

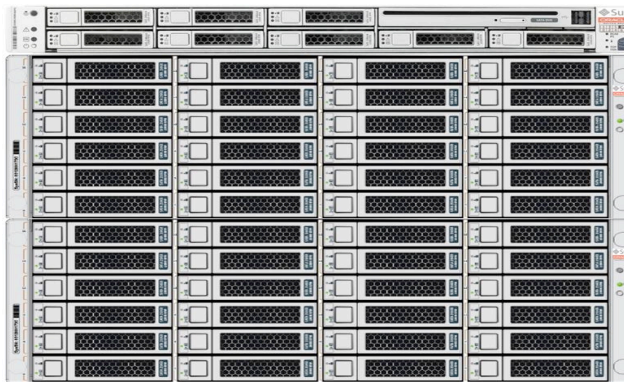
An Oracle White Paper
June 2012

Sun ZFS Storage 7320 Appliance 10,000 Mailbox Resiliency Exchange 2010 Storage Solution

Tested with: ESRP – Storage Version 3.0
Tested Date: 12/2010

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Overview

This document describes Oracle's storage solution for Microsoft Exchange Server, based on the Microsoft Exchange Solution Reviewed Program (ESRP) – Storage program*. The ESRP – Storage program was developed by Microsoft Corporation to provide a common storage testing framework for vendors to provide information on its storage solutions for Microsoft Exchange Server software.

Specifically, this document focuses on the mailbox server role, where the Microsoft Exchange databases and user mailboxes are stored. Note that hub transport, edge transport, client access, and unified messaging roles are not discussed here.

*For more details on the Microsoft ESRP – Storage program, please go to:

<http://technet.microsoft.com/en-us/exchange/ff182054.aspx>.

Introduction

Oracle's Sun ZFS Storage Appliance is an excellent platform for implementation of Microsoft Exchange deployments. The Sun ZFS Storage Appliance provides simplified storage that:

- Radically simplifies storage management for less cost
- Installs in minutes without training
- Is simple to configure and optimize
- Features easy-to-use graphical tools that provide real-time visibility
- Provides comprehensive self-healing

Benefits of the Flash Hybrid Storage Pool

A foundation of the Sun ZFS Storage Appliance's simplicity and efficiency is its flash hybrid storage pool. This technology provides some critical benefits.

Optimized storage pool

The Sun ZFS Storage 7320 uses a virtual storage pool to seamlessly optimize access to the different media types, including SSDs, improving efficiencies and increasing application performance. In fact it is the only system on the market with a hybrid storage pool that delivers over twice the performance at half the cost of traditional storage solutions, enabling you to shatter IO bottlenecks and increase productivity without breaking the bank.

Increased performance with hybrid architecture and SSDs

The Sun ZFS Storage 7320's hybrid architecture combines Read- and Write-optimized SSD-based Flash Accelerators with high-capacity disk drives to deliver higher performance and reduce power consumption and cooling requirements. This makes the Sun ZFS Storage 7320 ideal for organizations that require high throughput and lower response times for write- and read-intensive application workloads. In addition, using SSDs lowers power consumption by up to 80% compared to spinning disks.

Customers with write-intensive applications (synchronous writes) and read-intensive applications (caching frequently accessed data) can see the most benefit with the use of flash-based SSDs. For Sun ZFS Storage 7320 configurations, at least two SSD-based Read Flash Accelerators should be used for read-intensive workloads, and at least two Write Flash Accelerators should be used for write-intensive workloads.

Flexibility to meet changing needs

The Sun ZFS Storage 7320 provides you with a high-density server/storage solution. Unlike traditional storage architectures, the Sun ZFS Storage 7320 is highly adaptable to changing business needs. The system not only scales up to 192 TB of storage capacity, but also scales in multiple dimensions, including IO throughput, processor performance, cache, and total capacity.

For example, you can increase performance by adding SSDs. As your application requirements change, you can increase computational power by adding more CPUs and cache and expand total capacity by adding enterprise-class high-capacity drive expansion trays.

Environmental and energy efficiency

The Sun ZFS Storage 7320 helps you lower costs by reducing energy consumption and offering higher storage density, which reduces space requirements.

Benefits of Enhanced Analytics

Storage bottlenecks have often plagued Exchange administrators. In the past, the solution to a disk performance problem was to add additional expensive spindles, move from 10k RPM to 15k RPM, or add expensive NVRAM.

With built-in Analytics that are based on DTrace, unprecedented visibility is available to pinpoint storage bottlenecks. Breakdowns of IOPS, throughput, disk usage, disk offset, and dozens more statistics are readily available in graphical representations or through the scriptable CLI. The following screenshots illustrate various measurements during an arbitrary Jetstress run.

Figure 1 shows four Exchange servers each running with two FC ports. Analyzing this graph, isv-4150b only has a single port active, running roughly twice the throughput as the others, while the other three servers have half the throughput through two ports. It looks like isv-4150b's MPIO settings may be set to failover only, or a port may be down.



Figure 1: Fibre Channel bytes per second

Each Exchange server has three dbvol LUNs. As shown in Figure 2, you can view each LUN to see where there may be hot spots. You can place additional mailboxes in lower utilized LUNs.

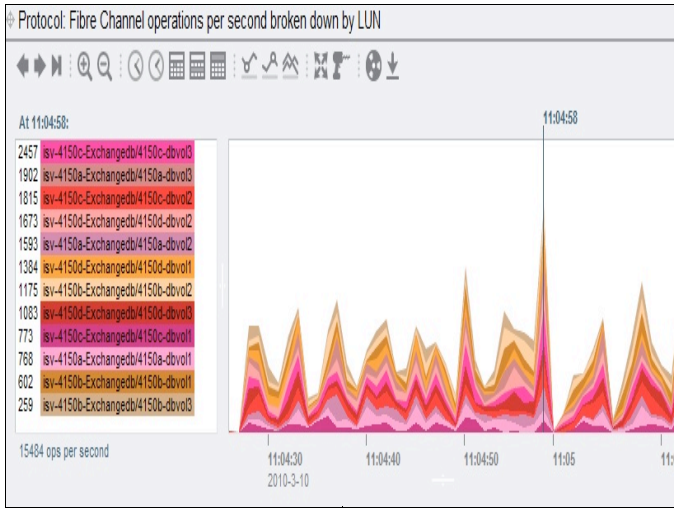


Figure 2: Fibre Channel operations per second

Sun ZFS Storage Appliance Options

The Sun ZFS Storage Appliance is available in four platforms that meet diverse requirements that include price, performance, capacity and data protection. The Sun ZFS Storage 7120, for example, is an entry-level storage system for workgroup environments that do not have medium-to-high READ performance requirements and thus are not equipped with a read-optimized flash device. On the other hand, the remaining three platforms offer up to 2TB of read cache, which substantially enables many applications to show much faster response times that are typically in the low single digit milliseconds. The write flash on all Sun ZFS Storage Appliances can improve response times for synchronous write IO intensive applications. Faster CPUs (that have up to eight threads per core) can provide up to 32 threads to process data in each Sun ZFS Storage Appliance controller. Specifically, the Sun ZFS Storage 7320 offers 72GB of primary cache and offers up to 512GB of DRAM memory. This release of the Sun ZFS Storage Appliance offers up to 2.5 TB of cache storage, which can dramatically improve READ intensive application throughput (IOPS).

Solution Description

This solution details a 10,000 mailbox, single database availability group (DAG) (2 copy) solution hosted across two separate Sun Fire servers attached using Fibre Channel to two Sun ZFS Storage 7320 controllers. The user profile used is 0.50 IOPS per mailbox.

Mailbox Storage

Two 7320 controllers are attached to two 24-disk J4410 storage shelves. Each 7320 controller has two read-optimized cache devices and three write-optimized cache devices. The database LUNs use two read-cache and two write-cache devices. The log LUNs utilize one write-cache device.

Fibre Channel Redundancy

Each Sun ZFS Storage 7320 and Sun Fire mailbox server utilizes one dual port 8Gb FC HBA. Each of these devices has a separate port connected to two Brocade 8Gb FC switches, providing full data path redundancy to and from each mailbox server and storage device.

DAG Solution

This is a single DAG solution utilizing two mailbox servers. Mailbox server aie-4240a contains primary databases 1-6 and passive databases 7-12. Mailbox server aie-4240b contains primary databases 7-12 and passive databases 1-6. In the event of a mailbox server related failure, the passive copies of the mailbox databases would be activated on the alternate mailbox server. In the event of a storage path related failure, the passive database copies would be made active on the alternate storage controller. In this solution, the primary copy storage and secondary copy storage are configured identically (from the host down to the spindle, including brand, model, firmware, drivers, and so on). Table 1 illustrates what each controller looks like.

