per storage group</i>	13.5
<i>MB read/sec total</i>	270.8

Table 17. Database Read-only Performance for Exchange Server SUN22

<i>MB read/sec per storage group</i>	13.6
<i>MB read/sec total</i>	272.2

Table 18. Database Read-only Performance for Exchange Server SUN23

<i>MB read/sec per storage group</i>	13.8
<i>MB read/sec total</i>	275.3

Table 19. Database Read-only Performance for Exchange Server SUN24

<i>MB read/sec per storage group</i>	13.4
<i>MB read/sec total</i>	268.1

Log Read-only Performance

This test measures the maximum rate at which the log files can be played against the databases. The following tables show the average rate for 500 log files played in a single storage group. Each log file is 1MB in size.

Table 20. Log Read-only Performance for Exchange Server SUN21

<i>Average time to play one log file (sec)</i>	1.19
--	------

Table 21. Log Read-only Performance for Exchange Server SUN22

<i>Average time to play one log file (sec)</i>	1.18
--	------

Table 22. Log Read-only Performance for Exchange Server SUN23

<i>Average time to play one log file (sec)</i>	1.17
--	------

Table 23. Log Read-only Performance for Exchange Server SUN24

<i>Average time to play one log file (sec)</i>	1.18
--	------

Conclusion

This document details a tested configuration capable of supporting 7,600 users with a 0.576 IOPS per user profile and user mailbox size of 2048MB. A Hitachi Adaptable Modular Storage 2300 with 240 300GB 15K RPM SAS disks, 16GB of cache and eight 4Gb/s Fibre Channel host paths was used for these tests. Testing confirmed that the 2300 is capable of delivering the IOPS and capacity requirements needed to support 7,600 Exchange mailboxes configured with the specified user profile, while maintaining additional headroom to support peak throughput.

The solution outlined in this document does not include data protection components such as local or remote replication. Adding these technologies might affect performance and capacity requirements and each needs to be factored into the storage design accordingly.

For more information about planning Exchange Server 2007 storage architectures for the Hitachi Adaptable Modular Storage 2000 family, see <http://www.hds.com/assets/pdf/hitachi-ams-2000-family.pdf>.

This document is developed by Hitachi Data Systems and reviewed by Microsoft Exchange Product team. The test results and data presented in this document are based on the tests introduced in the ESRP test framework. Do not quote the data directly for pre-deployment verification. It is still necessary to validate the storage design for a specific customer environment.

The ESRP program is not designed to be a benchmarking program; tests do not generate the maximum throughput for a given solution. Rather, it is focused on producing recommendations from vendors for Exchange application. Thus, do not use the data presented in this document for direct comparisons among the solutions.

Appendix A – RAID-5 Drive Failure and Rebuild

These ESRP tests used RAID-5 (4D+1P) rather than RAID-6 (for example, 4D+2P) or RAID-1+0 (for example, 4D+4D). RAID-5 is a much more capacity-efficient RAID level than the others, losing only 20 percent of the usable space (using 4D+1P) instead of 33 percent (4D+2P) or 50 percent (4D+4D). One downside with the use of parity RAID instead of mirrored and striped (RAID-1+0) is that for *writes*, the internal disk write penalty is higher. For SAS or Fibre Channel disks, RAID-5 requires four physical disk I/Os on the backend for every host write, whereas RAID-1+0 consumes two physical I/Os. RAID-6 requires six physical I/Os for each host write.

The other downside is the RAID group rebuild time after a sudden disk failure. The Hitachi Adaptable Modular Storage 2000 family is always scanning the storage system looking for *soft fails*, because excessive soft fails often predict a hard failure. If the number of soft fails exceeds the failure threshold in a 24-hour period (user parameter driven), the 2000 family storage system first executes a disk-to-disk copy to a global hot spare (thus avoiding a RAID-5 or RAID-6 rebuild), and then marks the disk as *failed* and replaces it.

If hard fail does occur, for RAID-1+0, the contents of the good disk are mirrored onto a spare disk (these 'hot spares' are user defined to be in several disk enclosures on a storage system). For RAID-5 and RAID-6, all disks in the RAID group must be read to recreate the missing data and parity that was on the failed disk onto the spare disk. This rebuild mode is called *Corrective Copy*. An associated array setting called *[Drive] Restore Options* determines how aggressive the rebuild operation is in the face of ongoing host I/Os. This setting has three levels: aggressive, moderate and background.

Lab tests show that, on a RAID-6 group using Fibre Channel disks (the only sample available), and an *aggressive* Restore Option setting, a RAID-6 (8D+2P) group Corrective Copy operation requires about 30 minutes to complete in the absence of host workloads on LUs from that RAID group. In the presence of sustained 100 percent sequential write workloads to LUs from that RAID Group, this rebuild time increased to 18 hours. The host performance on a LU from that RAID group was measured at 154MB/s (normal state) and 95MB/s (Corrective Copy state). Had this been RAID-5, the Corrective Copy times would have been reduced.

Appendix B – Test Reports

This appendix contains Jetstress test results for one of the servers used in testing this storage solution. These test results are representative of the results obtained for all of the servers tested.

Performance Test Result: SUN21

Test Summary

Overall Test Result	Pass
Machine Name	SUN21
Test Description	
Test Start Time	6/18/2009 4:13:04 AM
Test End Time	6/18/2009 8:28:07 PM
Jetstress Version	08.02.0060.000
Ese Version	08.01.0240.005
Operating System	Windows Server (R) 2008 Enterprise Service Pack 1 (6.0.6001.65536)
Performance Log	C:\ESRP Testing\SUN21\1sg_2db tests\2 hour\1900 users\Performance_2009_6_18_4_14_27.blg C:\ESRP Testing\SUN21\1sg_2db tests\2 hour\1900 users\DBChecksum_2009_6_18_20_28_7.blg

Database Sizing and Throughput

Achieved I/O per Second	1299.343
Target I/O per Second	1094.4
Initial database size	4086204858368
Final database size	4120690425856
Database files (count)	40

Jetstress System Parameters

Thread count	2 (per storage group)
Log buffers	9000
Minimum database cache	640.0 MB
Maximum database cache	5120.0 MB
Insert operations	40%
Delete operations	30%
Replace operations	5%
Read operations	25%
Lazy commits	55%

Disk Subsystem Performance

Logical Disk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (C:\asgluns\sg1)	0.008	0.004	37.557	26.207	(n/a)
Database (C:\asgluns\sg2)	0.008	0.005	38.114	26.871	(n/a)
Database (C:\asgluns\sg3)	0.008	0.005	37.672	26.588	(n/a)
Database (C:\asgluns\sg4)	0.008	0.005	38.151	26.716	(n/a)
Database (C:\asgluns\sg5)	0.008	0.004	38.206	27.504	(n/a)
Database (C:\asgluns\sg6)	0.008	0.005	37.944	27.359	(n/a)
Database (C:\asgluns\sg7)	0.008	0.006	38.072	27.427	(n/a)
Database (C:\asgluns\sg8)	0.008	0.005	37.905	27.208	(n/a)
Database (C:\asgluns\sg9)	0.008	0.006	37.801	26.820	(n/a)
Database (C:\asgluns\sg10)	0.008	0.005	38.310	27.089	(n/a)
Database (C:\asgluns\sg11)	0.008	0.006	37.894	26.747	(n/a)
Database (C:\asgluns\sg12)	0.008	0.005	38.497	27.390	(n/a)
Database (C:\asgluns\sg13)	0.008	0.005	38.286	27.214	(n/a)
Database (C:\asgluns\sg14)	0.008	0.006	38.385	27.217	(n/a)
Database (C:\asgluns\sg15)	0.008	0.005	37.265	26.155	(n/a)
Database (C:\asgluns\sg16)	0.008	0.006	37.116	26.055	(n/a)
Database (C:\asgluns\sg17)	0.008	0.005	37.544	26.503	(n/a)
Database (C:\asgluns\sg18)	0.008	0.006	38.475	27.016	(n/a)
Database (C:\asgluns\sg19)	0.008	0.006	38.729	27.059	(n/a)
Database (C:\asgluns\sg20)	0.008	0.005	38.614	27.663	(n/a)
Log (C:\alogluns\log1)	0.000	0.001	0.000	20.484	4288.935
Log (C:\alogluns\log2)	0.000	0.001	0.000	20.875	4275.039

Log (C:\alogluns\log3)	0.000	0.001	0.000	20.663	4273.471
Log (C:\alogluns\log4)	0.000	0.001	0.000	20.839	4208.828
Log (C:\alogluns\log5)	0.000	0.001	0.000	21.130	4308.970
Log (C:\alogluns\log6)	0.000	0.001	0.000	21.213	4393.319
Log (C:\alogluns\log7)	0.000	0.001	0.000	21.367	4364.051
Log (C:\alogluns\log8)	0.000	0.001	0.000	21.309	4265.246
Log (C:\alogluns\log9)	0.000	0.001	0.000	20.659	4323.457
Log (C:\alogluns\log10)	0.000	0.001	0.000	20.987	4306.301
Log (C:\alogluns\log11)	0.000	0.001	0.000	20.837	4224.410
Log (C:\alogluns\log12)	0.000	0.001	0.000	21.230	4252.454
Log (C:\alogluns\log13)	0.000	0.001	0.000	21.022	4285.343
Log (C:\alogluns\log14)	0.000	0.001	0.000	21.281	4267.696
Log (C:\alogluns\log15)	0.000	0.001	0.000	20.241	4322.128
Log (C:\alogluns\log16)	0.000	0.001	0.000	20.380	4261.374
Log (C:\alogluns\log17)	0.000	0.001	0.000	20.510	4315.260
Log (C:\alogluns\log18)	0.000	0.001	0.000	20.911	4215.660
Log (C:\alogluns\log19)	0.000	0.001	0.000	20.801	4228.003
Log (C:\alogluns\log20)	0.000	0.001	0.000	21.439	4272.228

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.575	0.305	2.003
Available MBytes	56609.387	56597.000	57081.000
Free System Page Table Entries	33560734.889	33560440.000	33560968.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	137415650.008	136785920.000	137748480.000
Pool Paged Bytes	138429752.770	138305536.000	138555392.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

6/18/2009 4:12:58 AM -- Jetstress testing begins ...
6/18/2009 4:13:04 AM -- Prepare testing begins ...
6/18/2009 4:13:44 AM -- Attaching databases ...
6/18/2009 4:13:44 AM -- Prepare testing ends.
6/18/2009 4:13:44 AM -- Dispatching transactions begins ...
6/18/2009 4:13:45 AM -- Database cache settings: (minimum: 640.0 MB, maximum: 5.0 GB)
6/18/2009 4:13:45 AM -- Database flush thresholds: (start: 51.2 MB, stop: 102.4 MB)
6/18/2009 4:14:27 AM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).
6/18/2009 4:14:27 AM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).
6/18/2009 4:14:29 AM -- Operation mix: Sessions 2, Inserts 40%, Deletes 30%,

