Dell™ PowerVault™MD1200

Nearline SAS

7200 Mailboxes using Mailbox Resiliency

Exchange 2010 Storage Solution

Tested with: ESRP – Storage Version 3.0
Tested Date: May 3, 2010

Content

Overview

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

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

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Features

This white paper describes a tested and validated storage solution for a 7200 mailbox Exchange 2010 environment with Data Availability Group. A DAG is the new high availability mechanism in Microsoft Exchange 2010. This model of mailbox resiliency supports multiple copies of Exchange database (up to 16) in a DAG. There is only one active copy of a given Exchange 2010 database at any given time. Secondary copies are periodically synched with the primary copy. Mail clients access the primary (active) copy, and database changes to the primary copy are copied to the secondary (passive) copies in the form of transaction logs. The copied log records are played on the secondary copy to keep the secondary database copies consistent with the primary copy. The secondary hosts are configured to be identical to the primary. The primary and secondary copy storages do not share storage array controllers or disks.

Dell™ PowerVault™ MD1200 is a SAS based storage enclosure. The major features of the storage system include:

- Capacity for 12 3.5-inch, hot-plug, 6.0-Gbps, serial-attached SCSI (SAS) hard drives , 600 GB capacity, and rated at 15K RPM
- Support for up to 8 daisy-chained storage enclosures per channel in unified mode for a total of (96) hard drives
- Host-based RAID support via a PERC H800 adapter
- In-band enclosure management provided through SCSI enclosure services (SES)
- RAID and system management using Dell™ OpenManage™ Server Administrator Storage Management Service

The PowerVault™ MD1200 enclosure supports up to (12) drives. The solution presented in this paper utilizes (2) MD1200 enclosures and (24) disks. Each disk houses one Exchange database and its Transaction Logs.

Solution Description

The Dell™ PowerVault™ MD1200 is a modular disk storage expansion enclosure for PowerEdge™ servers capable of housing up to (12) 3.5-inch disk drives in a single 2U rack able chassis. The expansion enclosure can support 2 Terabyte Near-Line SAS (7200 RPM) as well as 10K RPM and 15K RPM SAS drives up to capacities of 600GB..

Dell™ PowerVault™ MD1200 Product Page

Figure 1:Dell™ PowerVault™ MD1200 enclosure with (12) 3.5-inch drives

PERC H800 is the host-based RAID controller used to connect to the PowerVault™ MD1200 storage enclosures. The controller supports 6 Gbps Serial Attached SCSI (SAS) as the storage interconnect technology and PCI Express 2.0 (PCI-E) as the host-based interconnect technology.

The PERC H800 controller offers:

- 8 port LSI 2108 Chipset
- 512MB of customized DDR2 400MHz, Error-Correcting Code (ECC) cache memory with optional upgrade to 512MB
- 6 Gbps maximum speed for each SAS lane
- Two external x4 (“by four”) mini-SAS wide ports, each aggregating 4 SAS lanes for a total bandwidth per port of 12.0 Gbps
- x8 PCI E host interface for a total bandwidth of 32.0 Gbps
- Up to 72 hours of intelligent, transportable, battery-backed, cache memory

The presented solution is a Data Availability Group solution for up to 7200 mailboxes. It includes a single primary PowerEdge™ R610 server directly attached to 2 Dell™ PowerVault™ MD1200 storage enclosures. The secondary server is configured to be identical to the primary. The primary and secondary storage do not share storage array controllers or disks.

The tested user profile was 0.1 IOPS per user with a 4096 MB mailbox size. This IO profile for Exchange 2010 represents about 100 messages (sent/received) per mailbox per day. Sometimes additional applications, such as certain mobile messaging applications, can raise the IOPS profile of a user as high as three or four times that of normal. Using 7.2K RPM drives gives more than enough performance achieving over 30% more than the target of 720 IOPS. Single disk RAID 0 virtual drives were configured in this manner to exhibit each disk's maximum IOPS.

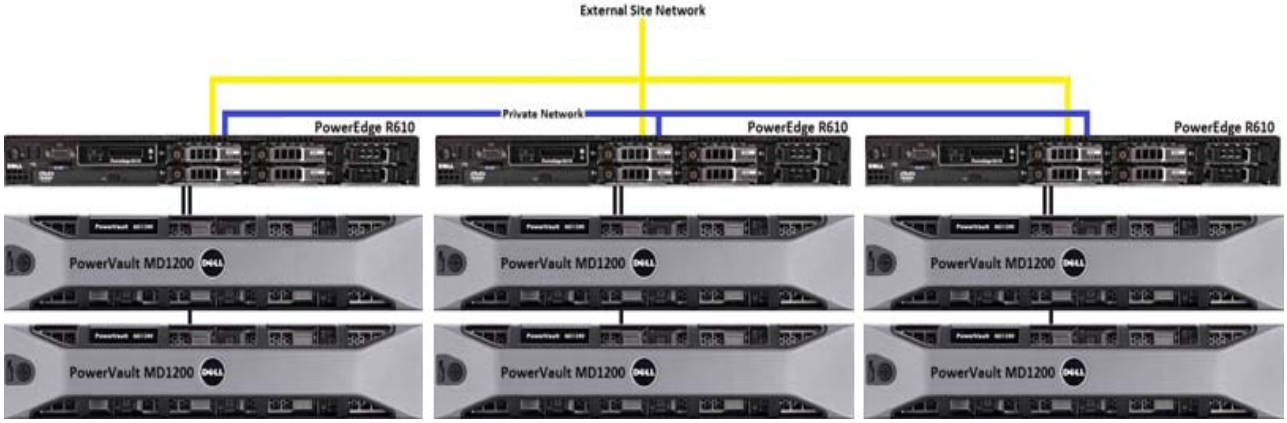

Figure 2: Test Setup Diagram

Microsoft Exchange Server System:

Server	Dell™ PowerEdge™ R610
CPU	2 Intel®Xeon®CPU;5570@2.93GHz
Memory	64 GB DDR2 ECC
NIC	Broadcom NeXtreme II
RAID Controller	PERC 6/i (FW Version 4.5.0.64)
Internal Disks	2 Seagate 146GB 15K RPM SAS(ST9146852SS)

Storage System:

Storage System	Dell™ PowerVault™ MD1200
Disks	24 Seagate 2TB 7.2K RPM NL-SAS (ST32000444SS) Drives
RAID Controller	PERC H800 4.22.0.64

Storage Configuration:

The storage configuration per enclosure was as follows:

- A single RAID 0 volume was created from each physical disk from 0 through 11 on each of the PowerVault™ MD1200(s). These volumes were used for Exchange Information stores and transaction logs.

The ESRP-Storage program focuses on storage solution testing to address performance and reliability issues with storage design. However, storage is not the only factor to take into consideration when designing a scale up Exchange solution.

Other factors which affect the server scalability are:

- Server processor utilization
- Server physical and virtual memory limitations
- Resource requirements for other applications
- Directory and network service latencies
- Network infrastructure limitations
- Replication and recovery requirements
- Client usage profiles

All these factors are beyond the scope for ESRP-Storage. Therefore, the number of mailboxes hosted per server as part of the tested configuration may not necessarily be viable for some customer deployment. For more information on identifying and addressing performance bottlenecks in an Exchange system, please refer to Microsoft's Troubleshooting Microsoft Exchange Server Performance, available at

http://go.microsoft.com/fwlink/?LinkId=23454.

Targeted Customer Profile

This solution is intended for small to mid size organizations hosting up to 7200 Exchange 2010 mailboxes as the following:

- Number of mailboxes : 7200
- Number of hosts attached to the storage systems: 3
- Number of PowerVault™ MD1200(s) storage systems per host : 2
- User IO profile: 0.1 I/O Operation per second
- 4096 MB Mailbox quota per mailbox
- 24x7 Background Database Maintenance enabled
- Data Availability Group (DAG) for Mailbox Resiliency

The table below summarizes the testing environment.

Simulated Exchange Configuration

Number of Exchange mailboxes simulated	7200

Number of Database Availability Groups (DAGs)	1
Number of servers/DAG	3
Number of active mailboxes/server	7200
Number of databases/host	24
Number of copies/database	3
Number of mailboxes/database	300
Simulated profile: I/O's per second per mailbox (IOPS, include 20% headroom)	0.1
Database LUN size	44700GB
Log LUN size	N/A
Total database size for performance testing	28,753 GB
% storage capacity used by Exchange database**	64% (28753/44700)

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

Primary Storage Hardware

Storage Connectivity (Fiber Channel, SAS, SATA, iSCSI)	SAS
Storage model and OS/firmware revision	PowerVault™ MD1200 + PERC H800 Firmware 4.22.0.64
Storage cache	512MB – PERC H800 RAID controller cache
Number of storage controllers	1
Number of storage ports	2
Maximum bandwidth of storage connectivity to host	6GBit
Switch type/model/firmware revision	N/A
HBA model and firmware	PERC H800 (RAID controller)
Number of HBA's/host	1
Host server type	Dell™ PowerEdge™ R610e 2 Intel®Xeon®CPU; 5570@2.93GHz 64GB memory
Total number of disks tested in solution	24
Maximum number of spindles can be hosted in the storage	12 per cabinet – up to 96 in daisy chain configuration

Storage Software

HBA driver	Dell™ PERC H800
HBA QueueTarget Setting	N/A
HBA QueueDepth Setting	N/A
Multi-Pathing	N/A
Host OS	Windows Server 2008 R2 Enterprise X64 Edition
ESE.dll file version	14.0.639.19
Replication solution name/version	N/A

Primary Storage Disk Configuration (Mailbox Store Disks)

Disk type, speed and firmware revision	Seagate 2TB 7.2K RPM NL-SAS (ST32000444SS) Drives
Raw capacity per disk (GB)	2048GB
Number of physical disks in test	24
Total raw storage capacity (GB)	49152GB (2048 * 24 GB)
Disk slice size (GB)	N/A
Number of slices per LUN or number of disks per LUN	1
Raid level	RAID 0
Total formatted capacity	1862.50 x 24drives(44700GB)
Storage capacity utilization	Formatted capacity/total raw capacity 44688/49152 = 90.91 %
Database capacity utilization	Database size/total raw capacity 28753.92/49152GB = 58.5% utilized

Replication Configuration

Replication mechanism	Exchange 2010 Data Availability Group Mailbox Resiliency
Number of links	2
Simulated link distance	LAN
Link type	IP
Link bandwidth	Gigabit Ethernet (1 Gbps)

The figure below shows the DAG configuration with 24 active database copies and 48 passive copies.