TABLE 1: DAG SOLUTION STORAGE LAYOUT

STORAGE APPLIANCE	STORAGE POOLS	RAID LEVEL	CACHE DEVICES	PROJECTS	LUNS	LUN SIZE	LOGS AND DATABASES
AIE-7320A	pool-0	10	1 write-cache	logs	logvol1	200 GB	Log1,2
					logvol2	200 GB	Log3,4
					logvol3	200 GB	Log5,6
	pool-1	10	2 write-cache 2 read-cache	dbvols	dbvol1	2 TB	DB1,2
					dbvol2	2 TB	DB3,4
					dbvol3	2 TB	DB5,6
				dbcopies	cpvol1	2 TB	CP7,8
					cpvol2	2 TB	CP9,10
					cpvol3	2 TB	CP11,12
CONTROLLER	STORAGE POOLS	RAID LEVEL	CACHE DEVICES	PROJECTS	LUNS	LUN SIZE	LOGS AND DATABASES
AIE-7320B	pool-0	10	1 write-cache	logs	logvol1	200 GB	Log7,8
					logvol2	200 GB	Log9,10
					logvol3	200 GB	Log11,12
	pool-1	10	2 write-cache 2 read-cache	dbvols	dbvol1	2 TB	DB7,8
					dbvol2	2 TB	DB9,10
					dbvol3	2 TB	DB11,12
				dbcopies	cpvol1	2 TB	CP1,2
					cpvol2	2 TB	CP3,4
					cpvol3	2 TB	CP5,6

Sizing

The following items are important considerations when sizing an Exchange mailbox solution:

- Number of mailboxes
- Mailbox size
- IOPS per mailbox
- Physical drive type
- Fault tolerance

Mailbox Servers

This example solution uses high-performance Sun Fire x4240 dual core processors with 32 GB RAM. Each server has expansion room for 5 PCI-e IO slots as well as 128 GB RAM.

Links to the Sun ZFS Storage Appliances in the Windows Server Catalog can be found here:

<http://www.windowsservercatalog.com/item.aspx?idItem=2999cdf3-6031-ea71-5734-996fe0021336&bCatID=1282>

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

For more information on identifying and addressing performance bottlenecks in an Exchange system, please refer to Microsoft's Troubleshooting Microsoft Exchange Server Performance, available at <http://technet.microsoft.com/en-us/library/dd335215.aspx>.

Targeted Customer Profile

The presented solution targets a mid-size to large mailbox deployment. This solution employs two concurrent servers, but allows for as many servers as the IOPS and response time requirements allow. The solution features:

- A 10,000 mailbox capacity
- Two mailbox servers
- User IO profile of 0.40 IOPs, 0.50 tested to includes 20% headroom

- One GB mailboxes
- 24x7 Background Database Maintenance configured
- Mailbox Resiliency as the primary data protection mechanism
- 833 GB database size tested
- Solaris ZFS to minimize risk of silent data corruption, Mailbox Resiliency

Tested Deployment

The following tables summarize the testing environment.

Simulated Exchange Configuration

Number of Exchange mailboxes simulated	10,000
Number of Database Availability Groups (DAGs)	1
Number of servers/DAG	2 (1 Tested)
Number of active mailboxes/server	5,000
Number of databases/host	6 (12 Total)
Number of copies/database	2
Number of mailboxes/database	833
Simulated profile: I/O's per second per mailbox (IOPS, include 20% headroom)	0.36 IOPs - 0.45 IOPs tested (0.36 +.09) for headroom
Database LUN size	2 TB
Log LUN size	200 GB
Total database size for performance testing	20 TB (10 TB Tested)
% storage capacity used by Exchange database**	75 %

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

Storage Hardware

Storage connectivity	Fibre Channel
Storage model and OS/firmware revision	Sun ZFS Storage 7320, 2010.Q3.1.0 Software Release
Storage cache	1,150 GB total per controller 72 GB ARC per controller 54 GB Write cache per controller 1,024 GB L2ARC per controller
Number of storage controllers	2 (1 Tested)
Number of storage ports	2 FC Ports per controller
Maximum bandwidth of storage connectivity to host	16 Gb total – 2 x 8 Gb per controller
Switch type/model/firmware revision	Brocade 300 8Gb FW v6.1.0h
HBA model and firmware	Emulex LightPulse 8Gb LPe12002, 1.11A5
Number of HBA's/host	1 Dual Port Fibre Channel HBA/Host
Host server type	2 Dual Core AMD 2222 ,32 GB RAM
Total number of disks tested in solution	88 (44 Tested)
Maximum number of spindles can be hosted in the storage	198

Storage Software

HBA driver	Emulex Storport Miniport 7.2.20.6
HBA QueueTarget Setting	0
HBA QueueDepth Setting	32
Multi-Pathing	Microsoft MPIO 6.0.6002.18005 RoundRobin
Host OS	Microsoft Windows Server Enterprise Edition 2008 SP2 x64
ESE.dll file version	14.00.0639.019
Replication solution name/version	NA

Storage Disk Configuration (Mailbox Store Disks)

Disk type, speed and firmware revision	SAS II - 7200 RPM FW v.0313 Write-SSD - FW v.9002 Read-SSD – FW v.AGYA0201
Raw capacity per disk (GB)	1 TB
Number of physical disks in test	64 (32 Tested)
Total raw storage capacity (GB)	64 TB (32 TB Tested)
Disk slice size (GB)	NA
Number of slices per LUN or number of disks per LUN	NA
RAID level	RAID 10
Total formatted capacity	26.4 TB (13.2 TB Tested)
Storage capacity utilization	41.00%
Database capacity utilization	31.00%

Storage Disk Configuration (Transactional Log Disks)

Disk type, speed and firmware revision	SAS II – 7200 RPM – 0313 Write-SSD - 9002
Raw capacity per disk (GB)	1 TB
Number of spindles in test	24 (12 Tested)
Total raw storage capacity (GB)	24 TB (12 TB Tested)
Disk slice size (GB)	NA
Number of slices per LUN or number of disks per LUN	NA
RAID level	RAID 10
Total formatted capacity	2.4 TB (1.2 TB Tested)

Best Practices

Consider the following best practices for configuring database and log LUNs in the Sun ZFS Storage Appliance for use with Exchange 2010 and for troubleshooting latency issues.

Database and Log LUNs

Exchange server is a disk-intensive application. Based on the testing run using the ESRP framework, Oracle recommends the following to improve storage performance:

- Use the mirrored profile when creating pools for both database LUNs and transactional log LUNs.
- Create database LUNs with a 32k volume record size.
- Create log LUNs with a 128k volume record size.
- Do not enable write cache.
- With Windows Server 2003, use diskpart.exe to align the sectors at 64k. Windows Server 2008 does this automatically.
- Format both DB and Log Volumes with an NTFS allocation unit size of 64k.
- When sizing databases, consider fewer, larger Dbs. Our testing showed a direct improvement in IOPs and response time by increasing the size and decreasing the number of Dbs.
- Do not share Exchange 2010 disks with any other applications that are IO intensive. This sharing will have a negative effect on your disk subsystem performance.

Troubleshooting

Use the ZFS Storage Appliance Analytics to troubleshoot any latency issues.

For Exchange 2010 best practices on storage design, please visit:

<http://technet.microsoft.com/en-us/library/dd346703.aspx>

For further information, including phone and mail contact information and online references, see Appendix A: References.

Test Result Summary

This section provides a high-level summary of the test data from ESRP and the link to the detailed html reports generated by the ESRP testing framework. Click the underlined headings that follow to view the html report for each test.

Reliability

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

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

- No errors reported in the saved eventlog file.
- No errors reported during the database and log [checksum](#) process.

[Storage Performance Results](#)

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

Individual Server Metrics

The sum of IOs across storage groups and the average latency across all storage groups on a per-server basis.

HOST: AIE-4240A

Database I/O	
Database Disks Transfers/sec	5831
Database Disks Reads/sec	3513
Database Disks Writes/sec	2318
Average Database Disk Read Latency (ms)	17.16
Average Database Disk Write Latency (ms)	15.71
Transaction Log I/O	
Log Disks Writes/sec	1214
Average Log Disk Write Latency (ms)	0.56

Aggregate Performance Across All Servers Metrics

The sum of IOs across servers in the solution and the average latency across all servers in the solution.

Database I/O	
Database Disks Transfers/sec	5831
Database Disks Reads/sec	3513
Database Disks Writes/sec	2318
Average Database Disk Read Latency (ms)	17.16
Average Database Disk Write Latency (ms)	15.71
Transaction Log I/O	
Log Disks Writes/sec	1214
Average Log Disk Write Latency (ms)	.56

Database Backup/Recovery Performance

There are two tests reports in this section. The first one measures the sequential read rate of the database files, and the second measures the recovery/replay performance (playing transaction logs in to the database).

Database Read-only Performance

The test measures the maximum rate at which databases could be backed up using VSS. The following table shows the average rate for a single database file.

HOST: AIE-4240A

MB read/sec per database	8.37
MB read/sec total per server	100.43

Transaction Log Recovery/Replay Performance

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

HOST: AIE-4240A

Average time to play one Log file (sec)	1.42
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Conclusion

The Sun ZFS Storage Appliance series is a family of unified storage systems that are ideal solutions for Microsoft Exchange environments as well as numerous other applications. Their comprehensive set of data services, storage efficiency features, analytics, massive scalability, intuitive user interface and excellent performance, along with their cost effectiveness, make them an excellent candidate for the data center.