Replaces 5%, Reads 25%, Lazy Commits 55%.
6/18/2009 4:14:29 AM -- Performance logging begins (interval: 15000 ms).
6/18/2009 4:14:29 AM -- Attaining prerequisites:
6/18/2009 4:39:36 AM -- \MSEExchange Database(Jetstresswin)\Database Cache Size, Last: 4836106000.0 (lower bound: 4831838000.0, upper bound: none)
6/18/2009 6:39:37 AM -- Performance logging ends.
6/18/2009 8:28:01 PM -- JetInterop batch transaction stats: 57698, 57781, 57840, 57468, 57905, 57689, 57769, 57708, 57629, 57373, 57433, 58073, 58140, 57358, 57370, 57481, 57627, 57901, 57857, and 57755.
6/18/2009 8:28:02 PM -- Dispatching transactions ends.
6/18/2009 8:28:02 PM -- Shutting down databases ...
6/18/2009 8:28:07 PM -- Instance4184.1 (complete), Instance4184.2 (complete), Instance4184.3 (complete), Instance4184.4 (complete), Instance4184.5 (complete), Instance4184.6 (complete), Instance4184.7 (complete), Instance4184.8 (complete), Instance4184.9 (complete), Instance4184.10 (complete), Instance4184.11 (complete), Instance4184.12 (complete), Instance4184.13 (complete), Instance4184.14 (complete), Instance4184.15 (complete), Instance4184.16 (complete), Instance4184.17 (complete), Instance4184.18 (complete), Instance4184.19 (complete), and Instance4184.20 (complete)
6/18/2009 8:28:08 PM -- Performance logging begins (interval: 30000 ms).
6/18/2009 8:28:08 PM -- Verifying database checksums ...
6/19/2009 12:41:06 AM -- C:\asgluns\sg1 (100% processed), C:\asgluns\sg2 (100% processed), C:\asgluns\sg3 (100% processed), C:\asgluns\sg4 (100% processed), C:\asgluns\sg5 (100% processed), C:\asgluns\sg6 (100% processed), C:\asgluns\sg7 (100% processed), C:\asgluns\sg8 (100% processed), C:\asgluns\sg9 (100% processed), C:\asgluns\sg10 (100% processed), C:\asgluns\sg11 (100% processed), C:\asgluns\sg12 (100% processed), C:\asgluns\sg13 (100% processed), C:\asgluns\sg14 (100% processed), C:\asgluns\sg15 (100% processed), C:\asgluns\sg16 (100% processed), C:\asgluns\sg17 (100% processed), C:\asgluns\sg18 (100% processed), C:\asgluns\sg19 (100% processed), and C:\asgluns\sg20 (100% processed)
6/19/2009 12:41:06 AM -- Performance logging ends.
6/19/2009 12:41:06 AM -- C:\ESRP Testing\SUN21\lsg_2db tests\2 hour\1900 users\DBChecksum_2009_6_18_20_28_7.blg has 505 samples.
6/19/2009 12:43:19 AM -- C:\ESRP Testing\SUN21\lsg_2db tests\2 hour\1900 users\DBChecksum_2009_6_18_20_28_7.html is saved.
6/19/2009 12:43:19 AM -- Verifying log checksums ...
6/19/2009 12:43:25 AM -- C:\alogluns\log1 (2 logs passed), C:\alogluns\log2 (2 logs passed), C:\alogluns\log3 (2 logs passed), C:\alogluns\log4 (2 logs passed), C:\alogluns\log5 (2 logs passed), C:\alogluns\log6 (2 logs passed), C:\alogluns\log7 (2 logs passed), C:\alogluns\log8 (2 logs passed), C:\alogluns\log9 (2 logs passed), C:\alogluns\log10 (2 logs passed), C:\alogluns\log11 (2 logs passed), C:\alogluns\log12 (2 logs passed), C:\alogluns\log13 (2 logs passed), C:\alogluns\log14 (2 logs passed), C:\alogluns\log15 (2 logs passed), C:\alogluns\log16 (2 logs passed), C:\alogluns\log17 (2 logs passed), C:\alogluns\log18 (2 logs passed), C:\alogluns\log19 (2 logs passed), and C:\alogluns\log20 (2 logs passed)
6/19/2009 12:43:25 AM -- C:\ESRP Testing\SUN21\lsg_2db tests\2 hour\1900 users\Performance_2009_6_18_4_14_27.blg has 578 samples.
6/19/2009 12:43:25 AM -- Creating test report ...
6/19/2009 12:43:49 AM -- Volume C:\asgluns\sg1 has 0.0081 for Avg. Disk sec/Read.
6/19/2009 12:43:49 AM -- Volume C:\asgluns\sg2 has 0.0083 for Avg. Disk sec/Read.
6/19/2009 12:43:50 AM -- Volume C:\asgluns\sg3 has 0.0080 for Avg. Disk sec/Read.
6/19/2009 12:43:50 AM -- Volume C:\asgluns\sg4 has 0.0081 for Avg. Disk sec/Read.
6/19/2009 12:43:50 AM -- Volume C:\asgluns\sg5 has 0.0078 for Avg. Disk sec/Read.
6/19/2009 12:43:50 AM -- Volume C:\asgluns\sg6 has 0.0082 for Avg. Disk sec/Read.
6/19/2009 12:43:50 AM -- Volume C:\asgluns\sg7 has 0.0082 for Avg. Disk sec/Read.
6/19/2009 12:43:50 AM -- Volume C:\asgluns\sg8 has 0.0077 for Avg. Disk sec/Read.
6/19/2009 12:43:50 AM -- Volume C:\asgluns\sg9 has 0.0082 for Avg. Disk

sec/Read.
6/19/2009 12:43:50 AM -- volume C:\asgluns\sg10 has 0.0079 for Avg. Disk
sec/Read.
6/19/2009 12:43:50 AM -- volume C:\asgluns\sg11 has 0.0083 for Avg. Disk
sec/Read.
6/19/2009 12:43:50 AM -- volume C:\asgluns\sg12 has 0.0078 for Avg. Disk
sec/Read.
6/19/2009 12:43:50 AM -- volume C:\asgluns\sg13 has 0.0079 for Avg. Disk
sec/Read.
6/19/2009 12:43:50 AM -- volume C:\asgluns\sg14 has 0.0083 for Avg. Disk
sec/Read.
6/19/2009 12:43:50 AM -- volume C:\asgluns\sg15 has 0.0078 for Avg. Disk
sec/Read.
6/19/2009 12:43:50 AM -- volume C:\asgluns\sg16 has 0.0079 for Avg. Disk
sec/Read.
6/19/2009 12:43:50 AM -- volume C:\asgluns\sg17 has 0.0081 for Avg. Disk
sec/Read.
6/19/2009 12:43:51 AM -- volume C:\asgluns\sg18 has 0.0079 for Avg. Disk
sec/Read.
6/19/2009 12:43:51 AM -- volume C:\asgluns\sg19 has 0.0082 for Avg. Disk
sec/Read.
6/19/2009 12:43:51 AM -- volume C:\asgluns\sg20 has 0.0078 for Avg. Disk
sec/Read.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log1 has 0.0009 for Avg. Disk
sec/write.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log1 has 0.0000 for Avg. Disk
sec/Read.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log2 has 0.0007 for Avg. Disk
sec/write.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log2 has 0.0000 for Avg. Disk
sec/Read.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log3 has 0.0010 for Avg. Disk
sec/write.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log3 has 0.0000 for Avg. Disk
sec/Read.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log4 has 0.0007 for Avg. Disk
sec/write.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log4 has 0.0000 for Avg. Disk
sec/Read.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log5 has 0.0009 for Avg. Disk
sec/write.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log5 has 0.0000 for Avg. Disk
sec/Read.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log6 has 0.0007 for Avg. Disk
sec/write.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log6 has 0.0000 for Avg. Disk
sec/Read.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log7 has 0.0009 for Avg. Disk
sec/write.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log7 has 0.0000 for Avg. Disk
sec/Read.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log8 has 0.0006 for Avg. Disk
sec/write.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log8 has 0.0000 for Avg. Disk
sec/Read.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log9 has 0.0009 for Avg. Disk
sec/write.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log9 has 0.0000 for Avg. Disk
sec/Read.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log10 has 0.0006 for Avg. Disk
sec/write.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log10 has 0.0000 for Avg. Disk
sec/Read.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log11 has 0.0009 for Avg. Disk
sec/write.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log11 has 0.0000 for Avg. Disk
sec/Read.
6/19/2009 12:43:51 AM -- volume C:\alogluns\log12 has 0.0006 for Avg. Disk

sec/write.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log12 has 0.0000 for Avg. Disk
 sec/Read.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log13 has 0.0010 for Avg. Disk
 sec/write.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log13 has 0.0000 for Avg. Disk
 sec/Read.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log14 has 0.0007 for Avg. Disk
 sec/write.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log14 has 0.0000 for Avg. Disk
 sec/Read.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log15 has 0.0010 for Avg. Disk
 sec/write.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log15 has 0.0000 for Avg. Disk
 sec/Read.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log16 has 0.0007 for Avg. Disk
 sec/write.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log16 has 0.0000 for Avg. Disk
 sec/Read.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log17 has 0.0010 for Avg. Disk
 sec/write.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log17 has 0.0000 for Avg. Disk
 sec/Read.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log18 has 0.0007 for Avg. Disk
 sec/write.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log18 has 0.0000 for Avg. Disk
 sec/Read.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log19 has 0.0009 for Avg. Disk
 sec/write.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log19 has 0.0000 for Avg. Disk
 sec/Read.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log20 has 0.0006 for Avg. Disk
 sec/write.
 6/19/2009 12:43:51 AM -- volume C:\alogluns\log20 has 0.0000 for Avg. Disk
 sec/Read.
 6/19/2009 12:43:51 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
 6/19/2009 12:43:51 AM -- Test has 0 Database Page Fault Stalls/sec samples
 higher than 0.
 6/19/2009 12:43:51 AM -- C:\ESRP Testing\SUN21\1sg_2db tests\2 hour\1900
 users\Performance_2009_6_18_4_14_27.xml has 477 samples queried.