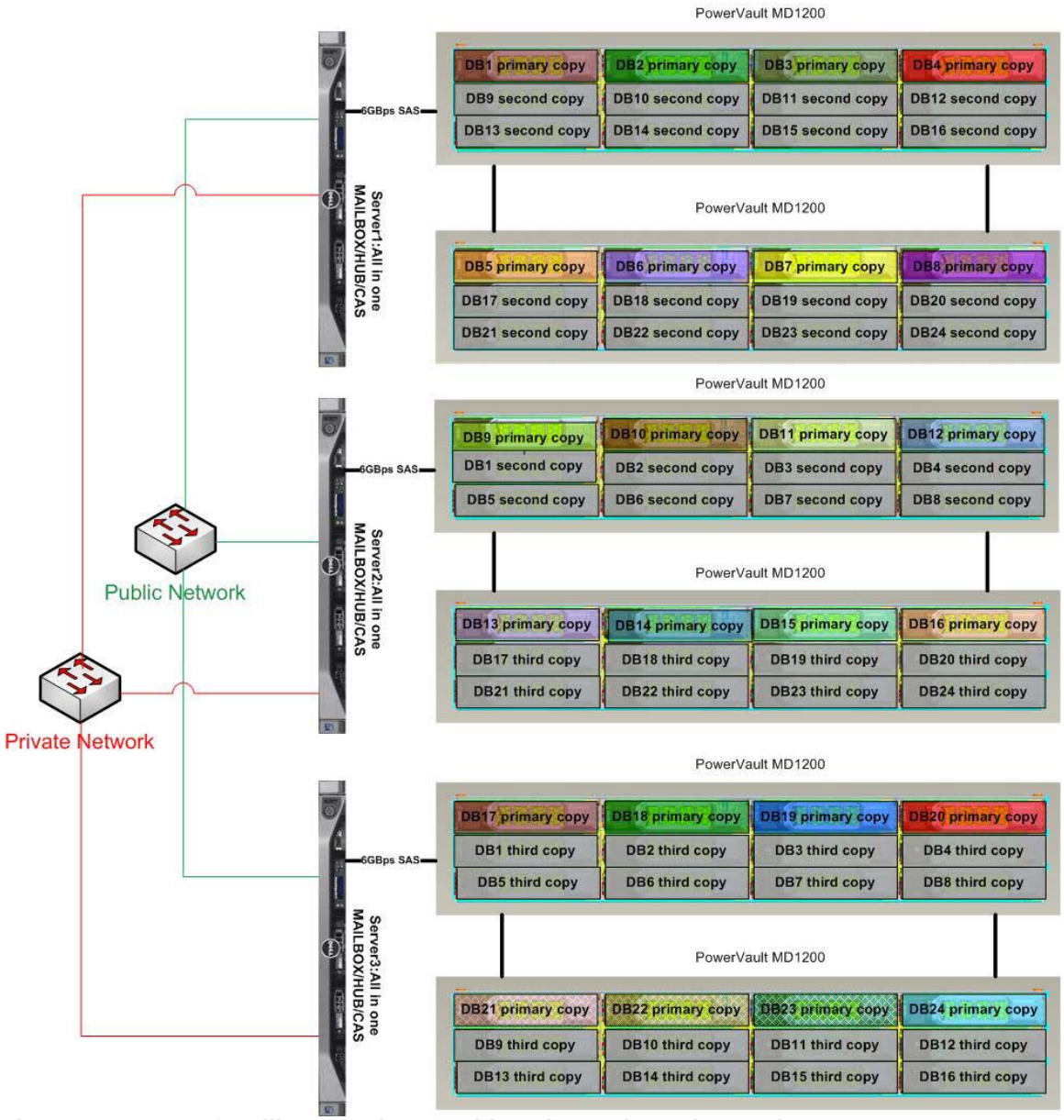

Figure 3: Layout of Mailbox Databases with active and passive copies

Best Practices

Exchange Server 2007 and 2010 overcome the memory limitations of previous Exchange versions by providing support as a 64-bit application capable of running on supported x64 platforms. On Windows Server 2008 R2

x64 Edition about 2TB of addressable memory is available for the kernel mode and the user mode applications. Both the application and kernel can have sufficient memory for operations, allowing the Extensible Storage Engine (ESE) in Exchange Server 2010 to utilize more memory to buffer data pages. The result is a reduction in the number of I/Os, specifically the read operations, required to the disk sub-system. The total number of database disk I/O operations for a given user load is dependent on the available system memory. For a given load, the total database disk I/O operations required per second (IOPS) decreases over a period with increase in system memory. This decrease in database IOPS is primarily caused by a decrease in database reads.

Even with the decrease in database IOPS using larger server memory, Exchange server remains a disk I/O intensive application. The disk subsystem should be capable to support both the capacity and I/O throughput demands of the application. Based on testing using the ESRP framework, we would recommend the following best practices to help improve the I/O subsystem performance:

1. Exchange 2010 is an IO intensive application. Sharing Exchange 2010 storage resources with other applications may negatively impact the performance of Exchange 2010 deployment and therefore is not recommended.
2. In our testing, the database and log folders shared the same physical disk. Other testing indicated that separating the database folders from log folders on to different set of disks does not provide a noticeable performance advantage. In an Exchange Server 2010 resiliency solution, separating the database and log folders is no longer a required best practice.
3. For Exchange 2010 Database, it is recommended that the size of elements within a RAID stripe be set 512K for best performance.
4. Windows NTFS allocation unit size for Exchange 2010 database partitions should be set to 64K for best performance. For log partitions, if separated from database, the default allocation unit size should be used.
5. Exchange Server 2010 storage latencies are most often related the number of disks available for given a workload. Windows Performance Monitor may be used to monitor Exchange Server 2010 database counters. Average database read latencies (Avg. Disk sec/Read) should not exceed 20ms.

For Exchange Server 2010 Mailbox Storage Design, please visit
http://technet.microsoft.com/en-us/library/dd346703.aspx

Backup strategy

To protect e-mail data from potential disasters having a well designed and implemented backup solution is critical. Depending on the requirements of an environment different backup strategies may be implemented such as:

- Backup to tape
- LAN/SAN based backup etc.

In this solution, DAG is used to maintain a passive database copy on a separate storage system. This passive copy of the database may be used to perform to tape or disk.

The tests performed for backup include: backup-to-disk (read only) and log replay. The backup-to-disk test measures the read I/O performance by running a checksum on all the databases and log files. This test can help determine what kind of database read throughput can be achieved during backups. The backup speed and throughput achieved will depend upon the backup device used. The log replay test was used to measure the maximum rate at which the log files can be played against the databases. This is used to determine the restore times and also database write throughput can be achieved during a log recovery.

Contact for Additional Information

For additional information please visit Dell™ and Exchange Server 2010

Test Result Summary

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

Reliability

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

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

- Any errors reported in the saved event log file? No errors reported on event log.
  No
- Any errors reported in during the database and log checksum process?
  No

Storage Performance Results

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

Individual Server Metrics:

Database I/O	
Database Disks Transfers/sec	1058.025
Total Database Disks Reads/sec	653.501
Total Database Disks Writes/sec	404.524
Average Database Disk Read Latency (ms)	13.65
Average Database Disk Write Latency (ms)	2.54
Transaction Log I/O	
Log Disks Writes/sec	343.472
Average Log Disk Write Latency (ms)	2.2478

Database Backup/Recovery Performance

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

Database Read-only Performance

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

MB read/sec per database	118.7388(Average)
MB read/sec total per server	2849.73

Transaction Log Recovery/Replay Performance

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

Average time to play one Log file (sec)	9.347 (average number of logs replayed across all servers/avg. resp time across all servers)

Conclusion

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

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

Appendix A: Stress Testing

Microsoft Exchange Server Jetstress Tool

Stress Test Result Report

Test Summary

Overall Test Result	**Pass**
Machine Name	R610E
Test Description	2TB dbmaint 4threads 512K Segment Size adaptive read ahead write back 64K cluster size .10 mailbox profile 7200 mail boxes non_daisy_chain 24 databases 24hour run
Test Start Time	4/1/2010 4:59:41 PM
Test End Time	4/2/2010 5:09:54 PM
Collection Start Time	4/1/2010 5:09:31 PM
Collection End Time	4/2/2010 5:09:31 PM
Jetstress Version	14.01.0043.000
Ese Version	14.00.0639.019
Operating System	Windows Server 2008 R2 Enterprise (6.1.7600.0)
Performance Log	C:\Jetstress\Results\sapex_7200_10ios_4threads_24hrs\Stress_2010_4_1_17_0_32.blg C:\Jetstress\Results\sapex_7200_10ios_4threads_24hrs\DBChecksum_2010_4_2_17_9_54.blg

Database Sizing and Throughput

Achieved Transactional I/O per Second	1003.931
Target Transactional I/O per Second	720
Initial Database Size (bytes)	31046982172672
Final Database Size (bytes)	31082960912384
Database Files (Count)	24

Jetstress System Parameters

Thread Count	4 (per database)
Minimum Database Cache	768.0 MB
Maximum Database Cache	6144.0 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	3

Database Configuration

Instance1928.1 Log Path: C:\Amnt\Disk0
Database: C:\Amnt\Disk0\Jetstress001001.edb

Instance1928.2 Log Path: C:\Amnt\Disk1
Database: C:\Amnt\Disk1\Jetstress002001.edb

Instance1928.3 Log Path: C:\Amnt\Disk2
Database: C:\Amnt\Disk2\Jetstress003001.edb

Instance1928.4 Log Path: C:\Amnt\Disk3
Database: C:\Amnt\Disk3\Jetstress004001.edb

Instance1928.5 Log Path: C:\Amnt\Disk4
Database: C:\Amnt\Disk4\Jetstress005001.edb

Instance1928.6 Log Path: C:\Amnt\Disk5
Database: C:\Amnt\Disk5\Jetstress006001.edb

Instance1928.7 Log Path: C:\Amnt\Disk6
Database: C:\Amnt\Disk6\Jetstress007001.edb

Instance1928.8 Log Path: C:\Amnt\Disk7
Database: C:\Amnt\Disk7\Jetstress008001.edb

Instance1928.9 Log Path: C:\Amnt\Disk8
Database: C:\Amnt\Disk8\Jetstress009001.edb

Instance1928.10 Log Path: C:\Amnt\Disk9
Database: C:\Amnt\Disk9\Jetstress010001.edb

Instance1928.11 Log Path: C:\Amnt\Disk10
Database: C:\Amnt\Disk10\Jetstress011001.edb

Instance1928.12 Log Path: C:\Amnt\Disk11
Database: C:\Amnt\Disk11\Jetstress012001.edb

Instance1928.13 Log Path: C:\Amnt\Disk12
Database: C:\Amnt\Disk12\Jetstress013001.edb

Instance1928.14 Log Path: C:\Amnt\Disk13

Database: C:\Amnt\Disk13\Jetstress014001.edb

Instance1928.15 Log Path: C:\Amnt\Disk14
Database: C:\Amnt\Disk14\Jetstress015001.edb

Instance1928.16 Log Path: C:\Amnt\Disk15
Database: C:\Amnt\Disk15\Jetstress016001.edb

Instance1928.17 Log Path: C:\Amnt\Disk16
Database: C:\Amnt\Disk16\Jetstress017001.edb

Instance1928.18 Log Path: C:\Amnt\Disk17
Database: C:\Amnt\Disk17\Jetstress018001.edb

Instance1928.19 Log Path: C:\Amnt\Disk18
Database: C:\Amnt\Disk18\Jetstress019001.edb

Instance1928.20 Log Path: C:\Amnt\Disk19
Database: C:\Amnt\Disk19\Jetstress020001.edb

Instance1928.21 Log Path: C:\Amnt\Disk20
Database: C:\Amnt\Disk20\Jetstress021001.edb

Instance1928.22 Log Path: C:\Amnt\Disk21
Database: C:\Amnt\Disk21\Jetstress022001.edb

Instance1928.23 Log Path: C:\Amnt\Disk22
Database: C:\Amnt\Disk22\Jetstress023001.edb

Instance1928.24 Log Path: C:\Amnt\Disk23
Database: C:\Amnt\Disk23\Jetstress024001.edb