For more information, visit the following websites:

- Sun ZFS Storage Appliance Solutions
<http://www.oracle.com/us/products/servers-storage/storage/unified-storage/index.html>
- Microsoft Exchange Solution Center
<http://support.microsoft.com/ph/13965>
- Exchange 2010 Mailbox Server Role Requirements Calculator
<http://msexchangeteam.com/archive/2009/11/09/453117.aspx>

This document is developed by storage solution providers and reviewed by the Microsoft Exchange Product team. The test results and data presented in this document are conducted in the ESRP test framework. Customers should not quote the data directly for pre-deployment verification. It is still necessary to go through the exercises to validate the storage design for your specific customer environment.

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

Appendix A: References

Use the following contacts for additional information:

By Phone

General inquiries:

+1.650.506.7000 or

+1.800.392.2999

International:

+1.650.506.7000

Sales:

+1.800.ORACLE1

By Mail

Oracle Corporation

500 Oracle Parkway

Redwood Shores, CA 94065

Web-based References from Oracle.com

- [Sun Unified Storage](#)
- [Sun ZFS Storage 7320 Appliance](#)
- [Sun ZFS Storage Appliance Software](#)
- [Oracle's Sun Flash Technology](#)
- [ZFS Storage Appliance Resource Kit](#)
- [Oracle's Sun Unified Storage Simulator](#)

Appendix B: Test Results

The results of each test from the systems are virtually identical. This appendix includes test results from one of the two servers tested, AIE-4240B.

Performance Test Result Report

Test Summary

Overall Test Result	Pass
Machine Name	AIE-4240A
Test Description	Two Hour Performance - 10,000 One GB Mailboxes, 2 Copies
Test Start Time	12/23/2010 5:23:54 PM
Test End Time	12/23/2010 7:26:47 PM
Collection Start Time	12/23/2010 5:26:35 PM
Collection End Time	12/23/2010 7:26:35 PM
Jetstress Version	14.01.0180.003
Ese Version	14.00.0639.019
Operating System	Windows Server (R) 2008 Enterprise without Hyper-V Service Pack 2 (6.0.6002.131072)
Performance Log	C:\Exchange\7320_10k\2hr-performance\Performance_2010_12_23_17_24_20.blg

Database Sizing and Throughput

Achieved Transactional I/O per Second	5831.316
Target Transactional I/O per Second	5000
Initial Database Size (bytes)	10969196265472
Final Database Size (bytes)	10981368135680
Database Files (Count)	12

Jetstress System Parameters

Thread Count	13 (per database)
Minimum Database Cache	384.0 MB
Maximum Database Cache	3072.0 MB
Insert Operations	40%
Delete Operations	20%

Replace Operations	5%
Read Operations	35%
Lazy Commits	70%
Run Background Database Maintenance	True
Number of Copies per Database	2

Database Configuration

Instance880.1	Log Path: Q:\sg1 Database: F:\sg1\Jetstress001001.edb
Instance880.2	Log Path: Q:\sg2 Database: F:\sg2\Jetstress002001.edb
Instance880.3	Log Path: R:\sg1 Database: G:\sg1\Jetstress003001.edb
Instance880.4	Log Path: R:\sg2 Database: G:\sg2\Jetstress004001.edb
Instance880.5	Log Path: S:\sg1 Database: H:\sg1\Jetstress005001.edb
Instance880.6	Log Path: S:\sg2 Database: H:\sg2\Jetstress006001.edb
Instance880.7	Log Path: T:\sg1 Database: I:\sg1\Jetstress007001.edb
Instance880.8	Log Path: T:\sg2 Database: I:\sg2\Jetstress008001.edb
Instance880.9	Log Path: U:\sg1 Database: J:\sg1\Jetstress009001.edb
Instance880.10	Log Path: U:\sg2 Database: J:\sg2\Jetstress010001.edb
Instance880.11	Log Path: V:\sg1 Database: K:\sg1\Jetstress011001.edb
Instance880.12	Log Path: v:\sg2 Database: K:\sg2\Jetstress012001.edb

Transactional I/O Performance

MSEXCHANGE DB => INSTANCES	I/O DB	I/O DB	I/O DB READS/SEC	I/O DB	I/O DB READS AVE BYTES	I/O DB WRITES AVE BYTES	I/O LOG	I/O LOG	I/O LOG READS/ SEC	I/O LOG WRITES/ SEC	I/O LOG READS AVE BYTES	I/O LOG WRITES AVE BYTES
	READS AVE LATENCY (MSEC)	WRITES AVE LATENCY (MSEC)		WRITES AVE LATENCY (MSEC)			WRITES AVE LATENCY (MSEC)					
Instance880.1	16.832	20.454	291.684	192.376	33116.165	34238.325	0.000	0.870	0.000	101.094	0.000	4831.839
Instance880.2	17.358	20.305	293.086	193.422	33142.297	34208.539	0.000	0.869	0.000	100.873	0.000	4806.189
Instance880.3	17.230	19.347	292.692	193.202	33079.916	34228.345	0.000	0.866	0.000	101.548	0.000	4803.928
Instance880.4	17.370	18.915	293.769	194.053	33106.373	34233.536	0.000	0.866	0.000	102.097	0.000	4863.642
Instance880.5	17.012	17.562	290.158	191.066	33182.853	34237.348	0.000	0.872	0.000	100.193	0.000	4817.431
Instance880.6	17.337	17.592	292.111	192.950	33155.598	34224.908	0.000	0.870	0.000	101.305	0.000	4831.291
Instance880.7	16.848	16.372	293.087	193.251	33184.947	34216.346	0.000	0.870	0.000	101.249	0.000	4806.475
Instance880.8	17.353	15.884	291.156	192.089	33136.682	34220.983	0.000	0.868	0.000	100.989	0.000	4810.542
Instance880.9	17.076	16.236	291.830	192.233	33041.335	34214.054	0.000	0.867	0.000	100.783	0.000	4801.031
Instance880.10	17.287	15.716	294.308	194.429	33104.534	34224.005	0.000	0.871	0.000	101.637	0.000	4822.466
Instance880.11	17.042	15.996	294.493	194.186	33120.336	34219.694	0.000	0.868	0.000	101.333	0.000	4828.576
Instance880.12	17.171	15.705	294.940	194.746	33131.266	34213.086	0.000	0.868	0.000	101.191	0.000	4803.560

Background Database Maintenance I/O Performance

MSEXCHANGE DATABASE ==> INSTANCES	DATABASE MAINTENANCE IO READS/SEC	DATABASE MAINTENANCE IO READS AVERAGE BYTES
Instance880.1	16.846	261734.961
Instance880.2	17.573	261618.017
Instance880.3	16.839	261619.810
Instance880.4	17.250	261643.742
Instance880.5	17.532	261655.302
Instance880.6	17.235	261637.922
Instance880.7	17.862	261742.544
Instance880.8	17.209	261625.687
Instance880.9	17.540	261723.318
Instance880.10	17.346	261683.360
Instance880.11	17.245	261625.824
Instance880.12	17.934	261662.584

Log Replication I/O Performance

MSEXCHANGE DATABASE ==> INSTANCES	I/O LOG READS/SEC	I/O LOG READS AVERAGE BYTES
Instance880.1	1.999	232556.629
Instance880.2	1.984	232563.091
Instance880.3	1.997	232560.259
Instance880.4	2.033	232566.818
Instance880.5	1.975	232560.280
Instance880.6	2.002	232561.778
Instance880.7	1.993	232560.804
Instance880.8	1.987	232564.844
Instance880.9	1.980	232561.778
Instance880.10	2.005	232561.421
Instance880.11	2.004	232560.839
Instance880.12	1.990	232558.364