Performance Test Database Checksums Result: SUN21

Checksum Statistics - All

Database	Seen pages	Bad pages	Correctable pages	Wrong page no pages	File length / seconds taken
C:\asgluns\sg1\Jetstress1.edb	12575074	0	0	0	98242 MBytes / 12057 seconds
C:\asgluns\sg1\Jetstress2.edb	12574818	0	0	0	98240 MBytes / 3086 seconds
C:\asgluns\sg2\Jetstress1.edb	12575842	0	0	0	98248 MBytes / 7917 seconds
C:\asgluns\sg2\Jetstress2.edb	12574562	0	0	0	98238 MBytes / 7260 seconds
C:\asgluns\sg3\Jetstress1.edb	12576354	0	0	0	98252 MBytes / 7488 seconds
C:\asgluns\sg3\Jetstress2.edb	12575074	0	0	0	98242 MBytes / 6997 seconds
C:\asgluns\sg4\Jetstress1.edb	12574050	0	0	0	98234 MBytes / 7873 seconds

C:\asgluns\sg4\Jetstress2.edb	12574818	0	0	0	98240 MBytes / 7298 seconds
C:\asgluns\sg5\Jetstress1.edb	12575586	0	0	0	98246 MBytes / 7480 seconds
C:\asgluns\sg5\Jetstress2.edb	12574562	0	0	0	98238 MBytes / 6958 seconds
C:\asgluns\sg6\Jetstress1.edb	12576610	0	0	0	98254 MBytes / 7799 seconds
C:\asgluns\sg6\Jetstress2.edb	12575586	0	0	0	98246 MBytes / 7335 seconds
C:\asgluns\sg7\Jetstress1.edb	12576354	0	0	0	98252 MBytes / 6899 seconds
C:\asgluns\sg7\Jetstress2.edb	12573794	0	0	0	98232 MBytes / 6884 seconds
C:\asgluns\sg8\Jetstress1.edb	12577634	0	0	0	98262 MBytes / 6884 seconds
C:\asgluns\sg8\Jetstress2.edb	12575842	0	0	0	98248 MBytes / 6974 seconds
C:\asgluns\sg9\Jetstress1.edb	12574306	0	0	0	98236 MBytes / 6882 seconds
C:\asgluns\sg9\Jetstress2.edb	12575074	0	0	0	98242 MBytes / 6899 seconds
C:\asgluns\sg10\Jetstress1.edb	12575842	0	0	0	98248 MBytes / 6869 seconds
C:\asgluns\sg10\Jetstress2.edb	12575842	0	0	0	98248 MBytes / 6993 seconds
C:\asgluns\sg11\Jetstress1.edb	12574050	0	0	0	98234 MBytes / 6893 seconds
C:\asgluns\sg11\Jetstress2.edb	12574306	0	0	0	98236 MBytes / 6898 seconds
C:\asgluns\sg12\Jetstress1.edb	12574562	0	0	0	98238 MBytes / 6844 seconds
C:\asgluns\sg12\Jetstress2.edb	12577634	0	0	0	98262 MBytes / 6983 seconds
C:\asgluns\sg13\Jetstress1.edb	12576866	0	0	0	98256 MBytes / 7406 seconds
C:\asgluns\sg13\Jetstress2.edb	12574818	0	0	0	98240 MBytes / 7019 seconds
C:\asgluns\sg14\Jetstress1.edb	12573794	0	0	0	98232 MBytes / 7710 seconds
C:\asgluns\sg14\Jetstress2.edb	12576610	0	0	0	98254 MBytes / 7399 seconds
C:\asgluns\sg15\Jetstress1.edb	12575330	0	0	0	98244 MBytes / 7369 seconds
C:\asgluns\sg15\Jetstress2.edb	12574050	0	0	0	98234 MBytes / 7043 seconds
C:\asgluns\sg16\Jetstress1.edb	12574562	0	0	0	98238 MBytes /

					7670 seconds
C:\asgluns\sg16\Jetstress2.edb	12574050	0	0	0	98234 MBytes / 7400 seconds
C:\asgluns\sg17\Jetstress1.edb	12576098	0	0	0	98250 MBytes / 7407 seconds
C:\asgluns\sg17\Jetstress2.edb	12577122	0	0	0	98258 MBytes / 7002 seconds
C:\asgluns\sg18\Jetstress1.edb	12576098	0	0	0	98250 MBytes / 7780 seconds
C:\asgluns\sg18\Jetstress2.edb	12575586	0	0	0	98246 MBytes / 7334 seconds
C:\asgluns\sg19\Jetstress1.edb	12573794	0	0	0	98232 MBytes / 6878 seconds
C:\asgluns\sg19\Jetstress2.edb	12575842	0	0	0	98248 MBytes / 6905 seconds
C:\asgluns\sg20\Jetstress1.edb	12573794	0	0	0	98232 MBytes / 7055 seconds
C:\asgluns\sg20\Jetstress2.edb	12577378	0	0	0	98260 MBytes / 6854 seconds
(Sum)	503013968	0	0	0	3929796 MBytes / 15178 seconds

Disk Subsystem Performance of Checksum

Logical Disk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec
C:\asgluns\sg1	0.103	0.000	206.787	0.000
C:\asgluns\sg2	0.076	0.000	206.433	0.000
C:\asgluns\sg3	0.073	0.000	216.773	0.000
C:\asgluns\sg4	0.076	0.000	207.063	0.000
C:\asgluns\sg5	0.072	0.000	217.364	0.000
C:\asgluns\sg6	0.076	0.000	207.135	0.000
C:\asgluns\sg7	0.069	0.000	227.958	0.000
C:\asgluns\sg8	0.069	0.000	226.723	0.000
C:\asgluns\sg9	0.069	0.000	227.973	0.000
C:\asgluns\sg10	0.069	0.000	226.622	0.000
C:\asgluns\sg11	0.069	0.000	227.670	0.000
C:\asgluns\sg12	0.069	0.000	227.338	0.000
C:\asgluns\sg13	0.072	0.000	217.841	0.000
C:\asgluns\sg14	0.076	0.000	208.045	0.000
C:\asgluns\sg15	0.072	0.000	217.870	0.000
C:\asgluns\sg16	0.076	0.000	208.455	0.000
C:\asgluns\sg17	0.072	0.000	217.959	0.000
C:\asgluns\sg18	0.076	0.000	207.759	0.000

C:\asgluns\sg19	0.069	0.000	227.909	0.000
C:\asgluns\sg20	0.070	0.000	225.837	0.000

Memory System Performance of Checksum

Counter	Average	Minimum	Maximum
% Processor Time	2.357	0.669	3.140
Available MBytes	61866.382	61833.000	61890.000
Free System Page Table Entries	33560459.663	33559685.000	33561911.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	138820001.711	138506240.000	139042816.000
Pool Paged Bytes	138747709.339	137633792.000	170328064.000

Test Log

6/18/2009 4:12:58 AM -- Jetstress testing begins ...
6/18/2009 4:13:04 AM -- Prepare testing begins ...
6/18/2009 4:13:44 AM -- Attaching databases ...
6/18/2009 4:13:44 AM -- Prepare testing ends.
6/18/2009 4:13:44 AM -- Dispatching transactions begins ...
6/18/2009 4:13:45 AM -- Database cache settings: (minimum: 640.0 MB, maximum: 5.0 GB)
6/18/2009 4:13:45 AM -- Database flush thresholds: (start: 51.2 MB, stop: 102.4 MB)
6/18/2009 4:14:27 AM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).
6/18/2009 4:14:27 AM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).
6/18/2009 4:14:29 AM -- Operation mix: Sessions 2, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.
6/18/2009 4:14:29 AM -- Performance logging begins (interval: 15000 ms).
6/18/2009 4:14:29 AM -- Attaining prerequisites:
6/18/2009 4:39:36 AM -- \MSEExchange Database(Jetstresswin)\Database Cache Size, Last: 4836106000.0 (lower bound: 4831838000.0, upper bound: none)
6/18/2009 6:39:37 AM -- Performance logging ends.
6/18/2009 8:28:01 PM -- JetInterop batch transaction stats: 57698, 57781, 57840, 57468, 57905, 57689, 57769, 57708, 57629, 57373, 57433, 58073, 58140, 57358, 57370, 57481, 57627, 57901, 57857, and 57755.
6/18/2009 8:28:02 PM -- Dispatching transactions ends.
6/18/2009 8:28:02 PM -- Shutting down databases ...
6/18/2009 8:28:07 PM -- Instance4184.1 (complete), Instance4184.2 (complete), Instance4184.3 (complete), Instance4184.4 (complete), Instance4184.5 (complete), Instance4184.6 (complete), Instance4184.7 (complete), Instance4184.8 (complete), Instance4184.9 (complete), Instance4184.10 (complete), Instance4184.11 (complete), Instance4184.12 (complete), Instance4184.13 (complete), Instance4184.14 (complete), Instance4184.15 (complete), Instance4184.16 (complete), Instance4184.17 (complete), Instance4184.18 (complete), Instance4184.19 (complete), and Instance4184.20 (complete)
6/18/2009 8:28:08 PM -- Performance logging begins (interval: 30000 ms).
6/18/2009 8:28:08 PM -- verifying database checksums ...
6/19/2009 12:41:06 AM -- C:\asgluns\sg1 (100% processed), C:\asgluns\sg2 (100% processed), C:\asgluns\sg3 (100% processed), C:\asgluns\sg4 (100% processed), C:\asgluns\sg5 (100% processed), C:\asgluns\sg6 (100% processed), C:\asgluns\sg7 (100% processed), C:\asgluns\sg8 (100% processed), C:\asgluns\sg9 (100% processed), C:\asgluns\sg10 (100% processed), C:\asgluns\sg11 (100% processed), C:\asgluns\sg12 (100% processed), C:\asgluns\sg13 (100% processed), C:\asgluns\sg14 (100% processed), C:\asgluns\sg15 (100% processed), C:\asgluns\sg16 (100% processed),

C:\asgluns\sg17 (100% processed), C:\asgluns\sg18 (100% processed), C:\asgluns\sg19 (100% processed), and C:\asgluns\sg20 (100% processed)
 6/19/2009 12:41:06 AM -- Performance logging ends.
 6/19/2009 12:41:06 AM -- C:\ESRP Testing\SUN21\1sg_2db tests\2 hour\1900 users\DBChecksum_2009_6_18_20_28_7.blg has 505 samples.

Stress Test Database Performance Result: SUN21

Test Summary

Overall Test Result	Pass
Machine Name	SUN21
Test Description	
Test Start Time	6/19/2009 1:18:19 AM
Test End Time	6/21/2009 8:18:36 PM
Jetstress Version	08.02.0060.000
Ese Version	08.01.0240.005
Operating System	Windows Server (R) 2008 Enterprise Service Pack 1 (6.0.6001.65536)
Performance Log	C:\ESRP Testing\SUN21\1sg_2db tests\Stress\1900 users\Stress_2009_6_19_1_19_42.blg C:\ESRP Testing\SUN21\1sg_2db tests\Stress\1900 users\DBChecksum_2009_6_21_20_18_36.blg

Database Sizing and Throughput

Achieved I/O per Second	1286.629
Target I/O per Second	1094.4
Initial database size	4120690425856
Final database size	4245485649920
Database files (count)	40

Jetstress System Parameters

Thread count	2 (per storage group)
Log buffers	9000
Minimum database cache	640.0 MB
Maximum database cache	5120.0 MB
Insert operations	40%
Delete operations	30%
Replace operations	5%
Read operations	25%
Lazy commits	55%

Disk Subsystem Performance

Logical Disk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
--------------	--------------------	---------------------	----------------	-----------------	-----------------------

Database (C:\asgluns\sg1)	0.008	0.004	38.563	26.039	(n/a)
Database (C:\asgluns\sg2)	0.008	0.005	38.453	25.891	(n/a)
Database (C:\asgluns\sg3)	0.008	0.004	38.492	26.032	(n/a)
Database (C:\asgluns\sg4)	0.008	0.005	38.408	25.859	(n/a)
Database (C:\asgluns\sg5)	0.008	0.004	38.342	25.940	(n/a)
Database (C:\asgluns\sg6)	0.008	0.005	38.271	25.764	(n/a)
Database (C:\asgluns\sg7)	0.008	0.006	38.385	25.938	(n/a)
Database (C:\asgluns\sg8)	0.008	0.005	38.428	25.960	(n/a)
Database (C:\asgluns\sg9)	0.008	0.006	38.488	26.053	(n/a)
Database (C:\asgluns\sg10)	0.008	0.005	38.347	25.798	(n/a)
Database (C:\asgluns\sg11)	0.008	0.006	38.434	26.059	(n/a)
Database (C:\asgluns\sg12)	0.008	0.005	38.396	25.909	(n/a)
Database (C:\asgluns\sg13)	0.008	0.005	38.247	25.977	(n/a)
Database (C:\asgluns\sg14)	0.008	0.006	38.776	26.174	(n/a)
Database (C:\asgluns\sg15)	0.008	0.005	38.249	25.860	(n/a)
Database (C:\asgluns\sg16)	0.008	0.006	38.247	25.959	(n/a)
Database (C:\asgluns\sg17)	0.008	0.005	38.597	26.049	(n/a)
Database (C:\asgluns\sg18)	0.008	0.006	38.240	25.821	(n/a)
Database (C:\asgluns\sg19)	0.008	0.006	38.246	25.745	(n/a)
Database (C:\asgluns\sg20)	0.008	0.005	38.321	25.872	(n/a)
Log (C:\alogluns\log1)	0.000	0.001	0.000	20.072	4284.750
Log (C:\alogluns\log2)	0.000	0.001	0.000	20.157	4241.613
Log (C:\alogluns\log3)	0.000	0.001	0.000	20.158	4258.019
Log (C:\alogluns\log4)	0.000	0.001	0.000	20.122	4251.574
Log (C:\alogluns\log5)	0.000	0.001	0.000	20.122	4303.442
Log (C:\alogluns\log6)	0.000	0.001	0.000	20.123	4274.865