Transactional I/O Performance

MSExchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance1928.1	16.232	3.032	25.792	16.045	37846.760	35371.584	0.000	3.000	0.000	13.430	0.000	4696.408
Instance1928.2	17.054	2.960	25.910	16.139	37796.573	35349.333	0.000	2.592	0.000	13.635	0.000	4664.594
Instance1928.3	12.381	2.937	25.722	16.009	38873.775	35362.887	0.000	2.148	0.000	13.579	0.000	4653.584
Instance1928.4	13.975	2.894	25.875	16.116	38554.426	35367.814	0.000	2.340	0.000	13.644	0.000	4689.455
Instance1928.5	13.713	2.875	25.673	15.971	38426.979	35355.401	0.000	2.296	0.000	13.495	0.000	4676.795

Instance1928.6	17.049	2.853	25.783	16.041	38978.488	35355.624	0.000	2.337	0.000	13.525	0.000	4691.603
Instance1928.7	13.672	2.813	25.729	16.033	38544.925	35327.411	0.000	2.231	0.000	13.528	0.000	4659.772
Instance1928.8	13.563	2.781	25.912	16.124	38655.627	35358.268	0.000	2.227	0.000	13.587	0.000	4656.256
Instance1928.9	13.637	2.742	25.815	16.073	38457.045	35359.354	0.000	2.343	0.000	13.606	0.000	4681.386
Instance1928.10	13.253	2.724	25.592	15.927	38625.531	35385.022	0.000	2.248	0.000	13.475	0.000	4659.509
Instance1928.11	15.044	2.685	25.677	15.970	38264.968	35344.093	0.000	2.460	0.000	13.493	0.000	4677.676
Instance1928.12	13.440	2.649	25.769	16.047	38617.918	35321.582	0.000	2.280	0.000	13.517	0.000	4656.861
Instance1928.13	13.825	2.619	25.689	15.985	38476.297	35336.002	0.000	2.315	0.000	13.472	0.000	4668.998
Instance1928.14	12.729	2.561	25.789	16.050	38777.961	35362.962	0.000	2.173	0.000	13.622	0.000	4673.623
Instance1928.15	14.108	2.525	25.766	16.032	38497.560	35372.273	0.000	2.284	0.000	13.535	0.000	4687.731
Instance1928.16	12.502	2.477	25.828	16.094	38928.302	35356.842	0.000	2.145	0.000	13.638	0.000	4687.532
Instance1928.17	14.022	2.432	25.780	16.048	38498.419	35378.144	0.000	2.299	0.000	13.559	0.000	4686.034
Instance1928.18	18.527	2.375	25.754	16.034	37621.743	35364.415	0.000	2.775	0.000	13.498	0.000	4682.690
Instance1928.19	13.418	2.297	25.896	16.116	38631.070	35354.636	0.000	2.239	0.000	13.582	0.000	4663.948
Instance1928.20	12.928	2.206	25.795	16.055	38631.062	35371.513	0.000	2.192	0.000	13.590	0.000	4684.058
Instance1928.21	13.920	2.129	25.669	15.953	38683.256	35358.844	0.000	2.258	0.000	13.459	0.000	4675.218
Instance1928.22	15.378	2.016	25.911	16.144	38173.147	35361.507	0.000	2.431	0.000	13.688	0.000	4675.287
Instance1928.23	13.793	1.940	25.733	16.015	38438.182	35389.731	0.000	2.295	0.000	13.544	0.000	4686.634
Instance1928.24	15.493	1.913	25.901	16.147	38076.854	35355.378	0.000	2.394	0.000	13.617	0.000	4671.347

Background Database Maintenance I/O Performance

MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance1928.1	29.985	261786.440
Instance1928.2	30.239	261776.316
Instance1928.3	30.844	261773.282
Instance1928.4	30.681	261773.405
Instance1928.5	30.550	261777.201
Instance1928.6	27.576	261842.421
Instance1928.7	30.594	261780.769
Instance1928.8	30.696	261780.544
Instance1928.9	30.653	261776.195
Instance1928.10	30.590	261782.909
Instance1928.11	30.396	261788.899
Instance1928.12	30.646	261793.685
Instance1928.13	30.515	261775.409
Instance1928.14	30.725	261784.465
Instance1928.15	30.545	261777.765
Instance1928.16	30.712	261787.626
Instance1928.17	30.448	261783.336
Instance1928.18	30.056	261784.299
Instance1928.19	30.527	261766.470
Instance1928.20	30.843	261799.693
Instance1928.21	30.331	261765.127
Instance1928.22	30.384	261786.449
Instance1928.23	30.452	261777.628

Instance1928.24	30.211	261809.283

Log Replication I/O Performance

MSExchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance1928.1	0.509	99931.021
Instance1928.2	0.512	100470.326
Instance1928.3	0.508	99813.619
Instance1928.4	0.515	100837.196
Instance1928.5	0.508	99298.055
Instance1928.6	0.509	99768.938
Instance1928.7	0.507	99736.085
Instance1928.8	0.509	100031.188
Instance1928.9	0.513	100269.823
Instance1928.10	0.506	99340.995
Instance1928.11	0.507	99510.126
Instance1928.12	0.505	98817.923
Instance1928.13	0.531	99119.512
Instance1928.14	0.512	100426.718
Instance1928.15	0.510	99658.444
Instance1928.16	0.514	100313.986
Instance1928.17	0.511	100126.055
Instance1928.18	0.509	99475.283
Instance1928.19	0.509	99955.058
Instance1928.20	0.511	100205.466
Instance1928.21	0.506	98846.896
Instance1928.22	0.515	100687.384
Instance1928.23	0.511	99900.876
Instance1928.24	0.511	100060.637

Total I/O Performance

MSExchange Database ==>	I/O DB Reads Average Latency (msec)	I/O DB Writes Average Latency (msec)	I/O DB Reads/ sec	I/O DB Writes/ sec	I/O DB Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Avg Latency (msec)	I/O Log Writes Avg Latency (msec)	I/O Log Reads /sec	I/O Log Writes /sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance1928.1	16.232	3.032	55.777	16.045	158233.179	35371.584	6.574	3.000	0.509	13.430	99931.021	4696.408
Instance1928.2	17.054	2.960	56.149	16.139	158419.889	35349.333	5.779	2.592	0.512	13.635	100470.326	4664.594
Instance1928.3	12.381	2.937	56.566	16.009	160415.368	35362.887	4.544	2.148	0.508	13.579	99813.619	4653.584
Instance1928.4	13.975	2.894	56.556	16.116	159648.145	35367.814	5.037	2.340	0.515	13.644	100837.196	4689.455

Instance1928.5	13.713	2.875	56.223	15.971	159790.101	35355.401	5.157	2.296	0.508	13.495	99298.055	4676.795
Instance1928.6	17.049	2.853	53.359	16.041	154154.278	35355.624	4.910	2.337	0.509	13.525	99768.938	4691.603
Instance1928.7	13.672	2.813	56.323	16.033	159802.526	35327.411	5.118	2.231	0.507	13.528	99736.085	4659.772
Instance1928.8	13.563	2.781	56.608	16.124	159646.723	35358.268	5.035	2.227	0.509	13.587	100031.188	4656.256
Instance1928.9	13.637	2.742	56.468	16.073	159683.910	35359.354	5.078	2.343	0.513	13.606	100269.823	4681.386
Instance1928.10	13.253	2.724	56.182	15.927	160131.179	35385.022	4.994	2.248	0.506	13.475	99340.995	4659.509
Instance1928.11	15.044	2.685	56.073	15.970	159431.641	35344.093	5.259	2.460	0.507	13.493	99510.126	4677.676
Instance1928.12	13.440	2.649	56.415	16.047	159853.298	35321.582	5.111	2.280	0.505	13.517	98817.923	4656.861
Instance1928.13	13.825	2.619	56.205	15.985	159713.046	35336.002	5.036	2.315	0.531	13.472	99119.512	4668.998
Instance1928.14	12.729	2.561	56.514	16.050	160019.492	35362.962	4.843	2.173	0.512	13.622	100426.718	4673.623
Instance1928.15	14.108	2.525	56.311	16.032	159612.169	35372.273	4.982	2.284	0.510	13.535	99658.444	4687.731
Instance1928.16	12.502	2.477	56.540	16.094	159982.921	35356.842	4.720	2.145	0.514	13.638	100313.986	4687.532
Instance1928.17	14.022	2.432	56.229	16.048	159410.003	35378.144	5.065	2.299	0.511	13.559	100126.055	4686.034
Instance1928.18	18.527	2.375	55.810	16.034	158342.776	35364.415	5.977	2.775	0.509	13.498	99475.283	4682.690
Instance1928.19	13.418	2.297	56.423	16.116	159355.875	35354.636	5.112	2.239	0.509	13.582	99955.058	4663.948
Instance1928.20	12.928	2.206	56.639	16.055	160161.020	35371.513	5.053	2.192	0.511	13.590	100205.466	4684.058
Instance1928.21	13.920	2.129	56.001	15.953	159509.678	35358.844	4.673	2.258	0.506	13.459	98846.896	4675.218
Instance1928.22	15.378	2.016	56.295	16.144	158863.079	35361.507	5.366	2.431	0.515	13.688	100687.384	4675.287
Instance1928.23	13.793	1.940	56.185	16.015	159486.002	35389.731	5.256	2.295	0.511	13.544	99900.876	4686.634
Instance1928.24	15.493	1.913	56.112	16.147	158535.297	35355.378	5.169	2.394	0.511	13.617	100060.637	4671.347

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.505	0.000	1.974
Available MBytes	8342.099	8165.000	9106.000
Free System Page Table Entries	33555593.966	33555581.000	33555594.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	81998387.147	81272832.000	82030592.000
Pool Paged Bytes	101471562.403	100085760.000	102604800.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log4/1/2010 4:59:41 PM -- Jetstress testing begins ...
4/1/2010 4:59:41 PM -- Prepare testing begins ...
4/1/2010 5:00:06 PM -- Attaching databases ...
4/1/2010 5:00:06 PM -- Prepare testing ends.
4/1/2010 5:00:06 PM -- Dispatching transactions begins ...
4/1/2010 5:00:06 PM -- Database cache settings: (minimum: 768.0 MB, maximum: 6.0 GB)
4/1/2010 5:00:06 PM -- Database flush thresholds: (start: 61.4 MB, stop: 122.9 MB)
4/1/2010 5:00:32 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 200 msec/read).
4/1/2010 5:00:32 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 200 msec/write).
4/1/2010 5:00:48 PM -- Operation mix: Sessions 4, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
4/1/2010 5:00:48 PM -- Performance logging begins (interval: 15000 ms).
4/1/2010 5:00:48 PM -- Attaining prerequisites:
4/1/2010 5:09:31 PM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last: 5804200000.0 (lower bound: 5798205000.0, upper bound: none)
4/2/2010 5:09:31 PM -- Performance logging ends.
4/2/2010 5:09:31 PM -- JetInterop batch transaction stats: 106398, 106433, 105893, 106664, 105940, 106055, 106068, 106506, 106221, 105611, 106160, 106126, 105668, 106112, 106122, 106201, 105949, 105973, 106176, 106327, 105816, 106838, 106019 and 106486.
4/2/2010 5:09:31 PM -- Dispatching transactions ends.