Total I/O Performance

MSEXCHANGE DB ==> INSTANCES	I/O DB		I/O DB				I/O LOG		I/O LOG		I/O LOG		I/O LOG	
	READS AVE	WRITES AVE	I/O DB READS/SEC	I/O DB WRITES/ SEC	I/O DB READS AVE BYTES	I/O DB WRITES AVE BYTES	READS AVE	WRITES AVE	READS/ LATENCY (MSEC)	WRITES/ LATENCY (MSEC)	READS/ SEC	WRITES/ SEC	I/O LOG READS AVE BYTES	I/O LOG WRITES AVE BYTES
Instance880.1	16.832	20.454	308.530	192.376	45598.764	34238.325	1.551	0.870	1.999	101.094	232556.629	4831.839		
Instance880.2	17.358	20.305	310.659	193.422	46066.640	34208.539	1.585	0.869	1.984	100.873	232563.091	4806.189		
Instance880.3	17.230	19.347	309.531	193.202	45513.041	34228.345	1.592	0.866	1.997	101.548	232560.259	4803.928		
Instance880.4	17.370	18.915	311.018	194.053	45781.523	34233.536	1.555	0.866	2.033	102.097	232566.818	4863.642		
Instance880.5	17.012	17.562	307.690	191.066	46201.052	34237.348	1.611	0.872	1.975	100.193	232560.280	4817.431		
Instance880.6	17.337	17.592	309.346	192.950	45885.109	34224.908	1.596	0.870	2.002	101.305	232561.778	4831.291		
Instance880.7	16.848	16.372	310.950	193.251	46314.283	34216.346	1.631	0.870	1.993	101.249	232560.804	4806.475		
Instance880.8	17.353	15.884	308.365	192.089	45887.918	34220.983	1.562	0.868	1.987	100.989	232564.844	4810.542		
Instance880.9	17.076	16.236	309.370	192.233	46006.770	34214.054	1.603	0.867	1.980	100.783	232561.778	4801.031		
Instance880.10	17.287	15.716	311.655	194.429	45826.920	34224.005	1.574	0.871	2.005	101.637	232561.421	4822.466		
Instance880.11	17.042	15.996	311.738	194.186	45761.273	34219.694	1.621	0.868	2.004	101.333	232560.839	4828.576		
Instance880.12	17.171	15.705	312.874	194.746	46230.497	34213.086	1.579	0.868	1.990	101.191	232558.364	4803.560		

Host System Performance

COUNTER	AVERAGE	MINIMUM	MAXIMUM
% Processor Time	29.392	19.321	36.696
Available Mbytes	27330.927	27326.000	27516.000
Free System Page Table Entries	33560171.388	33559901.000	33560751.000
Transition Pages Repurposed/sec	0.000	0.000	0.000
Pool Non-paged Bytes	122459676.860	122437632.000	122494976.000
Pool Paged Bytes	136794283.023	136396800.000	136957952.000
Database Page Fault Stalls/sec	0.013	0.000	5.985

Test Log

```

12/23/2010 5:23:54 PM -- Jetstress testing begins ...
12/23/2010 5:23:54 PM -- Prepare testing begins ...
12/23/2010 5:24:06 PM -- Attaching databases ...
12/23/2010 5:24:06 PM -- Prepare testing ends.
12/23/2010 5:24:07 PM -- Dispatching transactions begins ...
12/23/2010 5:24:07 PM -- Database cache settings: (minimum: 384.0 MB, maximum: 3.0 GB)
12/23/2010 5:24:07 PM -- Database flush thresholds: (start: 30.7 MB, stop: 61.4 MB)
12/23/2010 5:24:20 PM -- Database read latency thresholds: (average: 20 msec/read,
maximum: 100 msec/read).
12/23/2010 5:24:20 PM -- Log write latency thresholds: (average: 10 msec/write,
maximum: 100 msec/write).
12/23/2010 5:24:24 PM -- Operation mix: Sessions 13, Inserts 40%, Deletes 20%, Replaces
5%, Reads 35%, Lazy Commits 70%.
12/23/2010 5:24:24 PM -- Performance logging begins (interval: 15000 ms).
12/23/2010 5:24:24 PM -- Attaining prerequisites:
12/23/2010 5:26:35 PM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last:
2914263000.0 (lower bound: 2899103000.0, upper bound: none)
12/23/2010 7:26:36 PM -- Performance logging ends.
12/23/2010 7:26:36 PM -- JetInterop batch transaction stats: 70307, 70342, 70543,
70819, 69861, 70458, 70441, 70297, 69922, 70943, 70425 and 70565.
12/23/2010 7:26:38 PM -- Dispatching transactions ends.
12/23/2010 7:26:38 PM -- Shutting down databases ...
12/23/2010 7:26:47 PM -- Instance880.1 (complete), Instance880.2 (complete),
Instance880.3 (complete), Instance880.4 (complete), Instance880.5 (complete),
Instance880.6 (complete), Instance880.7 (complete), Instance880.8 (complete),
Instance880.9 (complete), Instance880.10 (complete), Instance880.11 (complete) and
Instance880.12 (complete)
12/23/2010 7:26:47 PM -- C:\Exchange\7320_10k\2hr-
performance\Performance_2010_12_23_17_24_20.blg has 487 samples.
12/23/2010 7:26:47 PM -- Creating test report ...
12/23/2010 7:26:55 PM -- Instance880.1 has 16.8 for I/O Database Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.1 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 7:26:55 PM -- Instance880.1 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.2 has 17.4 for I/O Database Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.2 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 7:26:55 PM -- Instance880.2 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.3 has 17.2 for I/O Database Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.3 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 7:26:55 PM -- Instance880.3 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.4 has 17.4 for I/O Database Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.4 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 7:26:55 PM -- Instance880.4 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.5 has 17.0 for I/O Database Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.5 has 0.9 for I/O Log Writes Average Latency.

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12/23/2010 7:26:55 PM -- Instance880.5 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.6 has 17.3 for I/O Database Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.6 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 7:26:55 PM -- Instance880.6 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.7 has 16.8 for I/O Database Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.7 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 7:26:55 PM -- Instance880.7 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.8 has 17.4 for I/O Database Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.8 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 7:26:55 PM -- Instance880.8 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.9 has 17.1 for I/O Database Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.9 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 7:26:55 PM -- Instance880.9 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.10 has 17.3 for I/O Database Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.10 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 7:26:55 PM -- Instance880.10 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.11 has 17.0 for I/O Database Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.11 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 7:26:55 PM -- Instance880.11 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.12 has 17.2 for I/O Database Reads Average Latency.
12/23/2010 7:26:55 PM -- Instance880.12 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 7:26:55 PM -- Instance880.12 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 7:26:55 PM -- Test has 5.98456451544872 Maximum Database Page Fault Stalls/sec.
12/23/2010 7:26:55 PM -- Test has 1 Database Page Fault Stalls/sec samples higher than 0.