Log (C:\alogluns\log7)	0.000	0.001	0.000	20.075	4278.850
Log (C:\alogluns\log8)	0.000	0.001	0.000	20.203	4265.258
Log (C:\alogluns\log9)	0.000	0.001	0.000	20.238	4270.997
Log (C:\alogluns\log10)	0.000	0.001	0.000	20.128	4246.689
Log (C:\alogluns\log11)	0.000	0.001	0.000	20.237	4280.488
Log (C:\alogluns\log12)	0.000	0.001	0.000	20.303	4275.994
Log (C:\alogluns\log13)	0.000	0.001	0.000	20.189	4305.273
Log (C:\alogluns\log14)	0.000	0.001	0.000	20.273	4250.722
Log (C:\alogluns\log15)	0.000	0.001	0.000	20.034	4272.887
Log (C:\alogluns\log16)	0.000	0.001	0.000	20.252	4286.879
Log (C:\alogluns\log17)	0.000	0.001	0.000	20.156	4258.075
Log (C:\alogluns\log18)	0.000	0.001	0.000	20.135	4281.678
Log (C:\alogluns\log19)	0.000	0.001	0.000	19.986	4258.401
Log (C:\alogluns\log20)	0.000	0.001	0.000	20.191	4264.054

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.643	0.240	2.234
Available MBytes	56589.064	56552.000	57110.000
Free System Page Table Entries	33561238.481	33560802.000	33561510.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	140428150.277	139767808.000	141066240.000
Pool Paged Bytes	139754725.776	138641408.000	172441600.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

```

6/19/2009 1:18:14 AM -- Jetstress testing begins ...
6/19/2009 1:18:19 AM -- Prepare testing begins ...
6/19/2009 1:19:00 AM -- Attaching databases ...
6/19/2009 1:19:00 AM -- Prepare testing ends.
6/19/2009 1:19:00 AM -- Dispatching transactions begins ...
6/19/2009 1:19:00 AM -- Database cache settings: (minimum: 640.0 MB, maximum:
5.0 GB)
6/19/2009 1:19:00 AM -- Database flush thresholds: (start: 51.2 MB, stop:
102.4 MB)
6/19/2009 1:19:42 AM -- Database read latency thresholds: (average: 0.02
seconds/read, maximum: 0.1 seconds/read).
6/19/2009 1:19:42 AM -- Log write latency thresholds: (average: 0.01
seconds/write, maximum: 0.1 seconds/write).
6/19/2009 1:19:45 AM -- Operation mix: Sessions 2, Inserts 40%, Deletes 30%,
Replaces 5%, Reads 25%, Lazy Commits 55%.
6/19/2009 1:19:45 AM -- Performance logging begins (interval: 15000 ms).
6/19/2009 1:19:45 AM -- Attaining prerequisites:
6/19/2009 1:45:03 AM -- \MSExchange Database(Jetstresswin)\Database Cache
Size, Last: 4832518000.0 (lower bound: 4831838000.0, upper bound: none)
6/20/2009 1:45:04 AM -- Performance logging ends.
6/21/2009 8:18:30 PM -- JetInterop batch transaction stats: 231253, 230951,

```

230655, 230080, 230912, 230441, 230737, 231153, 230143, 230914, 231770,
232441, 230148, 231006, 230512, 230414, 230986, 230484, 230435, and 230700.
6/21/2009 8:18:31 PM -- Dispatching transactions ends.
6/21/2009 8:18:31 PM -- Shutting down databases ...
6/21/2009 8:18:36 PM -- Instance2876.1 (complete), Instance2876.2 (complete),
Instance2876.3 (complete), Instance2876.4 (complete), Instance2876.5
(complete), Instance2876.6 (complete), Instance2876.7 (complete),
Instance2876.8 (complete), Instance2876.9 (complete), Instance2876.10
(complete), Instance2876.11 (complete), Instance2876.12 (complete),
Instance2876.13 (complete), Instance2876.14 (complete), Instance2876.15
(complete), Instance2876.16 (complete), Instance2876.17 (complete),
Instance2876.18 (complete), Instance2876.19 (complete), and Instance2876.20
(complete)
6/21/2009 8:18:37 PM -- Performance logging begins (interval: 30000 ms).
6/21/2009 8:18:37 PM -- Verifying database checksums ...
6/22/2009 12:39:18 AM -- C:\asgluns\sg1 (100% processed), C:\asgluns\sg2
(100% processed), C:\asgluns\sg3 (100% processed), C:\asgluns\sg4 (100%
processed), C:\asgluns\sg5 (100% processed), C:\asgluns\sg6 (100% processed),
C:\asgluns\sg7 (100% processed), C:\asgluns\sg8 (100% processed),
C:\asgluns\sg9 (100% processed), C:\asgluns\sg10 (100% processed),
C:\asgluns\sg11 (100% processed), C:\asgluns\sg12 (100% processed),
C:\asgluns\sg13 (100% processed), C:\asgluns\sg14 (100% processed),
C:\asgluns\sg15 (100% processed), C:\asgluns\sg16 (100% processed),
C:\asgluns\sg17 (100% processed), C:\asgluns\sg18 (100% processed),
C:\asgluns\sg19 (100% processed), and C:\asgluns\sg20 (100% processed)
6/22/2009 12:39:18 AM -- Performance logging ends.
6/22/2009 12:39:18 AM -- C:\ESRP Testing\SUN21\lsg_2db tests\Stress\1900
users\DBChecksum_2009_6_21_20_18_36.blg has 520 samples.
6/22/2009 12:41:35 AM -- C:\ESRP Testing\SUN21\lsg_2db tests\Stress\1900
users\DBChecksum_2009_6_21_20_18_36.html is saved.
6/22/2009 12:41:35 AM -- Verifying log checksums ...
6/22/2009 12:41:42 AM -- C:\alogluns\log1 (2 logs passed), C:\alogluns\log2
(2 logs passed), C:\alogluns\log3 (2 logs passed), C:\alogluns\log4 (2 logs
passed), C:\alogluns\log5 (2 logs passed), C:\alogluns\log6 (2 logs passed),
C:\alogluns\log7 (2 logs passed), C:\alogluns\log8 (2 logs passed),
C:\alogluns\log9 (2 logs passed), C:\alogluns\log10 (2 logs passed),
C:\alogluns\log11 (2 logs passed), C:\alogluns\log12 (2 logs passed),
C:\alogluns\log13 (2 logs passed), C:\alogluns\log14 (2 logs passed),
C:\alogluns\log15 (2 logs passed), C:\alogluns\log16 (2 logs passed),
C:\alogluns\log17 (2 logs passed), C:\alogluns\log18 (2 logs passed),
C:\alogluns\log19 (2 logs passed), and C:\alogluns\log20 (3 logs passed)
6/22/2009 12:41:42 AM -- C:\ESRP Testing\SUN21\lsg_2db tests\Stress\1900
users\Stress_2009_6_19_1_19_42.blg has 5840 samples.
6/22/2009 12:41:42 AM -- Creating test report ...
6/22/2009 12:45:27 AM -- Volume C:\asgluns\sg1 has 0.0080 for Avg. Disk
sec/Read.
6/22/2009 12:45:27 AM -- volume C:\asgluns\sg2 has 0.0082 for Avg. Disk
sec/Read.
6/22/2009 12:45:27 AM -- volume C:\asgluns\sg3 has 0.0079 for Avg. Disk
sec/Read.
6/22/2009 12:45:27 AM -- volume C:\asgluns\sg4 has 0.0082 for Avg. Disk
sec/Read.
6/22/2009 12:45:27 AM -- volume C:\asgluns\sg5 has 0.0079 for Avg. Disk
sec/Read.
6/22/2009 12:45:27 AM -- volume C:\asgluns\sg6 has 0.0081 for Avg. Disk
sec/Read.
6/22/2009 12:45:27 AM -- volume C:\asgluns\sg7 has 0.0081 for Avg. Disk
sec/Read.
6/22/2009 12:45:27 AM -- volume C:\asgluns\sg8 has 0.0077 for Avg. Disk
sec/Read.
6/22/2009 12:45:27 AM -- volume C:\asgluns\sg9 has 0.0081 for Avg. Disk
sec/Read.
6/22/2009 12:45:28 AM -- volume C:\asgluns\sg10 has 0.0077 for Avg. Disk
sec/Read.
6/22/2009 12:45:28 AM -- volume C:\asgluns\sg11 has 0.0081 for Avg. Disk
sec/Read.
6/22/2009 12:45:28 AM -- volume C:\asgluns\sg12 has 0.0078 for Avg. Disk
sec/Read.

6/22/2009 12:45:29 AM -- volume C:\alogluns\log14 has 0.0007 for Avg. Disk sec/write.
6/22/2009 12:45:29 AM -- volume C:\alogluns\log14 has 0.0000 for Avg. Disk sec/Read.
6/22/2009 12:45:29 AM -- volume C:\alogluns\log15 has 0.0010 for Avg. Disk sec/write.
6/22/2009 12:45:29 AM -- volume C:\alogluns\log15 has 0.0000 for Avg. Disk sec/Read.
6/22/2009 12:45:29 AM -- volume C:\alogluns\log16 has 0.0007 for Avg. Disk sec/write.
6/22/2009 12:45:29 AM -- volume C:\alogluns\log16 has 0.0000 for Avg. Disk sec/Read.
6/22/2009 12:45:29 AM -- volume C:\alogluns\log17 has 0.0010 for Avg. Disk sec/write.
6/22/2009 12:45:29 AM -- volume C:\alogluns\log17 has 0.0000 for Avg. Disk sec/Read.
6/22/2009 12:45:29 AM -- volume C:\alogluns\log18 has 0.0007 for Avg. Disk sec/write.
6/22/2009 12:45:29 AM -- volume C:\alogluns\log18 has 0.0000 for Avg. Disk sec/Read.
6/22/2009 12:45:29 AM -- volume C:\alogluns\log19 has 0.0009 for Avg. Disk sec/write.
6/22/2009 12:45:29 AM -- volume C:\alogluns\log19 has 0.0000 for Avg. Disk sec/Read.
6/22/2009 12:45:29 AM -- volume C:\alogluns\log20 has 0.0006 for Avg. Disk sec/write.
6/22/2009 12:45:29 AM -- volume C:\alogluns\log20 has 0.0000 for Avg. Disk sec/Read.
6/22/2009 12:45:29 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
6/22/2009 12:45:29 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
6/22/2009 12:45:29 AM -- C:\ESRP Testing\SUN21\1sg_2db tests\Stress\1900 users\Stress_2009_6_19_1_19_42.xml has 5739 samples queried.