4/2/2010 5:09:31 PM -- Shutting down databases ...
4/2/2010 5:09:54 PM -- Instance1928.1 (complete), Instance1928.2 (complete), Instance1928.3 (complete), Instance1928.4 (complete), Instance1928.5 (complete), Instance1928.6 (complete), Instance1928.7 (complete), Instance1928.8 (complete), Instance1928.9 (complete), Instance1928.10 (complete), Instance1928.11 (complete), Instance1928.12 (complete), Instance1928.13 (complete), Instance1928.14 (complete), Instance1928.15 (complete), Instance1928.16 (complete), Instance1928.17 (complete), Instance1928.18 (complete), Instance1928.19 (complete), Instance1928.20 (complete), Instance1928.21 (complete), Instance1928.22 (complete), Instance1928.23 (complete) and Instance1928.24 (complete)
4/2/2010 5:09:55 PM -- Performance logging begins (interval: 30000 ms).
4/2/2010 5:09:55 PM -- Verifying database checksums ...
4/2/2010 8:56:43 PM -- C:\Amnt\Disk0 (100% processed), C:\Amnt\Disk1 (100% processed), C:\Amnt\Disk2 (100% processed), C:\Amnt\Disk3 (100% processed), C:\Amnt\Disk4 (100% processed), C:\Amnt\Disk5 (100% processed), C:\Amnt\Disk6 (100% processed), C:\Amnt\Disk7 (100% processed), C:\Amnt\Disk8 (100% processed), C:\Amnt\Disk9 (100% processed), C:\Amnt\Disk10 (100% processed), C:\Amnt\Disk11 (100% processed), C:\Amnt\Disk12 (100% processed), C:\Amnt\Disk13 (100% processed), C:\Amnt\Disk14 (100% processed), C:\Amnt\Disk15 (100% processed), C:\Amnt\Disk16 (100% processed), C:\Amnt\Disk17 (100% processed), C:\Amnt\Disk18 (100% processed), C:\Amnt\Disk19 (100% processed), C:\Amnt\Disk20 (100% processed), C:\Amnt\Disk21 (100% processed), C:\Amnt\Disk22 (100% processed) and C:\Amnt\Disk23 (100% processed)
4/2/2010 8:56:43 PM -- Performance logging ends.
4/2/2010 8:56:43 PM -- C:\Jetstress\Results\sapex_7200_10ios_4threads_24hrs\DBChecksum_2010_4_2_17_9_54.blg has 453 samples.
4/2/2010 8:56:53 PM -- C:\Jetstress\Results\sapex_7200_10ios_4threads_24hrs\DBChecksum_2010_4_2_17_9_54.html is saved.
4/2/2010 8:56:53 PM -- Verifying log checksums ...
4/2/2010 8:56:53 PM -- C:\Amnt\Disk0 (10 log(s) processed), C:\Amnt\Disk1 (12 log(s) processed), C:\Amnt\Disk2 (11 log(s) processed), C:\Amnt\Disk3 (12 log(s) processed), C:\Amnt\Disk4 (11 log(s) processed), C:\Amnt\Disk5 (12 log(s) processed), C:\Amnt\Disk6 (10 log(s) processed), C:\Amnt\Disk7 (10 log(s) processed), C:\Amnt\Disk8 (12 log(s) processed), C:\Amnt\Disk9 (9 log(s) processed), C:\Amnt\Disk10 (10 log(s) processed), C:\Amnt\Disk11 (11 log(s) processed), C:\Amnt\Disk12 (12 log(s) processed), C:\Amnt\Disk13 (10 log(s) processed), C:\Amnt\Disk14 (11 log(s) processed), C:\Amnt\Disk15 (11 log(s) processed), C:\Amnt\Disk16 (11 log(s) processed), C:\Amnt\Disk17 (10 log(s) processed), C:\Amnt\Disk18 (12 log(s) processed), C:\Amnt\Disk19 (12 log(s) processed), C:\Amnt\Disk20 (11 log(s) processed), C:\Amnt\Disk21 (11 log(s) processed), C:\Amnt\Disk22 (12 log(s) processed) and C:\Amnt\Disk23 (11 log(s) processed)
4/2/2010 8:56:53 PM -- C:\Jetstress\Results\sapex_7200_10ios_4threads_24hrs\Stress_2010_4_1_17_0_32.blg has 5780 samples.
4/2/2010 8:56:53 PM -- Creating test report ...
4/2/2010 8:58:47 PM -- Instance1928.1 has 16.2 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.1 has 3.0 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.1 has 3.0 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.2 has 17.1 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.2 has 2.6 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.2 has 2.6 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.3 has 12.4 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.3 has 2.1 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.3 has 2.1 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.4 has 14.0 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.4 has 2.3 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.4 has 2.3 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.5 has 13.7 for I/O Database Reads Average Latency.

4/2/2010 8:58:47 PM -- Instance1928.5 has 2.3 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.5 has 2.3 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.6 has 17.0 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.6 has 2.3 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.6 has 2.3 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.7 has 13.7 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.7 has 2.2 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.7 has 2.2 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.8 has 13.6 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.8 has 2.2 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.8 has 2.2 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.9 has 13.6 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.9 has 2.3 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.9 has 2.3 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.10 has 13.3 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.10 has 2.2 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.10 has 2.2 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.11 has 15.0 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.11 has 2.5 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.11 has 2.5 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.12 has 13.4 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.12 has 2.3 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.12 has 2.3 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.13 has 13.8 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.13 has 2.3 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.13 has 2.3 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.14 has 12.7 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.14 has 2.2 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.14 has 2.2 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.15 has 14.1 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.15 has 2.3 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.15 has 2.3 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.16 has 12.5 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.16 has 2.1 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.16 has 2.1 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.17 has 14.0 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.17 has 2.3 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.17 has 2.3 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.18 has 18.5 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.18 has 2.8 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.18 has 2.8 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.19 has 13.4 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.19 has 2.2 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.19 has 2.2 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.20 has 12.9 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.20 has 2.2 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.20 has 2.2 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.21 has 13.9 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.21 has 2.3 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.21 has 2.3 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.22 has 15.4 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.22 has 2.4 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.22 has 2.4 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.23 has 13.8 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.23 has 2.3 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.23 has 2.3 for I/O Log Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.24 has 15.5 for I/O Database Reads Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.24 has 2.4 for I/O Log Writes Average Latency.
4/2/2010 8:58:47 PM -- Instance1928.24 has 2.4 for I/O Log Reads Average Latency.

4/2/2010 8:58:47 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.
4/2/2010 8:58:47 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
4/2/2010 8:58:47 PM -- C:\Jetstress\Results\sapex_7200_10ios_4threads_24hrs\Stress_2010_4_1_17_0_32.xml has 5745 samples queried.

Appendix B: Performance Testing

Microsoft Exchange Server Jetstress Tool

Performance Test Result Report

Test Summary

Overall Test Result	**Pass**
Machine Name	R610E
Test Description	2TB dbmaint 4threads 512K Segment Size adaptive read ahead write back 64K cluster size .10 mailbox profile 7200 mail boxes non_daisy_chain 24 databases
Test Start Time	4/1/2010 10:54:29 AM
Test End Time	4/1/2010 1:04:26 PM
Collection Start Time	4/1/2010 11:04:04 AM
Collection End Time	4/1/2010 1:03:56 PM
Jetstress Version	14.01.0043.000
Ese Version	14.00.0639.019
Operating System	Windows Server 2008 R2 Enterprise (6.1.7600.0)
Performance Log	C:\Jetstress\Results\sapex_7200_10ios_4threads_2hrs\Performance_2010_4_1_10_55_20.blg C:\Jetstress\Results\sapex_7200_10ios_4threads_2hrs\DBChecksum_2010_4_1_13_4_26.blg

Database Sizing and Throughput

Achieved Transactional I/O per Second 1058.025

Target Transactional I/O per Second	720
Initial Database Size (bytes)	31043635118080
Final Database Size (bytes)	31046982172672
Database Files (Count)	24

Jetstress System Parameters

Thread Count	4 (per database)
Minimum Database Cache	768.0 MB
Maximum Database Cache	6144.0 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	3

Database Configuration

Instance3084.1 Log Path: C:\Amnt\Disk0
Database: C:\Amnt\Disk0\Jetstress001001.edb

Instance3084.2 Log Path: C:\Amnt\Disk1
Database: C:\Amnt\Disk1\Jetstress002001.edb

Instance3084.3 Log Path: C:\Amnt\Disk2
Database: C:\Amnt\Disk2\Jetstress003001.edb

Instance3084.4 Log Path: C:\Amnt\Disk3
Database: C:\Amnt\Disk3\Jetstress004001.edb

Instance3084.5 Log Path: C:\Amnt\Disk4
Database: C:\Amnt\Disk4\Jetstress005001.edb

Instance3084.6 Log Path: C:\Amnt\Disk5
Database: C:\Amnt\Disk5\Jetstress006001.edb

Instance3084.7 Log Path: C:\Amnt\Disk6
Database: C:\Amnt\Disk6\Jetstress007001.edb

Instance3084.8 Log Path: C:\Amnt\Disk7
Database: C:\Amnt\Disk7\Jetstress008001.edb

Instance3084.9 Log Path: C:\Amnt\Disk8
Database: C:\Amnt\Disk8\Jetstress009001.edb

Instance3084.10 Log Path: C:\Amnt\Disk9

Database: C:\Amnt\Disk9\Jetstress010001.edb

Instance3084.11 Log Path: C:\Amnt\Disk10
Database: C:\Amnt\Disk10\Jetstress011001.edb

Instance3084.12 Log Path: C:\Amnt\Disk11
Database: C:\Amnt\Disk11\Jetstress012001.edb

Instance3084.13 Log Path: C:\Amnt\Disk12
Database: C:\Amnt\Disk12\Jetstress013001.edb

Instance3084.14 Log Path: C:\Amnt\Disk13
Database: C:\Amnt\Disk13\Jetstress014001.edb

Instance3084.15 Log Path: C:\Amnt\Disk14
Database: C:\Amnt\Disk14\Jetstress015001.edb

Instance3084.16 Log Path: C:\Amnt\Disk15
Database: C:\Amnt\Disk15\Jetstress016001.edb

Instance3084.17 Log Path: C:\Amnt\Disk16
Database: C:\Amnt\Disk16\Jetstress017001.edb

Instance3084.18 Log Path: C:\Amnt\Disk17
Database: C:\Amnt\Disk17\Jetstress018001.edb

Instance3084.19 Log Path: C:\Amnt\Disk18
Database: C:\Amnt\Disk18\Jetstress019001.edb

Instance3084.20 Log Path: C:\Amnt\Disk19
Database: C:\Amnt\Disk19\Jetstress020001.edb

Instance3084.21 Log Path: C:\Amnt\Disk20
Database: C:\Amnt\Disk20\Jetstress021001.edb

Instance3084.22 Log Path: C:\Amnt\Disk21
Database: C:\Amnt\Disk21\Jetstress022001.edb

Instance3084.23 Log Path: C:\Amnt\Disk22
Database: C:\Amnt\Disk22\Jetstress023001.edb

Instance3084.24 Log Path: C:\Amnt\Disk23
Database: C:\Amnt\Disk23\Jetstress024001.edb