12/23/2010 7:26:55 PM -- C:\Exchange\7320_10k\2hr-performance\Performance_2010_12_23_17_24_20.xml has 478 samples queried.

Stress Test Result Report

Test Summary

Overall Test Result	Pass
Machine Name	AIE-4240A
Test Description	Twenty Four Hour Performance - 10,000 One GB Mailboxes, 2 Copies
Test Start Time	12/20/2010 11:36:49 AM
Test End Time	12/21/2010 11:40:52 AM
Collection Start Time	12/20/2010 11:40:41 AM
Collection End Time	12/21/2010 11:40:32 AM
Jetstress Version	14.01.0180.003
Ese Version	14.00.0639.019
Operating System	Windows Server (R) 2008 Enterprise without Hyper-V Service Pack 2 (6.0.6002.131072)
Performance Log	C:\Exchange\7320_10k\24hr-stress\Stress_2010_12_20_11_37_15.blg

Database Sizing and Throughput

Achieved Transactional I/O per Second	6078.951
Target Transactional I/O per Second	5000
Initial Database Size (bytes)	10808000774144
Final Database Size (bytes)	10957779369984
Database Files (Count)	12

Jetstress System Parameters

Thread Count	13 (per database)
Minimum Database Cache	384.0 MB
Maximum Database Cache	3072.0 MB
Insert Operations	40%
Delete Operations	20%
Replace Operations	5%
Read Operations	35%
Lazy Commits	70%
Run Background Database Maintenance	True
Number of Copies per Database	2

Database Configuration

Instance880.1	Log Path: Q:\sg1 Database: F:\sg1\Jetstress001001.edb
Instance880.2	Log Path: Q:\sg2 Database: F:\sg2\Jetstress002001.edb
Instance880.3	Log Path: R:\sg1 Database: G:\sg1\Jetstress003001.edb
Instance880.4	Log Path: R:\sg2 Database: G:\sg2\Jetstress004001.edb
Instance880.5	Log Path: S:\sg1 Database: H:\sg1\Jetstress005001.edb
Instance880.6	Log Path: S:\sg2 Database: H:\sg2\Jetstress006001.edb
Instance880.7	Log Path: T:\sg1 Database: I:\sg1\Jetstress007001.edb
Instance880.8	Log Path: T:\sg2 Database: I:\sg2\Jetstress008001.edb
Instance880.9	Log Path: U:\sg1 Database: J:\sg1\Jetstress009001.edb
Instance880.10	Log Path: U:\sg2 Database: J:\sg2\Jetstress010001.edb
Instance880.11	Log Path: V:\sg1 Database: K:\sg1\Jetstress011001.edb
Instance880.12	Log Path: v:\sg2 Database: K:\sg2\Jetstress012001.edb

Transactional I/O Performance

MSEXCHANGE DB ==> INSTANCES	I/O DB			I/O DB			I/O LOG		I/O LOG			
	READS AVE LATENCY (MSEC)	WRITES AVE LATENCY (MSEC)	I/O DB READS/SEC	I/O DB WRITES/ SEC	I/O DB READS AVE BYTES	I/O DB WRITES AVE BYTES	READS LATENCY (MSEC)	WRITES LATENCY (MSEC)	I/O LOG READS/ SEC	I/O LOG WRITES/ SEC	I/O LOG READS AVE BYTES	I/O LOG WRITES AVE BYTES
Instance880.1	17.106	20.756	305.707	201.642	33071.204	34273.535	0.000	0.900	0.000	104.684	0.000	4895.920
Instance880.2	16.431	20.518	304.521	201.769	33068.277	34265.161	0.000	0.902	0.000	104.207	0.000	4900.145
Instance880.3	16.822	19.308	305.482	201.681	33058.951	34262.857	0.000	0.903	0.000	104.048	0.000	4892.527
Instance880.4	16.679	19.026	305.100	201.950	33051.638	34262.492	0.000	0.902	0.000	104.187	0.000	4904.934
Instance880.5	16.758	17.419	305.260	201.632	33026.499	34266.058	0.000	0.902	0.000	104.197	0.000	4901.771

Instance880.6	16.606	17.157	304.447	201.496	33070.491	34268.287	0.000	0.902	0.000	104.183	0.000	4909.196
Instance880.7	16.793	16.487	305.354	201.579	33040.487	34264.085	0.000	0.902	0.000	104.202	0.000	4896.644
Instance880.8	16.621	16.159	304.738	201.609	33044.315	34260.212	0.000	0.902	0.000	103.920	0.000	4899.925
Instance880.9	16.785	16.143	304.869	201.244	33038.871	34266.017	0.000	0.904	0.000	103.875	0.000	4903.045
Instance880.10	16.581	15.753	304.435	201.487	33053.100	34264.283	0.000	0.902	0.000	104.092	0.000	4907.988
Instance880.11	16.721	15.977	305.519	201.740	33069.115	34264.878	0.000	0.903	0.000	104.261	0.000	4904.055
Instance880.12	16.575	15.613	304.314	201.374	33049.025	34263.254	0.000	0.903	0.000	103.946	0.000	4903.216

Background Database Maintenance I/O Performance

MSEXCHANGE DATABASE ==> INSTANCES	DATABASE MAINTENANCE IO READS/SEC	DATABASE MAINTENANCE IO READS AVERAGE BYTES
Instance880.1	17.377	261664.870
Instance880.2	17.836	261673.643
Instance880.3	17.525	261650.078
Instance880.4	17.842	261643.159
Instance880.5	17.629	261665.332
Instance880.6	17.980	261641.840
Instance880.7	17.544	261633.640
Instance880.8	17.758	261660.099
Instance880.9	17.440	261656.071
Instance880.10	17.973	261672.007
Instance880.11	17.891	261664.728
Instance880.12	18.003	261665.229

Log Replication I/O Performance

MSEXCHANGE DATABASE ==> INSTANCES	I/O LOG READS/SEC	I/O LOG READS AVERAGE BYTES
Instance880.1	2.100	232562.108
Instance880.2	2.093	232561.951
Instance880.3	2.087	232561.067
Instance880.4	2.095	232560.938
Instance880.5	2.094	232559.639
Instance880.6	2.096	232561.470

Instance880.7	2.091	232561.509
Instance880.8	2.087	232561.676
Instance880.9	2.088	232562.573
Instance880.10	2.094	232558.823
Instance880.11	2.096	232561.944
Instance880.12	2.089	232561.428

Total I/O Performance

MSEXCHANGE DB => INSTANCES	I/O DB		I/O DB			I/O LOG		I/O LOG		I/O LOG		I/O LOG	
	READS	WRITES	I/O DB	I/O DB	I/O DB	READS	WRITES	I/O LOG	I/O LOG	I/O LOG	I/O LOG	READS	WRITES
	AVE	AVE	READS/SEC	WRITES/SEC	READS	WRITES	AVE	AVE	READS/SEC	WRITES/SEC	AVE	AVE	WRITES
	LATENCY (MSEC)	LATENCY (MSEC)			BYTES	BYTES	LATENCY (MSEC)	LATENCY (MSEC)	SEC	SEC	SEC	SEC	AVE BYTES
Instance880.1	17.106	20.756	323.084	201.642	45366.028	34273.535	1.660	0.900	2.100	104.684	232562.108	4895.920	
Instance880.2	16.431	20.518	322.357	201.769	45716.864	34265.161	1.585	0.902	2.093	104.207	232561.951	4900.145	
Instance880.3	16.822	19.308	323.007	201.681	45461.430	34262.857	1.640	0.903	2.087	104.048	232561.067	4892.527	
Instance880.4	16.679	19.026	322.942	201.950	45680.880	34262.492	1.557	0.902	2.095	104.187	232560.938	4904.934	
Instance880.5	16.758	17.419	322.890	201.632	45509.863	34266.058	1.651	0.902	2.094	104.197	232559.639	4901.771	
Instance880.6	16.606	17.157	322.427	201.496	45816.750	34268.287	1.563	0.902	2.096	104.183	232561.470	4909.196	
Instance880.7	16.793	16.487	322.898	201.579	45460.331	34264.085	1.648	0.902	2.091	104.202	232561.509	4896.644	
Instance880.8	16.621	16.159	322.496	201.609	45633.130	34260.212	1.553	0.902	2.087	103.920	232561.676	4899.925	
Instance880.9	16.785	16.143	322.308	201.244	45409.129	34266.017	1.641	0.904	2.088	103.875	232562.573	4903.045	
Instance880.10	16.581	15.753	322.409	201.487	45797.813	34264.283	1.551	0.902	2.094	104.092	232558.823	4907.988	
Instance880.11	16.721	15.977	323.410	201.740	45715.007	34264.878	1.652	0.903	2.096	104.261	232561.944	4904.055	
Instance880.12	16.575	15.613	322.317	201.374	45818.418	34263.254	1.558	0.903	2.089	103.946	232561.428	4903.216	

Host System Performance

COUNTER	AVERAGE	MINIMUM	MAXIMUM
% Processor Time	30.502	16.131	51.686
Available Mbytes	27495.810	27423.000	27637.000
Free System Page Table Entries	33559563.992	33558947.000	33559925.000
Transition Pages Repurposed/sec	0.000	0.000	0.000
Pool Non-paged Bytes	115318549.352	114487296.000	116645888.000
Pool Paged Bytes	126750782.050	126337024.000	166502400.000
Database Page Fault Stalls/sec	0.137	0.000	150.527

Test Log