Stress Test Database Checksums Result: SUN21

Checksum Statistics - All

Database	Seen pages	Bad pages	Correctable pages	Wrong page no pages	File length / seconds taken
C:\asgluns\sg1\Jetstress1.edb	12956002	0	0	0	101218 MBytes / 12450 seconds
C:\asgluns\sg1\Jetstress2.edb	12956514	0	0	0	101222 MBytes / 3190 seconds
C:\asgluns\sg2\Jetstress1.edb	12956770	0	0	0	101224 MBytes / 8127 seconds
C:\asgluns\sg2\Jetstress2.edb	12957538	0	0	0	101230 MBytes / 7474 seconds
C:\asgluns\sg3\Jetstress1.edb	12956514	0	0	0	101222 MBytes / 7756 seconds
C:\asgluns\sg3\Jetstress2.edb	12955234	0	0	0	101212 MBytes / 7190 seconds
C:\asgluns\sg4\Jetstress1.edb	12952162	0	0	0	101188 MBytes / 8127 seconds
C:\asgluns\sg4\Jetstress2.edb	12955746	0	0	0	101216 MBytes / 7472 seconds
C:\asgluns\sg5\Jetstress1.edb	12956258	0	0	0	101220 MBytes / 7675 seconds

C:\asgluns\sg5\Jetstress2.edb	12954210	0	0	0	101204 MBytes / 7223 seconds
C:\asgluns\sg6\Jetstress1.edb	12958050	0	0	0	101234 MBytes / 8051 seconds
C:\asgluns\sg6\Jetstress2.edb	12955490	0	0	0	101214 MBytes / 7519 seconds
C:\asgluns\sg7\Jetstress1.edb	12956258	0	0	0	101220 MBytes / 7038 seconds
C:\asgluns\sg7\Jetstress2.edb	12954722	0	0	0	101208 MBytes / 6971 seconds
C:\asgluns\sg8\Jetstress1.edb	12958562	0	0	0	101238 MBytes / 7079 seconds
C:\asgluns\sg8\Jetstress2.edb	12957026	0	0	0	101226 MBytes / 7255 seconds
C:\asgluns\sg9\Jetstress1.edb	12954210	0	0	0	101204 MBytes / 7014 seconds
C:\asgluns\sg9\Jetstress2.edb	12956002	0	0	0	101218 MBytes / 6977 seconds
C:\asgluns\sg10\Jetstress1.edb	12956002	0	0	0	101218 MBytes / 7044 seconds
C:\asgluns\sg10\Jetstress2.edb	12959074	0	0	0	101242 MBytes / 7281 seconds
C:\asgluns\sg11\Jetstress1.edb	12957794	0	0	0	101232 MBytes / 7015 seconds
C:\asgluns\sg11\Jetstress2.edb	12956258	0	0	0	101220 MBytes / 6987 seconds
C:\asgluns\sg12\Jetstress1.edb	12962658	0	0	0	101270 MBytes / 7076 seconds
C:\asgluns\sg12\Jetstress2.edb	12959074	0	0	0	101242 MBytes / 7260 seconds
C:\asgluns\sg13\Jetstress1.edb	12955746	0	0	0	101216 MBytes / 7628 seconds
C:\asgluns\sg13\Jetstress2.edb	12954210	0	0	0	101204 MBytes / 7240 seconds
C:\asgluns\sg14\Jetstress1.edb	12952418	0	0	0	101190 MBytes / 7993 seconds
C:\asgluns\sg14\Jetstress2.edb	12960354	0	0	0	101252 MBytes / 7586 seconds
C:\asgluns\sg15\Jetstress1.edb	12957026	0	0	0	101226 MBytes / 7635 seconds
C:\asgluns\sg15\Jetstress2.edb	12951906	0	0	0	101186 MBytes / 7288 seconds
C:\asgluns\sg16\Jetstress1.edb	12956770	0	0	0	101224 MBytes / 8003 seconds
C:\asgluns\sg16\Jetstress2.edb	12958562	0	0	0	101238 MBytes / 7569 seconds
C:\asgluns\sg17\Jetstress1.edb	12957794	0	0	0	101232 MBytes /

						7618 seconds
C:\asgluns\sg17\Jetstress2.edb	12955234	0	0	0		101212 MBytes / 7242 seconds
C:\asgluns\sg18\Jetstress1.edb	12953442	0	0	0		101198 MBytes / 8040 seconds
C:\asgluns\sg18\Jetstress2.edb	12958306	0	0	0		101236 MBytes / 7526 seconds
C:\asgluns\sg19\Jetstress1.edb	12954210	0	0	0		101204 MBytes / 7020 seconds
C:\asgluns\sg19\Jetstress2.edb	12954210	0	0	0		101204 MBytes / 6983 seconds
C:\asgluns\sg20\Jetstress1.edb	12952162	0	0	0		101188 MBytes / 7138 seconds
C:\asgluns\sg20\Jetstress2.edb	12957282	0	0	0		101228 MBytes / 7202 seconds
(Sum)	518247760	0	0	0		4048810 MBytes / 15641 seconds

Disk Subsystem Performance of Checksum

<i>Logical Disk</i>	<i>Avg. Disk sec/Read</i>	<i>Avg. Disk sec/Write</i>	<i>Disk Reads/sec</i>	<i>Disk Writes/sec</i>
C:\asgluns\sg1	0.103	0.001	204.707	0.001
C:\asgluns\sg2	0.077	0.001	207.093	0.001
C:\asgluns\sg3	0.073	0.001	216.070	0.001
C:\asgluns\sg4	0.077	0.000	206.961	0.001
C:\asgluns\sg5	0.073	0.001	217.375	0.001
C:\asgluns\sg6	0.076	0.000	207.877	0.001
C:\asgluns\sg7	0.068	0.000	230.837	0.002
C:\asgluns\sg8	0.070	0.001	225.914	0.001
C:\asgluns\sg9	0.068	0.001	231.334	0.001
C:\asgluns\sg10	0.070	0.001	225.980	0.001
C:\asgluns\sg11	0.068	0.000	231.238	0.002
C:\asgluns\sg12	0.070	0.000	225.845	0.001
C:\asgluns\sg13	0.072	0.001	217.536	0.001
C:\asgluns\sg14	0.077	0.001	207.427	0.001
C:\asgluns\sg15	0.073	0.000	216.394	0.001
C:\asgluns\sg16	0.077	0.001	207.687	0.001
C:\asgluns\sg17	0.072	0.001	217.627	0.001
C:\asgluns\sg18	0.077	0.001	207.986	0.001
C:\asgluns\sg19	0.068	0.001	231.082	0.001
C:\asgluns\sg20	0.070	0.001	225.454	0.001

Memory System Performance of Checksum

Counter	Average	Minimum	Maximum
% Processor Time	2.632	1.081	3.326
Available MBytes	61814.594	61785.000	61846.000
Free System Page Table Entries	33560701.623	33560227.000	33561944.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	144063204.431	143982592.000	144211968.000
Pool Paged Bytes	140524559.754	139157504.000	172109824.000

Test Log

6/19/2009 1:18:14 AM -- Jetstress testing begins ...
6/19/2009 1:18:19 AM -- Prepare testing begins ...
6/19/2009 1:19:00 AM -- Attaching databases ...
6/19/2009 1:19:00 AM -- Prepare testing ends.
6/19/2009 1:19:00 AM -- Dispatching transactions begins ...
6/19/2009 1:19:00 AM -- Database cache settings: (minimum: 640.0 MB, maximum: 5.0 GB)
6/19/2009 1:19:00 AM -- Database flush thresholds: (start: 51.2 MB, stop: 102.4 MB)
6/19/2009 1:19:42 AM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.1 seconds/read).
6/19/2009 1:19:42 AM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.1 seconds/write).
6/19/2009 1:19:45 AM -- Operation mix: Sessions 2, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.
6/19/2009 1:19:45 AM -- Performance logging begins (interval: 15000 ms).
6/19/2009 1:19:45 AM -- Attaining prerequisites:
6/19/2009 1:45:03 AM -- \MSEExchange Database(Jetstresswin)\Database Cache Size, Last: 4832518000.0 (lower bound: 4831838000.0, upper bound: none)
6/20/2009 1:45:04 AM -- Performance logging ends.
6/21/2009 8:18:30 PM -- JetInterop batch transaction stats: 231253, 230951, 230655, 230080, 230912, 230441, 230737, 231153, 230143, 230914, 231770, 232441, 230148, 231006, 230512, 230414, 230986, 230484, 230435, and 230700.
6/21/2009 8:18:31 PM -- Dispatching transactions ends.
6/21/2009 8:18:31 PM -- Shutting down databases ...
6/21/2009 8:18:36 PM -- Instance2876.1 (complete), Instance2876.2 (complete), Instance2876.3 (complete), Instance2876.4 (complete), Instance2876.5 (complete), Instance2876.6 (complete), Instance2876.7 (complete), Instance2876.8 (complete), Instance2876.9 (complete), Instance2876.10 (complete), Instance2876.11 (complete), Instance2876.12 (complete), Instance2876.13 (complete), Instance2876.14 (complete), Instance2876.15 (complete), Instance2876.16 (complete), Instance2876.17 (complete), Instance2876.18 (complete), Instance2876.19 (complete), and Instance2876.20 (complete)
6/21/2009 8:18:37 PM -- Performance logging begins (interval: 30000 ms).
6/21/2009 8:18:37 PM -- Verifying database checksums ...
6/22/2009 12:39:18 AM -- C:\asgluns\sg1 (100% processed), C:\asgluns\sg2 (100% processed), C:\asgluns\sg3 (100% processed), C:\asgluns\sg4 (100% processed), C:\asgluns\sg5 (100% processed), C:\asgluns\sg6 (100% processed), C:\asgluns\sg7 (100% processed), C:\asgluns\sg8 (100% processed), C:\asgluns\sg9 (100% processed), C:\asgluns\sg10 (100% processed), C:\asgluns\sg11 (100% processed), C:\asgluns\sg12 (100% processed), C:\asgluns\sg13 (100% processed), C:\asgluns\sg14 (100% processed), C:\asgluns\sg15 (100% processed), C:\asgluns\sg16 (100% processed), C:\asgluns\sg17 (100% processed), C:\asgluns\sg18 (100% processed), C:\asgluns\sg19 (100% processed), and C:\asgluns\sg20 (100% processed)
6/22/2009 12:39:18 AM -- Performance logging ends.
6/22/2009 12:39:18 AM -- C:\ESRP Testing\SUN21\1sg_2db tests\Stress\1900 users\DBChecksum_2009_6_21_20_18_36.blg has 520 samples.