Transactional I/O Performance

MSExchange Database ==> Instances	I/O DB Reads Average Latency (msec)	I/O DB Writes Average Latency (msec)	I/O DB Reads /sec	I/O DB Writes /sec	I/O DB Reads Average Bytes	I/O DB Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads /sec	I/O Log Writes /sec	I/O Log Reads Avg Bytes	I/O Log Writes Avg Bytes
Instance3084.1	14.786	3.035	27.304	16.964	37799.752	35360.461	0.000	2.796	0.000	14.269	0.000	4748.184
Instance3084.2	16.858	2.961	27.128	16.815	37639.512	35439.712	0.000	2.543	0.000	14.339	0.000	4627.112
Instance3084.3	12.562	2.952	27.094	16.769	37556.874	35386.993	0.000	2.105	0.000	14.243	0.000	4718.348
Instance3084.4	13.740	2.844	27.131	16.869	38057.881	35487.608	0.000	2.322	0.000	14.426	0.000	4745.587
Instance3084.5	13.723	2.863	27.239	16.792	37924.683	35333.932	0.000	2.271	0.000	14.370	0.000	4674.321
Instance3084.6	16.440	2.871	27.453	16.912	38018.838	35360.685	0.000	2.249	0.000	14.465	0.000	4653.878
Instance3084.7	12.819	2.807	27.370	17.003	38297.885	35366.871	0.000	2.134	0.000	14.362	0.000	4615.905
Instance3084.8	13.199	2.735	27.023	16.768	38134.749	35487.052	0.000	2.163	0.000	14.265	0.000	4718.946
Instance3084.9	13.422	2.694	27.492	17.128	37923.279	35429.852	0.000	2.276	0.000	14.456	0.000	4687.312
Instance3084.10	13.052	2.750	27.426	16.991	37980.556	35351.750	0.000	2.158	0.000	14.381	0.000	4587.948
Instance3084.11	14.742	2.680	27.613	17.170	37734.314	35370.700	0.000	2.287	0.000	14.577	0.000	4575.647
Instance3084.12	13.084	2.632	27.292	16.966	38427.291	35414.632	0.000	2.151	0.000	14.407	0.000	4674.602
Instance3084.13	13.045	2.624	26.666	16.443	38230.488	35334.968	0.000	2.225	0.000	14.043	0.000	4670.346
Instance3084.14	12.494	2.571	26.923	16.580	38218.482	35536.886	0.000	2.086	0.000	14.075	0.000	4607.432
Instance3084.15	12.835	2.484	27.036	16.664	38483.861	35490.799	0.000	2.141	0.000	14.260	0.000	4720.899
Instance3084.16	12.258	2.467	27.084	16.713	38667.591	35503.903	0.000	2.072	0.000	14.102	0.000	4708.280
Instance3084.17	13.004	2.407	27.232	16.839	37968.325	35442.688	0.000	2.172	0.000	14.230	0.000	4643.121
Instance3084.18	17.072	2.345	27.073	16.741	36968.403	35500.369	0.000	2.634	0.000	14.342	0.000	4614.305
Instance3084.19	12.592	2.269	27.081	16.761	38802.926	35505.102	0.000	2.154	0.000	14.382	0.000	4595.563
Instance3084.20	12.787	2.171	27.574	17.102	37854.465	35515.289	0.000	2.062	0.000	14.545	0.000	4678.871
Instance3084.21	12.091	2.104	27.117	16.751	37546.747	35344.775	0.000	2.203	0.000	14.078	0.000	4580.448
Instance3084.22	14.959	1.967	27.478	16.980	38095.652	35468.566	0.000	2.319	0.000	14.475	0.000	4703.293
Instance3084.23	13.107	1.892	27.111	16.911	38302.302	35447.205	0.000	2.171	0.000	14.049	0.000	4700.264
Instance3084.24	13.038	1.875	27.561	16.892	38003.758	35430.731	0.000	2.255	0.000	14.331	0.000	4600.904

Background Database Maintenance I/O Performance

MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance3084.1	30.391	261812.180
Instance3084.2	30.003	261822.950
Instance3084.3	30.547	261880.691
Instance3084.4	30.459	261813.017
Instance3084.5	30.489	261893.721
Instance3084.6	27.952	261847.297
Instance3084.7	30.740	261853.412
Instance3084.8	30.678	261888.575
Instance3084.9	30.556	261864.931
Instance3084.10	30.681	261872.272
Instance3084.11	30.467	261888.134
Instance3084.12	30.627	261869.192
Instance3084.13	30.524	261843.048
Instance3084.14	30.729	261871.886
Instance3084.15	30.685	261841.403
Instance3084.16	30.795	261814.681

Instance3084.17	30.626	261830.966
Instance3084.18	30.229	261841.784
Instance3084.19	30.806	261874.070
Instance3084.20	30.726	261821.527
Instance3084.21	30.899	261838.104
Instance3084.22	30.430	261846.792
Instance3084.23	30.612	261896.759
Instance3084.24	30.731	261872.772

Log Replication I/O Performance

MSExchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance3084.1	0.543	107013.706
Instance3084.2	0.536	104422.114
Instance3084.3	0.541	105395.176
Instance3084.4	0.546	107097.384
Instance3084.5	0.538	105416.790
Instance3084.6	0.541	106133.987
Instance3084.7	0.533	104632.330
Instance3084.8	0.543	106441.063
Instance3084.9	0.546	108306.582
Instance3084.10	0.531	103144.554
Instance3084.11	0.536	104640.122
Instance3084.12	0.541	105664.296
Instance3084.13	0.523	102918.474
Instance3084.14	0.526	103214.824
Instance3084.15	0.543	106368.238
Instance3084.16	0.531	103673.760
Instance3084.17	0.538	105917.093
Instance3084.18	0.533	104808.707
Instance3084.19	0.536	104662.758
Instance3084.20	0.548	106854.769
Instance3084.21	0.523	102171.492
Instance3084.22	0.546	107356.359
Instance3084.23	0.531	103906.170
Instance3084.24	0.533	104369.918

Total I/O Performance

MSExchange Database ==> Instances	I/O DB Reads Avg Latency (msec)	I/O DB Writes Avg Latency (msec)	I/O DB Reads /sec	I/O DB Writes /sec	I/O DB Reads Avg Bytes	I/O DB Writes Avg Bytes	I/O Log Reads Avg Latency (msec)	I/O Log Writes Avg Latency (msec)	I/O Log Reads /sec	I/O Log Writes /sec	I/O Log Reads Avg Bytes	I/O Log Writes Avg Bytes
Instance3084.1	14.786	3.035	57.695	16.964	155799.468	35360.461	7.145	2.796	0.543	14.269	107013.706	4748.184
Instance3084.2	16.858	2.961	57.131	16.815	155372.464	35439.712	5.891	2.543	0.536	14.339	104422.114	4627.112
Instance3084.3	12.562	2.952	57.641	16.769	156437.507	35386.993	4.700	2.105	0.541	14.243	105395.176	4718.348
Instance3084.4	13.740	2.844	57.590	16.869	156401.018	35487.608	5.351	2.322	0.546	14.426	107097.384	4745.587
Instance3084.5	13.723	2.863	57.728	16.792	156214.848	35333.932	5.459	2.271	0.538	14.370	105416.790	4674.321
Instance3084.6	16.440	2.871	55.405	16.912	150942.153	35360.685	4.803	2.249	0.541	14.465	106133.987	4653.878
Instance3084.7	12.819	2.807	58.110	17.003	156558.464	35366.871	5.049	2.134	0.533	14.362	104632.330	4615.905
Instance3084.8	13.199	2.735	57.701	16.768	157100.125	35487.052	5.496	2.163	0.543	14.265	106441.063	4718.946
Instance3084.9	13.422	2.694	58.047	17.128	155804.810	35429.852	5.244	2.276	0.546	14.456	108306.582	4687.312
Instance3084.10	13.052	2.750	58.107	16.991	156198.214	35351.750	5.065	2.158	0.531	14.381	103144.554	4587.948
Instance3084.11	14.742	2.680	58.080	17.170	155318.713	35370.700	5.634	2.287	0.536	14.577	104640.122	4575.647
Instance3084.12	13.084	2.632	57.919	16.966	156580.174	35414.632	5.270	2.151	0.541	14.407	105664.296	4674.602
Instance3084.13	13.045	2.624	57.190	16.443	157580.704	35334.968	4.968	2.225	0.523	14.043	102918.474	4670.346
Instance3084.14	12.494	2.571	57.652	16.580	157426.447	35536.886	4.944	2.086	0.526	14.075	103214.824	4607.432
Instance3084.15	12.835	2.484	57.721	16.664	157221.529	35490.799	4.783	2.141	0.543	14.260	106368.238	4720.899
Instance3084.16	12.258	2.467	57.879	16.713	157394.229	35503.903	4.795	2.072	0.531	14.102	103673.760	4708.280
Instance3084.17	13.004	2.407	57.857	16.839	156465.627	35442.688	4.837	2.172	0.538	14.230	105917.093	4643.121
Instance3084.18	17.072	2.345	57.302	16.741	155596.805	35500.369	6.161	2.634	0.533	14.342	104808.707	4614.305
Instance3084.19	12.592	2.269	57.887	16.761	157515.424	35505.102	4.895	2.154	0.536	14.382	104662.758	4595.563
Instance3084.20	12.787	2.171	58.300	17.102	155891.789	35515.289	5.420	2.062	0.548	14.545	106854.769	4678.871
Instance3084.21	12.091	2.104	58.015	16.751	157002.951	35344.775	4.752	2.203	0.523	14.078	102171.492	4580.448
Instance3084.22	14.959	1.967	57.908	16.980	155674.611	35468.566	5.539	2.319	0.546	14.475	107356.359	4703.293
Instance3084.23	13.107	1.892	57.723	16.911	156878.889	35447.205	5.479	2.171	0.531	14.049	103906.170	4700.264
Instance3084.24	13.038	1.875	58.292	16.892	156024.733	35430.731	5.225	2.255	0.533	14.331	104369.918	4600.904

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.752	0.466	1.050
Available MBytes	8553.737	8535.000	9155.000
Free System Page Table Entries	33555595.620	33555588.000	33555596.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	72508366.831	72036352.000	72826880.000
Pool Paged Bytes	98893259.624	98877440.000	98926592.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

4/1/2010 10:54:29 AM -- Jetstress testing begins ...
4/1/2010 10:54:29 AM -- Prepare testing begins ...
4/1/2010 10:54:54 AM -- Attaching databases ...
4/1/2010 10:54:54 AM -- Prepare testing ends.
4/1/2010 10:54:54 AM -- Dispatching transactions begins ...
4/1/2010 10:54:54 AM -- Database cache settings: (minimum: 768.0 MB, maximum: 6.0 GB)
4/1/2010 10:54:54 AM -- Database flush thresholds: (start: 61.4 MB, stop: 122.9 MB)
4/1/2010 10:55:20 AM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
4/1/2010 10:55:20 AM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
4/1/2010 10:55:36 AM -- Operation mix: Sessions 4, Inserts 40%, Deletes 20%, Replaces 5%,