```
12/20/2010 11:36:49 AM -- Jetstress testing begins ...
12/20/2010 11:36:49 AM -- Prepare testing begins ...
12/20/2010 11:37:02 AM -- Attaching databases ...
12/20/2010 11:37:02 AM -- Prepare testing ends.
12/20/2010 11:37:02 AM -- Dispatching transactions begins ...
12/20/2010 11:37:02 AM -- Database cache settings: (minimum: 384.0 MB, maximum: 3.0 GB)
12/20/2010 11:37:02 AM -- Database flush thresholds: (start: 30.7 MB, stop: 61.4 MB)
12/20/2010 11:37:15 AM -- Database read latency thresholds: (average: 20 msec/read,
maximum: 200 msec/read).
12/20/2010 11:37:15 AM -- Log write latency thresholds: (average: 10 msec/write,
maximum: 200 msec/write).
12/20/2010 11:37:19 AM -- Operation mix: Sessions 13, Inserts 40%, Deletes 20%,
Replaces 5%, Reads 35%, Lazy Commits 70%.
12/20/2010 11:37:19 AM -- Performance logging begins (interval: 15000 ms).
12/20/2010 11:37:19 AM -- Attaining prerequisites:
12/20/2010 11:40:41 AM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last:
2907165000.0 (lower bound: 2899103000.0, upper bound: none)
12/21/2010 11:40:42 AM -- Performance logging ends.
12/21/2010 11:40:42 AM -- JetInterop batch transaction stats: 874840, 874256, 872069,
874549, 874179, 874146, 872960, 872966, 873205, 873369, 873864 and 872773.
12/21/2010 11:40:43 AM -- Dispatching transactions ends.
12/21/2010 11:40:43 AM -- Shutting down databases ...
12/21/2010 11:40:52 AM -- Instance880.1 (complete), Instance880.2 (complete),
Instance880.3 (complete), Instance880.4 (complete), Instance880.5 (complete),
Instance880.6 (complete), Instance880.7 (complete), Instance880.8 (complete),
Instance880.9 (complete), Instance880.10 (complete), Instance880.11 (complete) and
Instance880.12 (complete)
12/21/2010 11:40:52 AM -- C:\Exchange\7320_10k\24hr-
stress\Stress_2010_12_20_11_37_15.blg has 5756 samples.
12/21/2010 11:40:52 AM -- Creating test report ...
12/21/2010 11:42:29 AM -- Instance880.1 has 17.1 for I/O Database Reads Average
Latency.
12/21/2010 11:42:29 AM -- Instance880.1 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.1 has 0.9 for I/O Log Reads Average Latency.
12/21/2010 11:42:29 AM -- Instance880.2 has 16.4 for I/O Database Reads Average
Latency.
12/21/2010 11:42:29 AM -- Instance880.2 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.2 has 0.9 for I/O Log Reads Average Latency.
12/21/2010 11:42:29 AM -- Instance880.3 has 16.8 for I/O Database Reads Average
Latency.
12/21/2010 11:42:29 AM -- Instance880.3 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.3 has 0.9 for I/O Log Reads Average Latency.
12/21/2010 11:42:29 AM -- Instance880.4 has 16.7 for I/O Database Reads Average
Latency.
12/21/2010 11:42:29 AM -- Instance880.4 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.4 has 0.9 for I/O Log Reads Average Latency.
12/21/2010 11:42:29 AM -- Instance880.5 has 16.8 for I/O Database Reads Average
Latency.
12/21/2010 11:42:29 AM -- Instance880.5 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.5 has 0.9 for I/O Log Reads Average Latency.
12/21/2010 11:42:29 AM -- Instance880.6 has 16.6 for I/O Database Reads Average
Latency.
12/21/2010 11:42:29 AM -- Instance880.6 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.6 has 0.9 for I/O Log Reads Average Latency.
12/21/2010 11:42:29 AM -- Instance880.7 has 16.8 for I/O Database Reads Average
Latency.
12/21/2010 11:42:29 AM -- Instance880.7 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.7 has 0.9 for I/O Log Reads Average Latency.
12/21/2010 11:42:29 AM -- Instance880.8 has 16.6 for I/O Database Reads Average
Latency.
12/21/2010 11:42:29 AM -- Instance880.8 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.8 has 0.9 for I/O Log Reads Average Latency.
12/21/2010 11:42:29 AM -- Instance880.9 has 16.8 for I/O Database Reads Average
Latency.
```

12/21/2010 11:42:29 AM -- Instance880.9 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.9 has 0.9 for I/O Log Reads Average Latency.
12/21/2010 11:42:29 AM -- Instance880.10 has 16.6 for I/O Database Reads Average
Latency.
12/21/2010 11:42:29 AM -- Instance880.10 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.10 has 0.9 for I/O Log Reads Average Latency.
12/21/2010 11:42:29 AM -- Instance880.11 has 16.7 for I/O Database Reads Average
Latency.
12/21/2010 11:42:29 AM -- Instance880.11 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.11 has 0.9 for I/O Log Reads Average Latency.
12/21/2010 11:42:29 AM -- Instance880.12 has 16.6 for I/O Database Reads Average
Latency.
12/21/2010 11:42:29 AM -- Instance880.12 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.12 has 0.9 for I/O Log Reads Average Latency.
12/21/2010 11:42:29 AM -- Test has 150.527032873491 Maximum Database Page Fault
Stalls/sec.
12/21/2010 11:42:29 AM -- Test has 11 Database Page Fault Stalls/sec samples higher
than 0.
12/21/2010 11:42:29 AM -- C:\Exchange\7320_10k\24hr-
stress\Stress_2010_12_20_11_37_15.xml has 5742 samples queried.

Database Checksum Result Report

Checksum Statistics - All

DATABASE	SEEN PAGES	BAD PAGES	CORRECTABLE PAGES	WRONG PAGE-NUMBER PAGES	FILE LENGTH / SECONDS TAKEN
F:\sg1\Jetstress001001.edb	27868482	0	0	0	870890 Mbytes / 21091 sec
F:\sg2\Jetstress002001.edb	27866946	0	0	0	870842 Mbytes / 12306 sec
G:\sg1\Jetstress003001.edb	27866946	0	0	0	870842 Mbytes / 15325 sec
G:\sg2\Jetstress004001.edb	27867714	0	0	0	870866 Mbytes / 14999 sec
H:\sg1\Jetstress005001.edb	27867458	0	0	0	870858 Mbytes / 15333 sec
H:\sg2\Jetstress006001.edb	27866690	0	0	0	870834 Mbytes / 14993 sec
I:\sg1\Jetstress007001.edb	27867714	0	0	0	870866 Mbytes / 15325 sec
I:\sg2\Jetstress008001.edb	27865154	0	0	0	870786 Mbytes / 14999 sec
J:\sg1\Jetstress009001.edb	27866434	0	0	0	870826 Mbytes / 15335 sec
J:\sg2\Jetstress010001.edb	27868226	0	0	0	870882 Mbytes / 14999 sec
K:\sg1\Jetstress011001.edb	27867458	0	0	0	870858 Mbytes / 15748 sec
K:\sg2\Jetstress012001.edb	27865666	0	0	0	870802 Mbytes / 15178 sec
(Sum)	334404888	0	0	0	10450152 Mbytes / 33398 sec

Disk Subsystem Performance (of checksum)

LOGICALDISK	AVG. DISK SEC/READ	AVG. DISK SEC/WRITE	DISK READS/SEC	DISK WRITES/SEC	AVG. DISK BYTES/READ
F:	0.056	0.000	834.089	0.000	65536.000
G:	0.052	0.000	919.144	0.000	65536.000
H:	0.052	0.000	919.051	0.000	65536.000
I:	0.052	0.000	919.079	0.000	65536.000
J:	0.052	0.000	918.555	0.000	65536.000
K:	0.053	0.000	901.052	0.000	65536.000

Memory System Performance (of checksum)

COUNTER	AVERAGE	MINIMUM	MAXIMUM
% Processor Time	22.688	8.662	41.320
Available Mbytes	30594.004	30544.000	30613.000
Free System Page Table Entries	33560239.856	33559745.000	33560620.000
Transition Pages Repurposed/sec	0.000	0.000	0.000
Pool Non-paged Bytes	115716272.806	115675136.000	115871744.000
Pool Paged Bytes	131588740.604	130957312.000	171241472

Test Log