Streaming Backup Test Result: SUN21

Streaming Backup Statistics - All

<i>Database Instance</i>	<i>Database Size (MBytes)</i>	<i>Elapsed Backup Time</i>	<i>MBytes Transferred/sec</i>
Instance2024.1	202437.55	04:17:20	13.11
Instance2024.2	202451.55	04:17:21	13.11
Instance2024.3	202431.55	04:16:52	13.13
Instance2024.4	202401.55	04:17:33	13.10
Instance2024.5	202421.55	04:17:22	13.11
Instance2024.6	202445.55	04:17:55	13.08
Instance2024.7	202425.55	03:58:08	14.17
Instance2024.8	202461.55	03:57:20	14.22
Instance2024.9	202419.55	03:58:00	14.17
Instance2024.10	202457.55	03:56:59	14.24
Instance2024.11	202449.55	03:57:25	14.21
Instance2024.12	202509.55	03:57:44	14.20
Instance2024.13	202417.55	04:17:25	13.11
Instance2024.14	202439.55	04:17:49	13.09
Instance2024.15	202409.55	04:17:19	13.11
Instance2024.16	202459.55	04:17:22	13.11
Instance2024.17	202441.55	04:17:24	13.11
Instance2024.18	202431.55	04:17:52	13.08
Instance2024.19	202405.55	03:58:27	14.15
Instance2024.20	202413.55	03:57:57	14.18

Jetstress System Parameters

<i>Thread count</i>	2 (per storage group)
<i>Log buffers</i>	9000
<i>Minimum database cache</i>	640.0 MB
<i>Maximum database cache</i>	5120.0 MB
<i>Insert operations</i>	40%
<i>Delete operations</i>	30%
<i>Replace operations</i>	5%
<i>Read operations</i>	25%
<i>Lazy commits</i>	55%

Disk Subsystem Performance

Logical Disk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (C:\asgluns\sg1)	0.009	0.000	104.672	0.002	(n/a)
Database (C:\asgluns\sg2)	0.009	0.000	104.676	0.002	(n/a)
Database (C:\asgluns\sg3)	0.009	0.000	104.665	0.002	(n/a)
Database (C:\asgluns\sg4)	0.009	0.000	104.645	0.002	(n/a)
Database (C:\asgluns\sg5)	0.009	0.000	104.660	0.002	(n/a)
Database (C:\asgluns\sg6)	0.010	0.000	104.642	0.000	(n/a)
Database (C:\asgluns\sg7)	0.008	0.000	104.644	0.003	(n/a)
Database (C:\asgluns\sg8)	0.008	0.000	104.670	0.003	(n/a)
Database (C:\asgluns\sg9)	0.008	0.000	104.638	0.003	(n/a)
Database (C:\asgluns\sg10)	0.008	0.000	104.646	0.003	(n/a)
Database (C:\asgluns\sg11)	0.008	0.000	104.662	0.003	(n/a)
Database (C:\asgluns\sg12)	0.008	0.000	104.683	0.003	(n/a)
Database (C:\asgluns\sg13)	0.009	0.000	104.665	0.002	(n/a)
Database (C:\asgluns\sg14)	0.009	0.000	104.660	0.002	(n/a)
Database (C:\asgluns\sg15)	0.009	0.000	104.646	0.002	(n/a)
Database (C:\asgluns\sg16)	0.009	0.000	104.685	0.002	(n/a)
Database (C:\asgluns\sg17)	0.009	0.000	104.671	0.002	(n/a)
Database (C:\asgluns\sg18)	0.009	0.000	104.669	0.002	(n/a)
Database (C:\asgluns\sg19)	0.008	0.000	104.643	0.003	(n/a)
Database (C:\asgluns\sg20)	0.008	0.000	104.630	0.003	(n/a)
Log (C:\alogluns\log1)	0.000	0.000	0.000	0.002	11.318
Log (C:\alogluns\log2)	0.000	0.000	0.000	0.002	11.472

Log (C:\alogluns\log3)	0.000	0.000	0.000	0.002	10.574
Log (C:\alogluns\log4)	0.000	0.000	0.000	0.002	5.354
Log (C:\alogluns\log5)	0.000	0.000	0.000	0.002	11.472
Log (C:\alogluns\log6)	0.000	0.000	0.000	0.000	0.000
Log (C:\alogluns\log7)	0.000	0.000	0.000	0.002	19.922
Log (C:\alogluns\log8)	0.000	0.000	0.000	0.002	18.843
Log (C:\alogluns\log9)	0.000	0.000	0.000	0.002	21.225
Log (C:\alogluns\log10)	0.000	0.000	0.000	0.002	13.256
Log (C:\alogluns\log11)	0.000	0.000	0.000	0.002	13.447
Log (C:\alogluns\log12)	0.000	0.000	0.000	0.002	19.549
Log (C:\alogluns\log13)	0.000	0.000	0.000	0.002	5.499
Log (C:\alogluns\log14)	0.000	0.000	0.000	0.001	4.482
Log (C:\alogluns\log15)	0.000	0.000	0.000	0.002	11.472
Log (C:\alogluns\log16)	0.000	0.000	0.000	0.002	11.472
Log (C:\alogluns\log17)	0.000	0.000	0.000	0.002	11.546
Log (C:\alogluns\log18)	0.000	0.000	0.000	0.001	4.277
Log (C:\alogluns\log19)	0.000	0.000	0.000	0.002	13.256
Log (C:\alogluns\log20)	0.000	0.000	0.000	0.002	13.256

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	1.745	0.448	2.421
Available MBytes	61862.223	61856.000	61868.000
Free System Page Table Entries	33561906.416	33561619.000	33562002.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	143936684.986	143933440.000	144015360.000
Pool Paged Bytes	144766128.963	143884288.000	144830464.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

6/22/2009 1:29:32 AM -- Jetstress testing begins ...
 6/22/2009 1:29:37 AM -- Prepare testing begins ...
 6/22/2009 1:30:18 AM -- Attaching databases ...
 6/22/2009 1:30:18 AM -- Prepare testing ends.
 6/22/2009 1:31:01 AM -- Performance logging begins (interval: 30000 ms).
 6/22/2009 1:31:01 AM -- Streaming backup databases ...
 6/22/2009 5:48:57 AM -- Performance logging ends.
 6/22/2009 5:48:57 AM -- Instance2024.1 (100% processed), Instance2024.2 (100% processed), Instance2024.3 (100% processed), Instance2024.4 (100% processed), Instance2024.5 (100% processed), Instance2024.6 (100% processed), Instance2024.7 (100% processed), Instance2024.8 (100% processed), Instance2024.9 (100% processed), Instance2024.10 (100% processed), Instance2024.11 (100% processed), Instance2024.12 (100% processed), Instance2024.13 (100% processed), Instance2024.14 (100% processed),

Instance2024.15 (100% processed), Instance2024.16 (100% processed),
 Instance2024.17 (100% processed), Instance2024.18 (100% processed),
 Instance2024.19 (100% processed), and Instance2024.20 (100% processed)
 6/22/2009 5:48:57 AM -- C:\ESRP Testing\SUN21\lsg_2db tests\Streaming
 Backup\StreamingBackup_2009_6_22_1_30_18.blg has 515 samples.
 6/22/2009 5:48:57 AM -- Creating test report ...

Soft Recovery Test Result: SUN21

Soft Recovery Statistics - All

<i>Database Instance</i>	<i>Log files replayed</i>	<i>Elapsed seconds</i>
Instance4268.1	503	602.1014596
Instance4268.2	514	605.28388
Instance4268.3	510	608.2010987
Instance4268.4	501	603.6926698
Instance4268.5	500	599.4494426
Instance4268.6	511	603.6926698
Instance4268.7	506	605.8142834
Instance4268.8	505	600.5102494
Instance4268.9	512	604.7534766
Instance4268.10	513	607.1402919
Instance4268.11	508	605.8142834
Instance4268.12	511	606.6098885
Instance4268.13	516	608.2010987
Instance4268.14	521	611.6487208
Instance4268.15	506	608.2010987
Instance4268.16	508	602.1014596
Instance4268.17	504	595.9862204
Instance4268.18	511	605.28388
Instance4268.19	519	610.0575106
Instance4268.20	511	597.0626273

Disk Subsystem Performance

<i>Logical Disk</i>	<i>Avg. Disk sec/Read</i>	<i>Avg. Disk sec/Write</i>	<i>Disk Reads/sec</i>	<i>Disk Writes/sec</i>	<i>Avg. Disk Bytes/Write</i>
Database (C:\asgluns\lsg1)	0.073	0.004	449.585	13.023	(n/a)
Database (C:\asgluns\lsg2)	0.079	0.005	453.344	13.261	(n/a)
Database (C:\asgluns\lsg3)	0.079	0.004	454.902	13.194	(n/a)
Database (C:\asgluns\lsg4)	0.084	0.004	448.419	13.016	(n/a)
Database	0.077	0.004	453.701	12.991	(n/a)

(C:\asgluns\sg5)					
Database (C:\asgluns\sg6)	0.077	0.004	457.823	13.237	(n/a)
Database (C:\asgluns\sg7)	0.079	0.004	457.207	13.134	(n/a)
Database (C:\asgluns\sg8)	0.085	0.005	445.293	13.023	(n/a)
Database (C:\asgluns\sg9)	0.087	0.004	456.319	13.258	(n/a)
Database (C:\asgluns\sg10)	0.085	0.004	452.462	13.277	(n/a)
Database (C:\asgluns\sg11)	0.081	0.004	451.677	13.153	(n/a)
Database (C:\asgluns\sg12)	0.087	0.005	459.288	13.267	(n/a)
Database (C:\asgluns\sg13)	0.077	0.004	458.205	13.362	(n/a)
Database (C:\asgluns\sg14)	0.086	0.004	464.766	13.470	(n/a)
Database (C:\asgluns\sg15)	0.075	0.004	450.550	13.097	(n/a)
Database (C:\asgluns\sg16)	0.080	0.004	454.120	13.175	(n/a)
Database (C:\asgluns\sg17)	0.074	0.004	453.450	13.083	(n/a)
Database (C:\asgluns\sg18)	0.081	0.005	454.435	13.267	(n/a)
Database (C:\asgluns\sg19)	0.083	0.004	465.111	13.450	(n/a)
Database (C:\asgluns\sg20)	0.081	0.005	454.433	13.152	(n/a)
Log (C:\alogluns\log1)	0.002	0.000	27.281	0.056	189.250
Log (C:\alogluns\log2)	0.002	0.000	27.770	0.051	160.463
Log (C:\alogluns\log3)	0.002	0.000	27.656	0.051	133.156
Log (C:\alogluns\log4)	0.002	0.000	27.222	0.044	105.472
Log (C:\alogluns\log5)	0.002	0.000	27.172	0.056	194.389
Log (C:\alogluns\log6)	0.002	0.000	27.770	0.052	161.280
Log (C:\alogluns\log7)	0.002	0.000	27.498	0.052	157.696
Log (C:\alogluns\log8)	0.002	0.000	27.269	0.057	186.596
Log (C:\alogluns\log9)	0.002	0.000	27.770	0.054	157.298
Log (C:\alogluns\log10)	0.002	0.000	27.824	0.054	142.933
Log (C:\alogluns\log11)	0.002	0.000	27.547	0.044	102.265
Log (C:\alogluns\log12)	0.002	0.000	27.771	0.054	143.430
Log (C:\alogluns\log13)	0.002	0.000	27.976	0.051	133.156