Reads 35%, Lazy Commits 70%.
4/1/2010 10:55:36 AM -- Performance logging begins (interval: 15000 ms).
4/1/2010 10:55:36 AM -- Attaining prerequisites:
4/1/2010 11:04:04 AM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last: 5804794000.0 (lower bound: 5798205000.0, upper bound: none)
4/1/2010 1:04:04 PM -- Performance logging ends.
4/1/2010 1:04:04 PM -- JetInterop batch transaction stats: 9965, 9885, 10034, 10098, 9912, 10037, 9898, 9936, 9941, 10050, 9898, 10096, 9867, 9848, 10022, 9986, 9958, 10052, 9985, 10125, 9915, 10122, 10078 and 9859.
4/1/2010 1:04:05 PM -- Dispatching transactions ends.
4/1/2010 1:04:05 PM -- Shutting down databases ...
4/1/2010 1:04:26 PM -- Instance3084.1 (complete), Instance3084.2 (complete), Instance3084.3 (complete), Instance3084.4 (complete), Instance3084.5 (complete), Instance3084.6 (complete), Instance3084.7 (complete), Instance3084.8 (complete), Instance3084.9 (complete), Instance3084.10 (complete), Instance3084.11 (complete), Instance3084.12 (complete), Instance3084.13 (complete), Instance3084.14 (complete), Instance3084.15 (complete), Instance3084.16 (complete), Instance3084.17 (complete), Instance3084.18 (complete), Instance3084.19 (complete), Instance3084.20 (complete), Instance3084.21 (complete), Instance3084.22 (complete), Instance3084.23 (complete) and Instance3084.24 (complete)
4/1/2010 1:04:27 PM -- Performance logging begins (interval: 30000 ms).
4/1/2010 1:04:27 PM -- Verifying database checksums ...
4/1/2010 4:53:58 PM -- C:\Amnt\Disk0 (100% processed), C:\Amnt\Disk1 (100% processed), C:\Amnt\Disk2 (100% processed), C:\Amnt\Disk3 (100% processed), C:\Amnt\Disk4 (100% processed), C:\Amnt\Disk5 (100% processed), C:\Amnt\Disk6 (100% processed), C:\Amnt\Disk7 (100% processed), C:\Amnt\Disk8 (100% processed), C:\Amnt\Disk9 (100% processed), C:\Amnt\Disk10 (100% processed), C:\Amnt\Disk11 (100% processed), C:\Amnt\Disk12 (100% processed), C:\Amnt\Disk13 (100% processed), C:\Amnt\Disk14 (100% processed), C:\Amnt\Disk15 (100% processed), C:\Amnt\Disk16 (100% processed), C:\Amnt\Disk17 (100% processed), C:\Amnt\Disk18 (100% processed), C:\Amnt\Disk19 (100% processed), C:\Amnt\Disk20 (100% processed), C:\Amnt\Disk21 (100% processed), C:\Amnt\Disk22 (100% processed) and C:\Amnt\Disk23 (100% processed)
4/1/2010 4:53:58 PM -- Performance logging ends.
4/1/2010 4:53:58 PM -- C:\Jetstress\Results\sapex_7200_10ios_4threads_2hrs\DBChecksum_2010_4_1_13_4_26.blg has 458 samples.
4/1/2010 4:54:08 PM -- C:\Jetstress\Results\sapex_7200_10ios_4threads_2hrs\DBChecksum_2010_4_1_13_4_26.html is saved.
4/1/2010 4:54:08 PM -- Verifying log checksums ...
4/1/2010 4:54:08 PM -- C:\Amnt\Disk0 (11 log(s) processed), C:\Amnt\Disk1 (10 log(s) processed), C:\Amnt\Disk2 (11 log(s) processed), C:\Amnt\Disk3 (11 log(s) processed), C:\Amnt\Disk4 (11 log(s) processed), C:\Amnt\Disk5 (12 log(s) processed), C:\Amnt\Disk6 (12 log(s) processed), C:\Amnt\Disk7 (11 log(s) processed), C:\Amnt\Disk8 (10 log(s) processed), C:\Amnt\Disk9 (12 log(s) processed), C:\Amnt\Disk10 (11 log(s) processed), C:\Amnt\Disk11 (10 log(s) processed), C:\Amnt\Disk12 (11 log(s) processed), C:\Amnt\Disk13 (12 log(s) processed), C:\Amnt\Disk14 (13 log(s) processed), C:\Amnt\Disk15 (12 log(s) processed), C:\Amnt\Disk16 (12 log(s) processed), C:\Amnt\Disk17 (11 log(s) processed), C:\Amnt\Disk18 (11 log(s) processed), C:\Amnt\Disk19 (11 log(s) processed), C:\Amnt\Disk20 (12 log(s) processed), C:\Amnt\Disk21 (11 log(s) processed), C:\Amnt\Disk22 (11 log(s) processed) and C:\Amnt\Disk23 (11 log(s) processed)
4/1/2010 4:54:08 PM -- C:\Jetstress\Results\sapex_7200_10ios_4threads_2hrs\Performance_2010_4_1_10_55_20.blg has 512 samples.
4/1/2010 4:54:08 PM -- Creating test report ...
4/1/2010 4:54:18 PM -- Instance3084.1 has 14.8 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.1 has 2.8 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.1 has 2.8 for I/O Log Reads Average Latency.

4/1/2010 4:54:18 PM -- Instance3084.2 has 16.9 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.2 has 2.5 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.2 has 2.5 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.3 has 12.6 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.3 has 2.1 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.3 has 2.1 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.4 has 13.7 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.4 has 2.3 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.4 has 2.3 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.5 has 13.7 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.5 has 2.3 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.5 has 2.3 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.6 has 16.4 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.6 has 2.2 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.6 has 2.2 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.7 has 12.8 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.7 has 2.1 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.7 has 2.1 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.8 has 13.2 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.8 has 2.2 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.8 has 2.2 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.9 has 13.4 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.9 has 2.3 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.9 has 2.3 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.10 has 13.1 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.10 has 2.2 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.10 has 2.2 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.11 has 14.7 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.11 has 2.3 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.11 has 2.3 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.12 has 13.1 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.12 has 2.2 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.12 has 2.2 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.13 has 13.0 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.13 has 2.2 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.13 has 2.2 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.14 has 12.5 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.14 has 2.1 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.14 has 2.1 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.15 has 12.8 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.15 has 2.1 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.15 has 2.1 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.16 has 12.3 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.16 has 2.1 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.16 has 2.1 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.17 has 13.0 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.17 has 2.2 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.17 has 2.2 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.18 has 17.1 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.18 has 2.6 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.18 has 2.6 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.19 has 12.6 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.19 has 2.2 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.19 has 2.2 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.20 has 12.8 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.20 has 2.1 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.20 has 2.1 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.21 has 12.1 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.21 has 2.2 for I/O Log Writes Average Latency.

4/1/2010 4:54:18 PM -- Instance3084.21 has 2.2 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.22 has 15.0 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.22 has 2.3 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.22 has 2.3 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.23 has 13.1 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.23 has 2.2 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.23 has 2.2 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.24 has 13.0 for I/O Database Reads Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.24 has 2.3 for I/O Log Writes Average Latency.
4/1/2010 4:54:18 PM -- Instance3084.24 has 2.3 for I/O Log Reads Average Latency.
4/1/2010 4:54:18 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.
4/1/2010 4:54:18 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
4/1/2010 4:54:18 PM -- C:\Jetstress\Results\sapex_7200_10ios_4threads_2hrs\Performance_2010_4_1_10_55_20.xml has 478 samples queried.

Appendix C Backup Testing

Microsoft Exchange Server Jetstress Tool

Database backup Test Result Report

Database Backup Statistics - All

Database Instance	Database Size (MBytes)	Elapsed Backup Time	MBytes Transferred/sec
Instance5068.1	1236530.59	02:59:19	114.93
Instance5068.2	1236562.59	02:55:37	117.35
Instance5068.3	1236570.59	02:52:24	119.54
Instance5068.4	1236562.59	02:45:51	124.26
Instance5068.5	1236546.59	02:56:19	116.88
Instance5068.6	1236562.59	02:47:50	122.79
Instance5068.7	1236538.59	02:50:23	120.95
Instance5068.8	1236570.59	02:50:24	120.94
Instance5068.9	1236570.59	02:48:00	122.67
Instance5068.10	1236546.59	02:49:56	121.28
Instance5068.11	1236562.59	02:55:35	117.37
Instance5068.12	1236562.59	02:49:47	121.38
Instance5068.13	1236530.59	03:05:07	111.32
Instance5068.14	1236570.59	02:58:15	115.62

Instance5068.15	1236538.59	03:02:24	112.98
Instance5068.16	1236578.59	02:54:55	117.82
Instance5068.17	1236546.59	03:01:10	113.75
Instance5068.18	1236562.59	02:55:23	117.50
Instance5068.19	1236538.59	03:02:03	113.20
Instance5068.20	1236586.59	03:00:01	114.48
Instance5068.21	1236538.59	02:35:54	132.19
Instance5068.22	1236530.59	02:43:57	125.70
Instance5068.23	1236466.59	02:53:44	118.61
Instance5068.24	1236490.59	02:57:18	116.22

Jetstress System Parameters

Thread Count	4 (per database)
Minimum Database Cache	768.0 MB
Maximum Database Cache	6144.0 MB
Insert Operations	40%
Delete Operations	20%
Replace Operations	5%
Read Operations	35%
Lazy Commits	70%

Database Configuration

Instance5068.1 Log Path: C:\Amnt\Disk0
Database: C:\Amnt\Disk0\Jetstress001001.edb

Instance5068.2 Log Path: C:\Amnt\Disk1
Database: C:\Amnt\Disk1\Jetstress002001.edb

Instance5068.3 Log Path: C:\Amnt\Disk2
Database: C:\Amnt\Disk2\Jetstress003001.edb

Instance5068.4 Log Path: C:\Amnt\Disk3
Database: C:\Amnt\Disk3\Jetstress004001.edb

Instance5068.5 Log Path: C:\Amnt\Disk4
Database: C:\Amnt\Disk4\Jetstress005001.edb

Instance5068.6 Log Path: C:\Amnt\Disk5
Database: C:\Amnt\Disk5\Jetstress006001.edb

Instance5068.7 Log Path: C:\Amnt\Disk6
Database: C:\Amnt\Disk6\Jetstress007001.edb

Instance5068.8 Log Path: C:\Amnt\Disk7
Database: C:\Amnt\Disk7\Jetstress008001.edb

Instance5068.9 Log Path: C:\Amnt\Disk8
Database: C:\Amnt\Disk8\Jetstress009001.edb

Instance5068.10 Log Path: C:\Amnt\Disk9
Database: C:\Amnt\Disk9\Jetstress010001.edb

Instance5068.11 Log Path: C:\Amnt\Disk10
Database: C:\Amnt\Disk10\Jetstress011001.edb

Instance5068.12 Log Path: C:\Amnt\Disk11
Database: C:\Amnt\Disk11\Jetstress012001.edb

Instance5068.13 Log Path: C:\Amnt\Disk12
Database: C:\Amnt\Disk12\Jetstress013001.edb

Instance5068.14 Log Path: C:\Amnt\Disk13
Database: C:\Amnt\Disk13\Jetstress014001.edb

Instance5068.15 Log Path: C:\Amnt\Disk14
Database: C:\Amnt\Disk14\Jetstress015001.edb

Instance5068.16 Log Path: C:\Amnt\Disk15
Database: C:\Amnt\Disk15\Jetstress016001.edb

Instance5068.17 Log Path: C:\Amnt\Disk16
Database: C:\Amnt\Disk16\Jetstress017001.edb

Instance5068.18 Log Path: C:\Amnt\Disk17
Database: C:\Amnt\Disk17\Jetstress018001.edb

Instance5068.19 Log Path: C:\Amnt\Disk18
Database: C:\Amnt\Disk18\Jetstress019001.edb

Instance5068.20 Log Path: C:\Amnt\Disk19
Database: C:\Amnt\Disk19\Jetstress020001.edb