```

12/20/2010 11:36:49 AM -- Jetstress testing begins ...
12/20/2010 11:36:49 AM -- Prepare testing begins ...
12/20/2010 11:37:02 AM -- Attaching databases ...
12/20/2010 11:37:02 AM -- Prepare testing ends.
12/20/2010 11:37:02 AM -- Dispatching transactions begins ...
12/20/2010 11:37:02 AM -- Database cache settings: (minimum: 384.0 MB, maximum: 3.0 GB)
12/20/2010 11:37:02 AM -- Database flush thresholds: (start: 30.7 MB, stop: 61.4 MB)
12/20/2010 11:37:15 AM -- Database read latency thresholds: (average: 20 msec/read,
maximum: 200 msec/read).
12/20/2010 11:37:15 AM -- Log write latency thresholds: (average: 10 msec/write,
maximum: 200 msec/write).
12/20/2010 11:37:19 AM -- Operation mix: Sessions 13, Inserts 40%, Deletes 20%,
Replaces 5%, Reads 35%, Lazy Commits 70%.
12/20/2010 11:37:19 AM -- Performance logging begins (interval: 15000 ms).
12/20/2010 11:37:19 AM -- Attaining prerequisites:
12/20/2010 11:40:41 AM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last:
2907165000.0 (lower bound: 2899103000.0, upper bound: none)
12/21/2010 11:40:42 AM -- Performance logging ends.
12/21/2010 11:40:42 AM -- JetInterop batch transaction stats: 874840, 874256, 872069,
874549, 874179, 874146, 872960, 872966, 873205, 873369, 873864 and 872773.
12/21/2010 11:40:43 AM -- Dispatching transactions ends.
12/21/2010 11:40:43 AM -- Shutting down databases ...
12/21/2010 11:40:52 AM -- Instance880.1 (complete), Instance880.2 (complete),
Instance880.3 (complete), Instance880.4 (complete), Instance880.5 (complete),
Instance880.6 (complete), Instance880.7 (complete), Instance880.8 (complete),
Instance880.9 (complete), Instance880.10 (complete), Instance880.11 (complete) and
Instance880.12 (complete)
12/21/2010 11:40:52 AM -- C:\Exchange\7320_10k\24hr-
stress\Stress_2010_12_20_11_37_15.blg has 5756 samples.
12/21/2010 11:40:52 AM -- Creating test report ...
12/21/2010 11:42:29 AM -- Instance880.1 has 17.1 for I/O Database Reads Average
Latency.
12/21/2010 11:42:29 AM -- Instance880.1 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.1 has 0.9 for I/O Log Reads Average Latency.
12/21/2010 11:42:29 AM -- Instance880.2 has 16.4 for I/O Database Reads Average
Latency.
12/21/2010 11:42:29 AM -- Instance880.2 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.2 has 0.9 for I/O Log Reads Average Latency.
12/21/2010 11:42:29 AM -- Instance880.3 has 16.8 for I/O Database Reads Average
Latency.
12/21/2010 11:42:29 AM -- Instance880.3 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.3 has 0.9 for I/O Log Reads Average Latency.
12/21/2010 11:42:29 AM -- Instance880.4 has 16.7 for I/O Database Reads Average
Latency.
12/21/2010 11:42:29 AM -- Instance880.4 has 0.9 for I/O Log Writes Average Latency.
12/21/2010 11:42:29 AM -- Instance880.4 has 0.9 for I/O Log Reads Average Latency.

```

12/21/2010 11:42:29 AM -- Instance880.5 has 16.8 for I/O Database Reads Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.5 has 0.9 for I/O Log Writes Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.5 has 0.9 for I/O Log Reads Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.6 has 16.6 for I/O Database Reads Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.6 has 0.9 for I/O Log Writes Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.6 has 0.9 for I/O Log Reads Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.7 has 16.8 for I/O Database Reads Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.7 has 0.9 for I/O Log Writes Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.7 has 0.9 for I/O Log Reads Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.8 has 16.6 for I/O Database Reads Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.8 has 0.9 for I/O Log Writes Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.8 has 0.9 for I/O Log Reads Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.9 has 16.8 for I/O Database Reads Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.9 has 0.9 for I/O Log Writes Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.9 has 0.9 for I/O Log Reads Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.10 has 16.6 for I/O Database Reads Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.10 has 0.9 for I/O Log Writes Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.10 has 0.9 for I/O Log Reads Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.11 has 16.7 for I/O Database Reads Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.11 has 0.9 for I/O Log Writes Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.11 has 0.9 for I/O Log Reads Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.12 has 16.6 for I/O Database Reads Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.12 has 0.9 for I/O Log Writes Average Latency.
 12/21/2010 11:42:29 AM -- Instance880.12 has 0.9 for I/O Log Reads Average Latency.
 12/21/2010 11:42:29 AM -- Test has 150.527032873491 Maximum Database Page Fault Stalls/sec.
 12/21/2010 11:42:29 AM -- Test has 11 Database Page Fault Stalls/sec samples higher than 0.
 12/21/2010 11:42:29 AM -- C:\Exchange\7320_10k\24hr-stress\Stress_2010_12_20_11_37_15.xml has 5742 samples queried.
 12/21/2010 11:42:30 AM -- C:\Exchange\7320_10k\24hr-stress\Stress_2010_12_20_11_37_15.html is saved.
 12/21/2010 11:42:30 AM -- Performance logging begins (interval: 30000 ms).
 12/21/2010 11:42:30 AM -- Verifying database checksums ...
 12/21/2010 8:59:09 PM -- F: (100% processed), G: (100% processed), H: (100% processed), I: (100% processed), J: (100% processed) and K: (100% processed)
 12/21/2010 8:59:10 PM -- Performance logging ends.
 12/21/2010 8:59:10 PM -- C:\Exchange\7320_10k\24hr-stress\DBChecksum_2010_12_21_11_42_30.blg has 1112 samples.

Soft Recovery Test Result Report

Test Summary

Overall Test Result	Pass
Machine Name	AIE-4240A
Test Description	Soft Recovery - 10,000 One GB Mailboxes, 2 Copies
Test Start Time	12/23/2010 8:51:02 AM
Test End Time	12/23/2010 9:28:20 AM
Collection Start Time	12/23/2010 8:51:46 AM
Collection End Time	12/23/2010 9:28:05 AM
Jetstress Version	14.01.0180.003
Ese Version	14.00.0639.019
Operating System	Windows Server (R) 2008 Enterprise without Hyper-V Service Pack 2 (6.0.6002.131072)
Performance Log	C:\Exchange\7320_10k\soft-recovery\Performance_2010_12_23_8_51_28.blg

Database Sizing and Throughput

Achieved Transactional I/O per Second	5918.298
Target Transactional I/O per Second	5000
Initial Database Size (bytes)	10965345894400
Final Database Size (bytes)	10969296928768
Database Files (Count)	12

Jetstress System Parameters

Thread Count	13 (per database)
Minimum Database Cache	384.0 MB
Maximum Database Cache	3072.0 MB
Insert Operations	40%
Delete Operations	20%
Replace Operations	5%
Read Operations	35%
Lazy Commits	70%

Database Configuration

Instance880.1	Log Path: Q:\sg1 Database: F:\sg1\Jetstress001001.edb
Instance880.2	Log Path: Q:\sg2 Database: F:\sg2\Jetstress002001.edb
Instance880.3	Log Path: R:\sg1 Database: G:\sg1\Jetstress003001.edb
Instance880.4	Log Path: R:\sg2 Database: G:\sg2\Jetstress004001.edb
Instance880.5	Log Path: S:\sg1 Database: H:\sg1\Jetstress005001.edb
Instance880.6	Log Path: S:\sg2 Database: H:\sg2\Jetstress006001.edb
Instance880.7	Log Path: T:\sg1 Database: I:\sg1\Jetstress007001.edb
Instance880.8	Log Path: T:\sg2 Database: I:\sg2\Jetstress008001.edb
Instance880.9	Log Path: U:\sg1 Database: J:\sg1\Jetstress009001.edb
Instance880.10	Log Path: U:\sg2 Database: J:\sg2\Jetstress010001.edb
Instance880.11	Log Path: V:\sg1 Database: K:\sg1\Jetstress011001.edb
Instance880.12	Log Path: v:\sg2 Database: K:\sg2\Jetstress012001.edb

Transactional I/O Performance

MSEXCHANGE DB ==> INSTANCES	I/O DB			I/O DB			I/O LOG		I/O LOG			
	READS AVE LATENCY (MSEC)	WRITES AVE LATENCY (MSEC)	I/O DB READS/SEC	I/O DB WRITES/ SEC	I/O DB READS AVE BYTES	I/O DB WRITES AVE BYTES	READS AVE LATENCY (MSEC)	WRITES AVE LATENCY (MSEC)	I/O LOG READS/ SEC	I/O LOG WRITES/ SEC	I/O LOG READS AVE BYTES	I/O LOG WRITES AVE BYTES
Instance880.1	14.777	23.148	292.229	196.818	32807.332	34321.692	0.000	0.927	0.000	102.959	0.000	4994.573
Instance880.2	15.570	22.951	300.060	201.760	32822.231	34357.597	0.000	0.931	0.000	103.178	0.000	4973.423
Instance880.3	14.872	21.497	290.859	194.964	32811.611	34315.060	0.000	0.936	0.000	100.405	0.000	5010.020
Instance880.4	15.271	21.516	299.775	202.066	32812.161	34354.055	0.000	0.933	0.000	102.009	0.000	5005.782
Instance880.5	14.737	18.966	294.394	197.714	32815.372	34457.043	0.000	0.929	0.000	102.770	0.000	5010.777

Instance880.6	15.227	19.040	295.410	197.559	32800.419	34280.178	0.000	0.932	0.000	100.795	0.000	4958.097
Instance880.7	14.536	17.601	295.387	199.121	32804.748	34313.145	0.000	0.931	0.000	102.940	0.000	4982.695
Instance880.8	15.182	17.325	289.611	194.502	32810.969	34366.545	0.000	0.934	0.000	101.357	0.000	5058.997
Instance880.9	14.677	16.530	295.028	198.404	32806.454	34275.549	0.000	0.932	0.000	102.611	0.000	5017.667
Instance880.10	15.107	16.931	294.228	197.666	32812.511	34486.220	0.000	0.931	0.000	102.176	0.000	4966.463
Instance880.11	14.548	16.676	293.993	198.261	32798.605	34298.712	0.000	0.928	0.000	102.168	0.000	4969.468
Instance880.12	15.190	15.956	298.312	200.178	32806.898	34260.784	0.000	0.921	0.000	103.378	0.000	5014.606

Host System Performance

COUNTER	AVERAGE	MINIMUM	MAXIMUM
% Processor Time	31.684	12.960	48.884
Available Mbytes	27424.034	27338.000	30151.000
Free System Page Table Entries	33560005.459	33559778.000	33560500.000
Transition Pages Repurposed/sec	0.000	0.000	0.000
Pool Non-paged Bytes	121918618.301	121901056.000	122015744.000
Pool Paged Bytes	135988238.027	134385664.000	136085504.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