Log (C:\alogluns\log14)	0.002	0.000	28.256	0.018	118.613
Log (C:\alogluns\log15)	0.002	0.000	27.438	0.053	132.779
Log (C:\alogluns\log16)	0.002	0.000	27.607	0.057	188.901
Log (C:\alogluns\log17)	0.002	0.000	27.384	0.059	200.501
Log (C:\alogluns\log18)	0.002	0.000	27.770	0.052	157.696
Log (C:\alogluns\log19)	0.002	0.000	28.203	0.051	130.389
Log (C:\alogluns\log20)	0.002	0.000	27.607	0.058	190.957

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	5.785	3.258	39.327
Available MBytes	56981.139	56505.000	61606.000
Free System Page Table Entries	33561207.391	33560984.000	33561338.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	150324556.291	145657856.000	152829952.000
Pool Paged Bytes	147528805.722	146862080.000	147775488.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

6/22/2009 8:31:09 PM -- Jetstress testing begins ...
 6/22/2009 8:31:15 PM -- Prepare testing begins ...
 6/22/2009 8:31:55 PM -- Attaching databases ...
 6/22/2009 8:31:55 PM -- Prepare testing ends.
 6/22/2009 8:31:55 PM -- Dispatching transactions begins ...
 6/22/2009 8:31:56 PM -- Database cache settings: (minimum: 640.0 MB, maximum: 5.0 GB)
 6/22/2009 8:31:56 PM -- Database flush thresholds: (start: 51.2 MB, stop: 102.4 MB)
 6/22/2009 8:32:39 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).
 6/22/2009 8:32:39 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).
 6/22/2009 8:32:41 PM -- Operation mix: Sessions 2, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.
 6/22/2009 8:32:41 PM -- Performance logging begins (interval: 15000 ms).
 6/22/2009 8:32:41 PM -- Generating log files ...
 6/23/2009 12:24:41 AM -- C:\alogluns\log1 (100.8% generated), C:\alogluns\log2 (103.0% generated), C:\alogluns\log3 (102.2% generated), C:\alogluns\log4 (100.4% generated), C:\alogluns\log5 (100.2% generated), C:\alogluns\log6 (102.4% generated), C:\alogluns\log7 (101.4% generated), C:\alogluns\log8 (101.2% generated), C:\alogluns\log9 (102.6% generated), C:\alogluns\log10 (102.8% generated), C:\alogluns\log11 (101.8% generated), C:\alogluns\log12 (102.4% generated), C:\alogluns\log13 (103.4% generated), C:\alogluns\log14 (104.4% generated), C:\alogluns\log15 (101.4% generated), C:\alogluns\log16 (101.8% generated), C:\alogluns\log17 (101.0% generated), C:\alogluns\log18 (102.4% generated), C:\alogluns\log19 (104.0% generated), and C:\alogluns\log20 (102.4% generated)
 6/23/2009 12:24:41 AM -- Performance logging ends.
 6/23/2009 12:24:41 AM -- JetInterop batch transaction stats: 12829, 12851, 12842, 12584, 12820, 13022, 12856, 12861, 13029, 12896, 12844, 13036, 12949, 13175, 12854, 12818, 12740, 12902, 13161, and 12980.
 6/23/2009 12:24:42 AM -- Dispatching transactions ends.
 6/23/2009 12:24:42 AM -- Shutting down databases ...

6/23/2009 12:24:46 AM -- Instance4268.1 (complete), Instance4268.2 (complete), Instance4268.3 (complete), Instance4268.4 (complete), Instance4268.5 (complete), Instance4268.6 (complete), Instance4268.7 (complete), Instance4268.8 (complete), Instance4268.9 (complete), Instance4268.10 (complete), Instance4268.11 (complete), Instance4268.12 (complete), Instance4268.13 (complete), Instance4268.14 (complete), Instance4268.15 (complete), Instance4268.16 (complete), Instance4268.17 (complete), Instance4268.18 (complete), Instance4268.19 (complete), and Instance4268.20 (complete)

6/23/2009 12:24:46 AM -- C:\ESRP Testing\SUN21\1sg_2db tests\Soft Recovery\Performance_2009_6_22_20_32_39.blg has 924 samples.

6/23/2009 12:24:46 AM -- Creating test report ...

6/23/2009 12:25:10 AM -- Volume C:\asgluns\sg1 has 0.0080 for Avg. Disk sec/Read.

6/23/2009 12:25:10 AM -- volume C:\asgluns\sg2 has 0.0082 for Avg. Disk sec/Read.

6/23/2009 12:25:10 AM -- volume C:\asgluns\sg3 has 0.0079 for Avg. Disk sec/Read.

6/23/2009 12:25:10 AM -- volume C:\asgluns\sg4 has 0.0083 for Avg. Disk sec/Read.

6/23/2009 12:25:10 AM -- volume C:\asgluns\sg5 has 0.0079 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- volume C:\asgluns\sg6 has 0.0081 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- volume C:\asgluns\sg7 has 0.0080 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- volume C:\asgluns\sg8 has 0.0076 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- volume C:\asgluns\sg9 has 0.0081 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- volume C:\asgluns\sg10 has 0.0077 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- volume C:\asgluns\sg11 has 0.0079 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- volume C:\asgluns\sg12 has 0.0077 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- volume C:\asgluns\sg13 has 0.0079 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- volume C:\asgluns\sg14 has 0.0083 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- volume C:\asgluns\sg15 has 0.0079 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- volume C:\asgluns\sg16 has 0.0082 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- volume C:\asgluns\sg17 has 0.0079 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- volume C:\asgluns\sg18 has 0.0082 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- volume C:\asgluns\sg19 has 0.0081 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- volume C:\asgluns\sg20 has 0.0076 for Avg. Disk sec/Read.

6/23/2009 12:25:12 AM -- volume C:\alogluns\log1 has 0.0009 for Avg. Disk sec/write.

6/23/2009 12:25:12 AM -- volume C:\alogluns\log1 has 0.0000 for Avg. Disk sec/Read.

6/23/2009 12:25:12 AM -- volume C:\alogluns\log2 has 0.0007 for Avg. Disk sec/write.

6/23/2009 12:25:12 AM -- volume C:\alogluns\log2 has 0.0000 for Avg. Disk sec/Read.

6/23/2009 12:25:12 AM -- volume C:\alogluns\log3 has 0.0009 for Avg. Disk sec/write.

6/23/2009 12:25:12 AM -- volume C:\alogluns\log3 has 0.0000 for Avg. Disk sec/Read.

6/23/2009 12:25:12 AM -- volume C:\alogluns\log4 has 0.0007 for Avg. Disk sec/write.

6/23/2009 12:25:12 AM -- volume C:\alogluns\log4 has 0.0000 for Avg. Disk sec/Read.

6/23/2009 12:25:12 AM -- Volume C:\alogluns\log5 has 0.0010 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log5 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log6 has 0.0007 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log6 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log7 has 0.0009 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log7 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log8 has 0.0006 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log8 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log9 has 0.0009 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log9 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log10 has 0.0006 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log10 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log11 has 0.0009 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log11 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log12 has 0.0006 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log12 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log13 has 0.0010 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log13 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log14 has 0.0007 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log14 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log15 has 0.0010 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log15 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log16 has 0.0007 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log16 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log17 has 0.0010 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log17 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log18 has 0.0007 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log18 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log19 has 0.0009 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log19 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log20 has 0.0006 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log20 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
6/23/2009 12:25:12 AM -- Test has 0 Database Page Fault Stalls/sec samples
higher than 0.
6/23/2009 12:25:12 AM -- C:\ESRP Testing\SUN21\lsg_2db tests\Soft

Recovery\Performance_2009_6_22_20_32_39.xml has 923 samples queried.
 6/23/2009 12:25:12 AM -- C:\ESRP Testing\SUN21\lsg_2db tests\Soft
 Recovery\Performance_2009_6_22_20_32_39.html is saved.
 6/23/2009 12:32:24 AM -- Performance logging begins (interval: 4000 ms).
 6/23/2009 12:32:24 AM -- Recovering databases ...
 6/23/2009 12:42:36 AM -- Performance logging ends.
 6/23/2009 12:42:36 AM -- Instance4268.1 (602.1014596), Instance4268.2
 (605.28388), Instance4268.3 (608.2010987), Instance4268.4 (603.6926698),
 Instance4268.5 (599.4494426), Instance4268.6 (603.6926698), Instance4268.7
 (605.8142834), Instance4268.8 (600.5102494), Instance4268.9 (604.7534766),
 Instance4268.10 (607.1402919), Instance4268.11 (605.8142834), Instance4268.12
 (606.6098885), Instance4268.13 (608.2010987), Instance4268.14 (611.6487208),
 Instance4268.15 (608.2010987), Instance4268.16 (602.1014596), Instance4268.17
 (595.9862204), Instance4268.18 (605.28388), Instance4268.19 (610.0575106),
 and Instance4268.20 (597.0626273)
 6/23/2009 12:42:37 AM -- C:\ESRP Testing\SUN21\lsg_2db tests\Soft
 Recovery\SoftRecovery_2009_6_23_0_32_19.blg has 151 samples.
 6/23/2009 12:42:37 AM -- Creating test report ...

Soft Recovery Test Performance Result: SUN21

Test Summary

Overall Test Result	Pass
Machine Name	SUN21
Test Description	
Test Start Time	6/22/2009 8:31:15 PM
Test End Time	6/23/2009 12:24:46 AM
Jetstress Version	08.02.0060.000
Ese Version	08.01.0240.005
Operating System	Windows Server (R) 2008 Enterprise Service Pack 1 (6.0.6001.65536)
Performance Log	C:\ESRP Testing\SUN21\lsg_2db tests\Soft Recovery\Performance_2009_6_22_20_32_39.blg

Database Sizing and Throughput

Achieved I/O per Second	1286.524
Capacity Percentage	100%
Throughput Percentage	100%
Initial database size	4245485649920
Final database size	4252005695488
Database files (count)	40

Jetstress System Parameters

Thread count	2 (per storage group)
Log buffers	9000
Minimum database cache	640.0 MB
Maximum database cache	5120.0 MB
Insert operations	40%

Delete operations	30%
Replace operations	5%
Read operations	25%
Lazy commits	55%

Disk Subsystem Performance

Logical Disk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (C:\asgluns\sg1)	0.008	0.004	38.798	25.206	(n/a)
Database (C:\asgluns\sg2)	0.008	0.005	38.589	25.416	(n/a)
Database (C:\asgluns\sg3)	0.008	0.004	38.575	25.430	(n/a)
Database (C:\asgluns\sg4)	0.008	0.005	38.287	24.972	(n/a)
Database (C:\asgluns\sg5)	0.008	0.004	38.896	25.271	(n/a)
Database (C:\asgluns\sg6)	0.008	0.005	39.209	25.657	(n/a)
Database (C:\asgluns\sg7)	0.008	0.006	39.032	25.445	(n/a)
Database (C:\asgluns\sg8)	0.008	0.004	38.571	25.142	(n/a)
Database (C:\asgluns\sg9)	0.008	0.006	38.962	25.566	(n/a)
Database (C:\asgluns\sg10)	0.008	0.005	38.582	25.456	(n/a)
Database (C:\asgluns\sg11)	0.008	0.006	38.614	25.215	(n/a)
Database (C:\asgluns\sg12)	0.008	0.005	39.570	25.921	(n/a)
Database (C:\asgluns\sg13)	0.008	0.005	38.887	25.614	(n/a)
Database (C:\asgluns\sg14)	0.008	0.006	39.547	26.098	(n/a)
Database (C:\asgluns\sg15)	0.008	0.005	38.578	25.127	(n/a)
Database (C:\asgluns\sg16)	0.008	0.006	38.665	25.450	(n/a)
Database (C:\asgluns\sg17)	0.008	0.005	38.467	25.173	(n/a)
Database (C:\asgluns\sg18)	0.008	0.006	38.733	25.408	(n/a)
Database	0.008	0.006	39.584	25.919	(n/a)