Instance5068.21 Log Path: C:\Amnt\Disk20
Database: C:\Amnt\Disk20\Jetstress021001.edb

Instance5068.22 Log Path: C:\Amnt\Disk21
Database: C:\Amnt\Disk21\Jetstress022001.edb

Instance5068.23 Log Path: C:\Amnt\Disk22
Database: C:\Amnt\Disk22\Jetstress023001.edb

Instance5068.24 Log Path: C:\Amnt\Disk23
Database: C:\Amnt\Disk23\Jetstress024001.edb

Transactional I/O Performance

MSExchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance5068.1	3.296	0.000	459.508	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.2	3.208	0.000	469.485	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.3	3.162	0.000	478.215	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.4	3.049	0.000	497.121	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.5	3.219	0.000	467.575	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.6	3.080	0.000	491.226	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.7	3.120	0.000	483.860	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.8	3.112	0.000	483.820	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.9	3.079	0.000	490.762	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.10	3.119	0.000	485.176	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.11	3.196	0.000	469.618	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.12	3.102	0.000	485.574	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.13	3.404	0.000	445.333	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.14	3.272	0.000	462.466	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.15	3.361	0.000	451.909	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.16	3.214	0.000	471.304	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.17	3.339	0.000	455.042	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.18	3.306	0.000	470.019	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.19	3.363	0.000	452.801	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.20	3.323	0.000	457.928	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.21	3.474	0.000	529.085	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.22	3.404	0.000	502.940	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.23	3.195	0.000	474.431	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance5068.24	3.260	0.000	464.902	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	4.337	0.103	4.957
Available MBytes	14612.488	14556.000	14620.000
Free System Page Table Entries	33555594.033	33555594.000	33555596.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	81927770.190	81924096.000	81969152.000
Pool Paged Bytes	120780960.954	119431168.000	150216704.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

4/6/2010 4:53:42 PM -- Jetstress testing begins ...
4/6/2010 4:53:42 PM -- Prepare testing begins ...
4/6/2010 4:54:06 PM -- Attaching databases ...
4/6/2010 4:54:06 PM -- Prepare testing ends.
4/6/2010 4:54:39 PM -- Performance logging begins (interval: 30000 ms).
4/6/2010 4:54:39 PM -- Backing up databases ...
4/6/2010 7:59:47 PM -- Performance logging ends.
4/6/2010 7:59:47 PM -- Instance5068.1 (100% processed), Instance5068.2 (100% processed), Instance5068.3 (100% processed), Instance5068.4 (100% processed), Instance5068.5 (100% processed), Instance5068.6 (100% processed), Instance5068.7 (100%

processed), Instance5068.8 (100% processed), Instance5068.9 (100% processed), Instance5068.10 (100% processed), Instance5068.11 (100% processed), Instance5068.12 (100% processed), Instance5068.13 (100% processed), Instance5068.14 (100% processed), Instance5068.15 (100% processed), Instance5068.16 (100% processed), Instance5068.17 (100% processed), Instance5068.18 (100% processed), Instance5068.19 (100% processed), Instance5068.20 (100% processed), Instance5068.21 (100% processed), Instance5068.22 (100% processed), Instance5068.23 (100% processed) and Instance5068.24 (100% processed)
4/6/2010 7:59:47 PM -- C:\Jetstress\Results\sapex_7200_10ios_dbbackup\DatabaseBackup_2010_4_6_16_54_6.blg has 369 samples.
4/6/2010 7:59:47 PM -- Creating test report ...

Appendix D Soft Recovery Testing

Microsoft Exchange Server Jetstress Tool

SoftRecovery Test Result Report

Soft-Recovery Statistics - All

Database Instance	Log files replayed	Elapsed seconds
Instance4008.1	503	4763.0003658
Instance4008.2	509	4781.2991979
Instance4008.3	507	4682.3794242
Instance4008.4	512	4779.4427946
Instance4008.5	513	4738.6019229
Instance4008.6	502	4723.4854964
Instance4008.7	518	4793.7636198
Instance4008.8	510	4782.3599998
Instance4008.9	510	4774.4039858
Instance4008.10	509	4772.5475825
Instance4008.11	514	4765.9175709
Instance4008.12	518	4775.9951886
Instance4008.13	500	4732.5023122
Instance4008.14	504	4769.8955779
Instance4008.15	512	4765.9175709
Instance4008.16	507	4708.8994707

Instance4008.17	508	4774.4039858
Instance4008.18	504	4768.3043751
Instance4008.19	522	4781.8295988
Instance4008.20	515	4798.0068272
Instance4008.21	510	4779.1775942
Instance4008.22	514	4753.7183495
Instance4008.23	510	4771.2215802
Instance4008.24	502	4657.9809813

Database Configuration

Instance4008.1 Log Path: C:\Amnt\Disk0
Database: C:\Amnt\Disk0\Jetstress001001.edb

Instance4008.2 Log Path: C:\Amnt\Disk1
Database: C:\Amnt\Disk1\Jetstress002001.edb

Instance4008.3 Log Path: C:\Amnt\Disk2
Database: C:\Amnt\Disk2\Jetstress003001.edb

Instance4008.4 Log Path: C:\Amnt\Disk3
Database: C:\Amnt\Disk3\Jetstress004001.edb

Instance4008.5 Log Path: C:\Amnt\Disk4
Database: C:\Amnt\Disk4\Jetstress005001.edb

Instance4008.6 Log Path: C:\Amnt\Disk5
Database: C:\Amnt\Disk5\Jetstress006001.edb

Instance4008.7 Log Path: C:\Amnt\Disk6
Database: C:\Amnt\Disk6\Jetstress007001.edb

Instance4008.8 Log Path: C:\Amnt\Disk7
Database: C:\Amnt\Disk7\Jetstress008001.edb

Instance4008.9 Log Path: C:\Amnt\Disk8
Database: C:\Amnt\Disk8\Jetstress009001.edb

Instance4008.10 Log Path: C:\Amnt\Disk9
Database: C:\Amnt\Disk9\Jetstress010001.edb

Instance4008.11 Log Path: C:\Amnt\Disk10
Database: C:\Amnt\Disk10\Jetstress011001.edb

Instance4008.12 Log Path: C:\Amnt\Disk11
Database: C:\Amnt\Disk11\Jetstress012001.edb

Instance4008.13 Log Path: C:\Amnt\Disk12

Database: C:\Amnt\Disk12\Jetstress013001.edb

Instance4008.14 Log Path: C:\Amnt\Disk13
Database: C:\Amnt\Disk13\Jetstress014001.edb

Instance4008.15 Log Path: C:\Amnt\Disk14
Database: C:\Amnt\Disk14\Jetstress015001.edb

Instance4008.16 Log Path: C:\Amnt\Disk15
Database: C:\Amnt\Disk15\Jetstress016001.edb

Instance4008.17 Log Path: C:\Amnt\Disk16
Database: C:\Amnt\Disk16\Jetstress017001.edb

Instance4008.18 Log Path: C:\Amnt\Disk17
Database: C:\Amnt\Disk17\Jetstress018001.edb

Instance4008.19 Log Path: C:\Amnt\Disk18
Database: C:\Amnt\Disk18\Jetstress019001.edb

Instance4008.20 Log Path: C:\Amnt\Disk19
Database: C:\Amnt\Disk19\Jetstress020001.edb

Instance4008.21 Log Path: C:\Amnt\Disk20
Database: C:\Amnt\Disk20\Jetstress021001.edb

Instance4008.22 Log Path: C:\Amnt\Disk21
Database: C:\Amnt\Disk21\Jetstress022001.edb

Instance4008.23 Log Path: C:\Amnt\Disk22
Database: C:\Amnt\Disk22\Jetstress023001.edb

Instance4008.24 Log Path: C:\Amnt\Disk23
Database: C:\Amnt\Disk23\Jetstress024001.edb

Transactional I/O Performance

MSExchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads /sec	I/O Log Writes /sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance4008.1	746.671	64.021	59.435	0.633	58336.136	31549.241	34.942	0.137	0.951	0.003	109533.566	1.731
Instance4008.2	860.618	64.370	58.528	0.638	59611.555	31441.808	34.729	0.050	0.960	0.003	110162.358	0.863
Instance4008.3	681.780	65.939	60.078	0.649	62547.187	32063.615	35.620	0.086	0.975	0.003	113865.085	1.321
Instance4008.4	699.157	64.877	58.865	0.642	62641.440	31441.808	36.500	0.064	0.964	0.001	112356.400	0.863
Instance4008.5	715.569	65.070	59.067	0.649	62061.372	31877.111	37.098	0.349	0.975	0.003	111395.181	1.305
Instance4008.6	704.246	65.086	58.798	0.637	63442.936	31538.851	37.703	0.208	0.957	0.003	112638.176	1.309
Instance4008.7	702.811	65.173	59.326	0.647	62036.551	31527.832	35.753	0.000	0.970	0.000	111970.451	0.000
Instance4008.8	716.953	64.031	58.705	0.639	61117.516	31442.925	36.202	0.021	0.961	0.001	111373.020	0.431
Instance4008.9	741.405	63.183	59.424	0.641	59791.749	31634.255	35.989	0.049	0.962	0.003	111353.997	0.864

Instance4008.10	718.159	65.560	59.268	0.640	62053.327	31661.907	35.602	0.089	0.961	0.003	109982.766	1.296
Instance4008.11	753.941	67.050	59.027	0.647	60039.672	32075.523	37.075	0.052	0.972	0.003	113771.073	0.866
Instance4008.12	802.398	64.365	58.670	0.650	59085.917	31718.098	34.481	0.079	0.976	0.003	111937.201	1.295
Instance4008.13	742.189	64.497	58.192	0.634	60031.448	31847.707	36.219	0.146	0.951	0.003	110151.331	1.307
Instance4008.14	727.351	64.898	59.477	0.634	58914.145	31688.649	34.512	0.140	0.952	0.003	110059.219	1.297
Instance4008.15	750.687	64.609	59.674	0.644	61767.187	31576.940	36.701	0.082	0.968	0.003	113718.285	0.866
Instance4008.16	668.757	62.880	59.603	0.645	60248.586	31591.713	37.177	0.196	0.969	0.003	112231.028	1.313
Instance4008.17	723.417	64.339	59.115	0.638	61858.006	31800.169	34.299	0.148	0.959	0.003	110359.630	1.296
Instance4008.18	778.318	63.391	58.625	0.634	59400.307	31410.746	36.546	0.206	0.952	0.003	110072.030	1.298
Instance4008.19	740.486	66.531	59.793	0.655	60199.580	32050.251	34.927	0.027	0.983	0.003	111635.102	0.863
Instance4008.20	692.735	64.052	59.290	0.642	61306.267	31473.802	35.868	0.000	0.964	0.000	109575.135	0.000
Instance4008.21	719.695	67.647	58.576	0.640	59522.902	31607.582	35.025	0.044	0.962	0.003	110454.496	0.863
Instance4008.22	763.350	67.607	59.899	0.649	60889.258	31823.837	35.630	0.129	0.974	0.003	113552.371	0.868
Instance4008.23	734.209	65.195	58.786	0.641	62444.686	31800.169	34.984	0.104	0.962	0.003	113336.885	1.296
Instance4008.24	714.410	60.857	59.379	0.646	61149.447	31691.782	36.402	0.264	0.970	0.003	112605.565	1.328