```

12/23/2010 8:50:17 AM -- Jetstress testing begins ...
12/23/2010 8:50:17 AM -- Prepare testing begins ...
12/23/2010 8:50:30 AM -- Attaching databases ...
12/23/2010 8:50:30 AM -- Prepare testing ends.
12/23/2010 8:50:30 AM -- Jetstress testing ends.
12/23/2010 8:51:02 AM -- Jetstress testing begins ...
12/23/2010 8:51:02 AM -- Prepare testing begins ...
12/23/2010 8:51:15 AM -- Attaching databases ...
12/23/2010 8:51:15 AM -- Prepare testing ends.
12/23/2010 8:51:15 AM -- Dispatching transactions begins ...
12/23/2010 8:51:15 AM -- Database cache settings: (minimum: 384.0 MB, maximum: 3.0 GB)
12/23/2010 8:51:15 AM -- Database flush thresholds: (start: 30.7 MB, stop: 61.4 MB)
12/23/2010 8:51:28 AM -- Database read latency thresholds: (average: 20 msec/read,
maximum: 100 msec/read).
12/23/2010 8:51:28 AM -- Log write latency thresholds: (average: 10 msec/write,
maximum: 100 msec/write).
12/23/2010 8:51:31 AM -- Operation mix: Sessions 13, Inserts 40%, Deletes 20%, Replaces
5%, Reads 35%, Lazy Commits 70%.
12/23/2010 8:51:31 AM -- Performance logging begins (interval: 15000 ms).
12/23/2010 8:51:31 AM -- Generating log files ...
12/23/2010 9:28:11 AM -- Q:\sg1 (103.0% generated), Q:\sg2 (102.8% generated), R:\sg1
(100.8% generated), R:\sg2 (102.2% generated), S:\sg1 (103.2% generated), S:\sg2
(100.2% generated), T:\sg1 (102.8% generated), T:\sg2 (103.0% generated), U:\sg1
(103.2% generated), U:\sg2 (101.4% generated), V:\sg1 (101.8% generated) and v:\sg2
(103.8% generated)
12/23/2010 9:28:11 AM -- Performance logging ends.
12/23/2010 9:28:11 AM -- JetInterop batch transaction stats: 22124, 22551, 21954,
22657, 22480, 22287, 22486, 22160, 22451, 22210, 22394 and 22589.
12/23/2010 9:28:12 AM -- Dispatching transactions ends.
12/23/2010 9:28:12 AM -- Shutting down databases ...

```

12/23/2010 9:28:20 AM -- Instance880.1 (complete), Instance880.2 (complete), Instance880.3 (complete), Instance880.4 (complete), Instance880.5 (complete), Instance880.6 (complete), Instance880.7 (complete), Instance880.8 (complete), Instance880.9 (complete), Instance880.10 (complete), Instance880.11 (complete) and Instance880.12 (complete)
12/23/2010 9:28:20 AM -- C:\Exchange\7320_10k\soft-recovery\Performance_2010_12_23_8_51_28.blg has 146 samples.
12/23/2010 9:28:20 AM -- Creating test report ...
12/23/2010 9:28:21 AM -- Instance880.1 has 14.8 for I/O Database Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.1 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 9:28:21 AM -- Instance880.1 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.2 has 15.6 for I/O Database Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.2 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 9:28:21 AM -- Instance880.2 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.3 has 14.9 for I/O Database Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.3 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 9:28:21 AM -- Instance880.3 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.4 has 15.3 for I/O Database Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.4 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 9:28:21 AM -- Instance880.4 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.5 has 14.7 for I/O Database Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.5 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 9:28:21 AM -- Instance880.5 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.6 has 15.2 for I/O Database Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.6 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 9:28:21 AM -- Instance880.6 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.7 has 14.5 for I/O Database Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.7 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 9:28:21 AM -- Instance880.7 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.8 has 15.2 for I/O Database Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.8 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 9:28:21 AM -- Instance880.8 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.9 has 14.7 for I/O Database Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.9 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 9:28:21 AM -- Instance880.9 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.10 has 15.1 for I/O Database Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.10 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 9:28:21 AM -- Instance880.10 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.11 has 14.5 for I/O Database Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.11 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 9:28:21 AM -- Instance880.11 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.12 has 15.2 for I/O Database Reads Average Latency.
12/23/2010 9:28:21 AM -- Instance880.12 has 0.9 for I/O Log Writes Average Latency.
12/23/2010 9:28:21 AM -- Instance880.12 has 0.9 for I/O Log Reads Average Latency.
12/23/2010 9:28:21 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
12/23/2010 9:28:21 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
12/23/2010 9:28:21 AM -- C:\Exchange\7320_10k\soft-recovery\Performance_2010_12_23_8_51_28.xml has 145 samples queried.

Database Backup Test Result Report

Database Backup Statistics - All

DATABASE INSTANCE	DATABASE SIZE (MBYTES)	ELAPSED BACKUP TIME	MBYTES TRANSFERRED/SEC
Instance880.1	870882.09	06:25:10	7.95
Instance880.2	870834.09	04:08:29	8.60
Instance880.3	870834.09	05:19:12	8.25
Instance880.4	870858.09	04:28:26	8.50
Instance880.5	870850.09	05:15:19	8.27
Instance880.6	870826.09	04:23:50	8.52
Instance880.7	870858.09	05:16:06	8.27
Instance880.8	870778.09	04:25:38	8.51
Instance880.9	870818.09	05:22:19	8.24
Instance880.10	870874.09	04:30:17	8.49
Instance880.11	870850.09	05:13:15	8.28
Instance880.12	870794.09	04:18:09	8.55

Jetstress System Parameters

Thread Count	13 (per database)
Minimum Database Cache	384.0 MB
Maximum Database Cache	3072.0 MB
Insert Operations	40%
Delete Operations	20%
Replace Operations	5%
Read Operations	35%
Lazy Commits	70%

Database Configuration

Instance880.1	Log Path: Q:\sg1 Database: F:\sg1\Jetstress001001.edb
Instance880.2	Log Path: Q:\sg2 Database: F:\sg2\Jetstress002001.edb
Instance880.3	Log Path: R:\sg1 Database: G:\sg1\Jetstress003001.edb
Instance880.4	Log Path: R:\sg2 Database: G:\sg2\Jetstress004001.edb
Instance880.5	Log Path: S:\sg1 Database: H:\sg1\Jetstress005001.edb
Instance880.6	Log Path: S:\sg2 Database: H:\sg2\Jetstress006001.edb
Instance880.7	Log Path: T:\sg1 Database: I:\sg1\Jetstress007001.edb
Instance880.8	Log Path: T:\sg2 Database: I:\sg2\Jetstress008001.edb
Instance880.9	Log Path: U:\sg1 Database: J:\sg1\Jetstress009001.edb
Instance880.10	Log Path: U:\sg2 Database: J:\sg2\Jetstress010001.edb
Instance880.11	Log Path: V:\sg1 Database: K:\sg1\Jetstress011001.edb
Instance880.12	Log Path: v:\sg2 Database: K:\sg2\Jetstress012001.edb

Transactional I/O Performance

MSEXCHANGE DB ==> INSTANCES	I/O DB		I/O DB			I/O LOG		I/O LOG		I/O LOG		I/O LOG
	READS AVE LATENCY (MSEC)	WRITES AVE LATENCY (MSEC)	I/O DB READS/SEC	I/O DB WRITES/ SEC	I/O DB READS AVE BYTES	I/O DB WRITES AVE BYTES	READS AVE LATENCY (MSEC)	WRITES AVE LATENCY (MSEC)	I/O LOG READS/ SEC	I/O LOG WRITES/ SEC	I/O LOG READS AVE BYTES	I/O LOG WRITES AVE BYTES
Instance880.1	52.794	0.000	31.803	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance880.2	47.633	0.000	34.383	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance880.3	50.175	0.000	32.997	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance880.4	48.194	0.000	33.982	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance880.5	50.021	0.000	33.075	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Instance880.6	48.030	0.000	34.073	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance880.7	50.069	0.000	33.056	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance880.8	48.101	0.000	34.036	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance880.9	50.304	0.000	32.941	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance880.10	48.245	0.000	33.946	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance880.11	49.946	0.000	33.114	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance880.12	47.855	0.000	34.186	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Host System Performance

COUNTER	AVERAGE	MINIMUM	MAXIMUM
% Processor Time	5.425	1.051	29.364
Available Mbytes	30595.339	30553.000	30601.000
Free System Page Table Entries	33560328.700	33559943.000	33560487.000
Transition Pages Repurposed/sec	0.000	0.000	0.000
Pool Non-paged Bytes	115667617.300	115658752.000	115683328.000
Pool Paged Bytes	133087027.425	130904064.000	172920832.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

```

12/21/2010 9:14:14 PM -- Jetstress testing begins ...
12/21/2010 9:14:14 PM -- Prepare testing begins ...
12/21/2010 9:14:27 PM -- Attaching databases ...
12/21/2010 9:14:27 PM -- Prepare testing ends.
12/21/2010 9:14:42 PM -- Performance logging begins (interval: 30000 ms).
12/21/2010 9:14:42 PM -- Backing up databases ...
12/23/2010 3:39:53 AM -- Performance logging ends.
12/23/2010 3:39:53 AM -- Instance880.1 (100% processed), Instance880.2 (100%
processed), Instance880.3 (100% processed), Instance880.4 (100% processed),
Instance880.5 (100% processed), Instance880.6 (100% processed), Instance880.7 (100%
processed), Instance880.8 (100% processed), Instance880.9 (100% processed),
Instance880.10 (100% processed), Instance880.11 (100% processed) and Instance880.12
(100% processed)
12/23/2010 3:39:53 AM -- C:\Exchange\7320_10k\database-
backup\DatabaseBackup_2010_12_21_21_14_27.blg has 3644 samples.
12/23/2010 3:39:53 AM -- Creating test report ...

```



Sun ZFS Storage 7320 Appliance
10,000 Mailbox Resiliency Exchange 2010
Storage Solution

June 2012, Version 1.2

Author: Oracle

Contributing Authors: Thomas Hanvey;
Andrew Ness

Oracle Corporation
World Headquarters
500 Oracle Parkway
Redwood Shores, CA 94065
U.S.A.

Worldwide Inquiries:
Phone: +1.650.506.7000
Fax: +1.650.506.7200

oracle.com



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