(C:\asgluns\sg19)					
Database (C:\asgluns\sg20)	0.008	0.005	39.245	25.648	(n/a)
Log (C:\alogluns\log1)	0.000	0.001	0.000	19.275	4384.699
Log (C:\alogluns\log2)	0.000	0.001	0.000	19.740	4359.423
Log (C:\alogluns\log3)	0.000	0.001	0.000	19.506	4345.177
Log (C:\alogluns\log4)	0.000	0.001	0.000	19.250	4343.719
Log (C:\alogluns\log5)	0.000	0.001	0.000	19.242	4364.015
Log (C:\alogluns\log6)	0.000	0.001	0.000	19.742	4340.712
Log (C:\alogluns\log7)	0.000	0.001	0.000	19.411	4337.801
Log (C:\alogluns\log8)	0.000	0.001	0.000	19.476	4332.744
Log (C:\alogluns\log9)	0.000	0.001	0.000	19.655	4378.407
Log (C:\alogluns\log10)	0.000	0.001	0.000	19.748	4342.823
Log (C:\alogluns\log11)	0.000	0.001	0.000	19.373	4385.038
Log (C:\alogluns\log12)	0.000	0.001	0.000	19.862	4287.856
Log (C:\alogluns\log13)	0.000	0.001	0.000	19.683	4360.775
Log (C:\alogluns\log14)	0.000	0.001	0.000	19.978	4381.143
Log (C:\alogluns\log15)	0.000	0.001	0.000	19.283	4384.326
Log (C:\alogluns\log16)	0.000	0.001	0.000	19.613	4361.062
Log (C:\alogluns\log17)	0.000	0.001	0.000	19.270	4383.408
Log (C:\alogluns\log18)	0.000	0.001	0.000	19.641	4369.314
Log (C:\alogluns\log19)	0.000	0.001	0.000	19.937	4358.810
Log (C:\alogluns\log20)	0.000	0.001	0.000	19.631	4373.225

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	1.036	0.389	3.391
Available MBytes	56828.565	56532.000	61657.000
Free System Page Table Entries	33560678.636	33559939.000	33560943.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	143933196.190	143904768.000	144080896.000
Pool Paged Bytes	146128851.671	145055744.000	146968576.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

6/22/2009 8:31:09 PM -- Jetstress testing begins ...
6/22/2009 8:31:15 PM -- Prepare testing begins ...
6/22/2009 8:31:55 PM -- Attaching databases ...
6/22/2009 8:31:55 PM -- Prepare testing ends.
6/22/2009 8:31:55 PM -- Dispatching transactions begins ...
6/22/2009 8:31:56 PM -- Database cache settings: (minimum: 640.0 MB, maximum:

5.0 GB)
6/22/2009 8:31:56 PM -- Database flush thresholds: (start: 51.2 MB, stop: 102.4 MB)
6/22/2009 8:32:39 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).
6/22/2009 8:32:39 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).
6/22/2009 8:32:41 PM -- Operation mix: Sessions 2, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.
6/22/2009 8:32:41 PM -- Performance logging begins (interval: 15000 ms).
6/22/2009 8:32:41 PM -- Generating log files ...
6/23/2009 12:24:41 AM -- C:\alogluns\log1 (100.8% generated), C:\alogluns\log2 (103.0% generated), C:\alogluns\log3 (102.2% generated), C:\alogluns\log4 (100.4% generated), C:\alogluns\log5 (100.2% generated), C:\alogluns\log6 (102.4% generated), C:\alogluns\log7 (101.4% generated), C:\alogluns\log8 (101.2% generated), C:\alogluns\log9 (102.6% generated), C:\alogluns\log10 (102.8% generated), C:\alogluns\log11 (101.8% generated), C:\alogluns\log12 (102.4% generated), C:\alogluns\log13 (103.4% generated), C:\alogluns\log14 (104.4% generated), C:\alogluns\log15 (101.4% generated), C:\alogluns\log16 (101.8% generated), C:\alogluns\log17 (101.0% generated), C:\alogluns\log18 (102.4% generated), C:\alogluns\log19 (104.0% generated), and C:\alogluns\log20 (102.4% generated)
6/23/2009 12:24:41 AM -- Performance logging ends.
6/23/2009 12:24:41 AM -- JetInterop batch transaction stats: 12829, 12851, 12842, 12584, 12820, 13022, 12856, 12861, 13029, 12896, 12844, 13036, 12949, 13175, 12854, 12818, 12740, 12902, 13161, and 12980.
6/23/2009 12:24:42 AM -- Dispatching transactions ends.
6/23/2009 12:24:42 AM -- Shutting down databases ...
6/23/2009 12:24:46 AM -- Instance4268.1 (complete), Instance4268.2 (complete), Instance4268.3 (complete), Instance4268.4 (complete), Instance4268.5 (complete), Instance4268.6 (complete), Instance4268.7 (complete), Instance4268.8 (complete), Instance4268.9 (complete), Instance4268.10 (complete), Instance4268.11 (complete), Instance4268.12 (complete), Instance4268.13 (complete), Instance4268.14 (complete), Instance4268.15 (complete), Instance4268.16 (complete), Instance4268.17 (complete), Instance4268.18 (complete), Instance4268.19 (complete), and Instance4268.20 (complete)
6/23/2009 12:24:46 AM -- C:\ESRP Testing\SUN21\lsg_2db tests\Soft Recovery\Performance_2009_6_22_20_32_39.blg has 924 samples.
6/23/2009 12:24:46 AM -- Creating test report ...
6/23/2009 12:25:10 AM -- volume C:\asgluns\sg1 has 0.0080 for Avg. Disk sec/Read.
6/23/2009 12:25:10 AM -- volume C:\asgluns\sg2 has 0.0082 for Avg. Disk sec/Read.
6/23/2009 12:25:10 AM -- volume C:\asgluns\sg3 has 0.0079 for Avg. Disk sec/Read.
6/23/2009 12:25:10 AM -- volume C:\asgluns\sg4 has 0.0083 for Avg. Disk sec/Read.
6/23/2009 12:25:10 AM -- volume C:\asgluns\sg5 has 0.0079 for Avg. Disk sec/Read.
6/23/2009 12:25:11 AM -- volume C:\asgluns\sg6 has 0.0081 for Avg. Disk sec/Read.
6/23/2009 12:25:11 AM -- volume C:\asgluns\sg7 has 0.0080 for Avg. Disk sec/Read.
6/23/2009 12:25:11 AM -- volume C:\asgluns\sg8 has 0.0076 for Avg. Disk sec/Read.
6/23/2009 12:25:11 AM -- volume C:\asgluns\sg9 has 0.0081 for Avg. Disk sec/Read.
6/23/2009 12:25:11 AM -- volume C:\asgluns\sg10 has 0.0077 for Avg. Disk sec/Read.
6/23/2009 12:25:11 AM -- volume C:\asgluns\sg11 has 0.0079 for Avg. Disk sec/Read.
6/23/2009 12:25:11 AM -- volume C:\asgluns\sg12 has 0.0077 for Avg. Disk sec/Read.
6/23/2009 12:25:11 AM -- volume C:\asgluns\sg13 has 0.0079 for Avg. Disk sec/Read.
6/23/2009 12:25:11 AM -- volume C:\asgluns\sg14 has 0.0083 for Avg. Disk sec/Read.

6/23/2009 12:25:11 AM -- Volume C:\asgluns\sg15 has 0.0079 for Avg. Disk
sec/Read.
6/23/2009 12:25:11 AM -- Volume C:\asgluns\sg16 has 0.0082 for Avg. Disk
sec/Read.
6/23/2009 12:25:11 AM -- Volume C:\asgluns\sg17 has 0.0079 for Avg. Disk
sec/Read.
6/23/2009 12:25:11 AM -- Volume C:\asgluns\sg18 has 0.0082 for Avg. Disk
sec/Read.
6/23/2009 12:25:11 AM -- Volume C:\asgluns\sg19 has 0.0081 for Avg. Disk
sec/Read.
6/23/2009 12:25:11 AM -- Volume C:\asgluns\sg20 has 0.0076 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log1 has 0.0009 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log1 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log2 has 0.0007 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log2 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log3 has 0.0009 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log3 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log4 has 0.0007 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log4 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log5 has 0.0010 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log5 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log6 has 0.0007 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log6 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log7 has 0.0009 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log7 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log8 has 0.0006 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log8 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log9 has 0.0009 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log9 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log10 has 0.0006 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log10 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log11 has 0.0009 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log11 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log12 has 0.0006 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log12 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log13 has 0.0010 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log13 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log14 has 0.0007 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- Volume C:\alogluns\log14 has 0.0000 for Avg. Disk
sec/Read.

6/23/2009 12:25:12 AM -- volume C:\alogluns\log15 has 0.0010 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- volume C:\alogluns\log15 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- volume C:\alogluns\log16 has 0.0007 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- volume C:\alogluns\log16 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- volume C:\alogluns\log17 has 0.0010 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- volume C:\alogluns\log17 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- volume C:\alogluns\log18 has 0.0007 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- volume C:\alogluns\log18 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- volume C:\alogluns\log19 has 0.0009 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- volume C:\alogluns\log19 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- volume C:\alogluns\log20 has 0.0006 for Avg. Disk
sec/write.
6/23/2009 12:25:12 AM -- volume C:\alogluns\log20 has 0.0000 for Avg. Disk
sec/Read.
6/23/2009 12:25:12 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
6/23/2009 12:25:12 AM -- Test has 0 Database Page Fault Stalls/sec samples
higher than 0.
6/23/2009 12:25:12 AM -- C:\ESRP Testing\SUN21\lsg_2db tests\Soft
Recovery\Performance_2009_6_22_20_32_39.xml has 923 samples queried.



Corporate Headquarters 750 Central Expressway, Santa Clara, California 95050-2627 USA
Contact Information: + 1 408 970 1000 www.hds.com / info@hds.com

Asia Pacific and Americas 750 Central Expressway, Santa Clara, California 95050-2627 USA
Contact Information: + 1 408 970 1000 www.hds.com / info@hds.com

Europe Headquarters Sefton Park, Stoke Poges, Buckinghamshire SL2 4HD United Kingdom
Contact Information: + 44 (0) 1753 618000 www.hds.com / info.uk@hds.com

Hitachi is a registered trademark of Hitachi, Ltd., in the United States and other countries. Hitachi Data Systems is a registered trademark and service mark of Hitachi, Ltd., in the United States and other countries.

All other trademarks, service marks and company names mentioned in this document or Web site are properties of their respective owners.

Notice: This document is for informational purposes only, and does not set forth any warranty, expressed or implied, concerning any equipment or service offered or to be offered by Hitachi Data Systems. This document describes some capabilities that are conditioned on a maintenance contract with Hitachi Data Systems being in effect and that may be configuration dependent, and features that may not be currently available. Contact your local Hitachi Data Systems sales office for information on feature and product availability.

© Hitachi Data Systems Corporation 2009. All Rights Reserved.

ESRP-014-00 June 2009