Background Database Maintenance I/O Performance

MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance4008.1	6.299	261171.436
Instance4008.2	5.922	261973.783
Instance4008.3	6.437	260766.009
Instance4008.4	6.459	261919.024
Instance4008.5	6.325	261086.296
Instance4008.6	6.443	261238.309
Instance4008.7	6.407	261919.848
Instance4008.8	6.355	261943.052
Instance4008.9	6.378	261610.177
Instance4008.10	6.307	261753.073
Instance4008.11	6.240	261433.636
Instance4008.12	6.136	261336.465
Instance4008.13	6.293	261148.531
Instance4008.14	6.335	261417.982
Instance4008.15	6.231	261484.895
Instance4008.16	6.402	260669.858
Instance4008.17	6.360	261519.456
Instance4008.18	6.131	261667.272
Instance4008.19	6.331	261862.640
Instance4008.20	6.388	261891.474
Instance4008.21	6.494	261853.781
Instance4008.22	6.273	261444.814
Instance4008.23	6.350	261402.421
Instance4008.24	6.373	260598.761

Total I/O Performance

MSExchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O DB Reads /sec	I/O DB Writes /sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads /sec	I/O Log Writes /sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance4008.1	746.671	64.021	65.735	0.633	77773.716	31549.241	34.942	0.137	0.951	0.003	109533.566	1.731
Instance4008.2	860.618	64.370	64.449	0.638	78204.980	31441.808	34.729	0.050	0.960	0.003	110162.358	0.863
Instance4008.3	681.780	65.939	66.514	0.649	81728.666	32063.615	35.620	0.086	0.975	0.003	113865.085	1.321
Instance4008.4	699.157	64.877	65.324	0.642	82344.156	31441.808	36.500	0.064	0.964	0.001	112356.400	0.863
Instance4008.5	715.569	65.070	65.392	0.649	81313.157	31877.111	37.098	0.349	0.975	0.003	111395.181	1.305
Instance4008.6	704.246	65.086	65.241	0.637	82975.781	31538.851	37.703	0.208	0.957	0.003	112638.176	1.309
Instance4008.7	702.811	65.173	65.733	0.647	81520.581	31527.832	35.753	0.000	0.970	0.000	111970.451	0.000
Instance4008.8	716.953	64.031	65.060	0.639	80734.242	31442.925	36.202	0.021	0.961	0.001	111373.020	0.431
Instance4008.9	741.405	63.183	65.801	0.641	79352.269	31634.255	35.989	0.049	0.962	0.003	111353.997	0.864
Instance4008.10	718.159	65.560	65.575	0.640	81260.338	31661.907	35.602	0.089	0.961	0.003	109982.766	1.296
Instance4008.11	753.941	67.050	65.267	0.647	79294.638	32075.523	37.075	0.052	0.972	0.003	113771.073	0.866
Instance4008.12	802.398	64.365	64.806	0.650	78236.910	31718.098	34.481	0.079	0.976	0.003	111937.201	1.295
Instance4008.13	742.189	64.497	64.485	0.634	79658.452	31847.707	36.219	0.146	0.951	0.003	110151.331	1.307
Instance4008.14	727.351	64.898	65.812	0.634	78405.912	31688.649	34.512	0.140	0.952	0.003	110059.219	1.297
Instance4008.15	750.687	64.609	65.905	0.644	80650.044	31576.940	36.701	0.082	0.968	0.003	113718.285	0.866
Instance4008.16	668.757	62.880	66.005	0.645	79687.752	31591.713	37.177	0.196	0.969	0.003	112231.028	1.313
Instance4008.17	723.417	64.339	65.475	0.638	81253.379	31800.169	34.299	0.148	0.959	0.003	110359.630	1.296
Instance4008.18	778.318	63.391	64.755	0.634	78549.349	31410.746	36.546	0.206	0.952	0.003	110072.030	1.298
Instance4008.19	740.486	66.531	66.124	0.655	79507.331	32050.251	34.927	0.027	0.983	0.003	111635.102	0.863
Instance4008.20	692.735	64.052	65.678	0.642	80815.281	31473.802	35.868	0.000	0.964	0.000	109575.135	0.000
Instance4008.21	719.695	67.647	65.070	0.640	79714.640	31607.582	35.025	0.044	0.962	0.003	110454.496	0.863
Instance4008.22	763.350	67.607	66.172	0.649	79901.260	31823.837	35.630	0.129	0.974	0.003	113552.371	0.868
Instance4008.23	734.209	65.195	65.135	0.641	81840.145	31800.169	34.984	0.104	0.962	0.003	113336.885	1.296
Instance4008.24	714.410	60.857	65.751	0.646	80480.625	31691.782	36.402	0.264	0.970	0.003	112605.565	1.328

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.840	0.000	9.397
Available MBytes	8600.221	8420.000	14064.000
Free System Page Table Entries	33555593.463	33555587.000	33555596.000
Transition Pages RePurposed/sec	25.023	0.000	3479.309
Pool Nonpaged Bytes	100077316.944	82616320.000	100737024.000
Pool Paged Bytes	151251475.345	151171072.000	151392256.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

4/7/2010 10:57:16 AM -- Jetstress testing begins ...
4/7/2010 10:57:16 AM -- Prepare testing begins ...
4/7/2010 10:57:40 AM -- Attaching databases ...
4/7/2010 10:57:40 AM -- Prepare testing ends.
4/7/2010 10:57:40 AM -- Dispatching transactions begins ...
4/7/2010 10:57:41 AM -- Database cache settings: (minimum: 768.0 MB, maximum: 6.0 GB)
4/7/2010 10:57:41 AM -- Database flush thresholds: (start: 61.4 MB, stop: 122.9 MB)
4/7/2010 10:58:06 AM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
4/7/2010 10:58:06 AM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).

4/7/2010 10:58:15 AM -- Operation mix: Sessions 4, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
4/7/2010 10:58:15 AM -- Performance logging begins (interval: 15000 ms).
4/7/2010 10:58:15 AM -- Generating log files ...
4/7/2010 3:17:59 PM -- C:\Amnt\Disk0 (100.8% generated), C:\Amnt\Disk1 (101.8% generated), C:\Amnt\Disk2 (101.6% generated), C:\Amnt\Disk3 (102.6% generated), C:\Amnt\Disk4 (102.8% generated), C:\Amnt\Disk5 (100.6% generated), C:\Amnt\Disk6 (103.8% generated), C:\Amnt\Disk7 (102.0% generated), C:\Amnt\Disk8 (102.2% generated), C:\Amnt\Disk9 (102.0% generated), C:\Amnt\Disk10 (103.0% generated), C:\Amnt\Disk11 (103.8% generated), C:\Amnt\Disk12 (100.2% generated), C:\Amnt\Disk13 (101.0% generated), C:\Amnt\Disk14 (102.6% generated), C:\Amnt\Disk15 (101.6% generated), C:\Amnt\Disk16 (101.8% generated), C:\Amnt\Disk17 (101.0% generated), C:\Amnt\Disk18 (104.6% generated), C:\Amnt\Disk19 (103.2% generated), C:\Amnt\Disk20 (102.0% generated), C:\Amnt\Disk21 (103.0% generated), C:\Amnt\Disk22 (102.2% generated) and C:\Amnt\Disk23 (100.6% generated)
4/7/2010 3:18:00 PM -- Performance logging ends.
4/7/2010 3:18:00 PM -- JetInterop batch transaction stats: 22197, 22075, 21991, 22080, 22247, 22014, 22295, 22024, 22094, 22241, 22110, 22030, 21794, 22217, 22070, 22089, 22230, 21998, 22353, 22154, 22081, 22188, 22082 and 21963.
4/7/2010 3:18:00 PM -- Dispatching transactions ends.
4/7/2010 3:18:00 PM -- Shutting down databases ...
4/7/2010 3:18:26 PM -- Instance4008.1 (complete), Instance4008.2 (complete), Instance4008.3 (complete), Instance4008.4 (complete), Instance4008.5 (complete), Instance4008.6 (complete), Instance4008.7 (complete), Instance4008.8 (complete), Instance4008.9 (complete), Instance4008.10 (complete), Instance4008.11 (complete), Instance4008.12 (complete), Instance4008.13 (complete), Instance4008.14 (complete), Instance4008.15 (complete), Instance4008.16 (complete), Instance4008.17 (complete), Instance4008.18 (complete), Instance4008.19 (complete), Instance4008.20 (complete), Instance4008.21 (complete), Instance4008.22 (complete), Instance4008.23 (complete) and Instance4008.24 (complete)
4/7/2010 3:18:26 PM -- C:\Jetstress\Results\sapex_7200_10ios_softrecovery\Performance_2010_4_7_10_58_6.blg has 1037 samples.
4/7/2010 3:18:26 PM -- Creating test report ...
4/7/2010 3:18:35 PM -- Instance4008.1 has 23.8 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.1 has 2.7 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.1 has 2.7 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.2 has 26.8 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.2 has 2.5 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.2 has 2.5 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.3 has 20.2 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.3 has 2.2 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.3 has 2.2 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.4 has 22.6 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.4 has 2.4 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.4 has 2.4 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.5 has 21.8 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.5 has 2.3 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.5 has 2.3 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.6 has 22.3 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.6 has 2.5 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.6 has 2.5 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.7 has 21.1 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.7 has 2.2 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.7 has 2.2 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.8 has 22.1 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.8 has 2.3 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.8 has 2.3 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.9 has 21.7 for I/O Database Reads Average Latency.

4/7/2010 3:18:35 PM -- Instance4008.9 has 2.4 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.9 has 2.4 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.10 has 21.4 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.10 has 2.2 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.10 has 2.2 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.11 has 23.6 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.11 has 2.4 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.11 has 2.4 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.12 has 21.3 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.12 has 2.3 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.12 has 2.3 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.13 has 21.4 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.13 has 2.4 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.13 has 2.4 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.14 has 21.0 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.14 has 2.3 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.14 has 2.3 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.15 has 21.3 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.15 has 2.3 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.15 has 2.3 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.16 has 19.6 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.16 has 2.3 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.16 has 2.3 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.17 has 21.6 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.17 has 2.5 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.17 has 2.5 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.18 has 28.0 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.18 has 3.0 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.18 has 3.0 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.19 has 21.0 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.19 has 2.4 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.19 has 2.4 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.20 has 21.0 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.20 has 2.5 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.20 has 2.5 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.21 has 19.8 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.21 has 2.5 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.21 has 2.5 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.22 has 24.4 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.22 has 2.7 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.22 has 2.7 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.23 has 21.4 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.23 has 2.5 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.23 has 2.5 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.24 has 21.3 for I/O Database Reads Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.24 has 2.7 for I/O Log Writes Average Latency.
4/7/2010 3:18:35 PM -- Instance4008.24 has 2.7 for I/O Log Reads Average Latency.
4/7/2010 3:18:35 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.
4/7/2010 3:18:35 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
4/7/2010 3:18:35 PM -- C:\Jetstress\Results\sapex_7200_10ios_softrecovery\Performance_2010_4_7_10_58_6.xml has 1036 samples queried.
4/7/2010 3:18:35 PM -- C:\Jetstress\Results\sapex_7200_10ios_softrecovery\Performance_2010_4_7_10_58_6.html is saved.
4/7/2010 3:18:48 PM -- Performance logging begins (interval: 4000 ms).
4/7/2010 3:18:48 PM -- Recovering databases ...
4/7/2010 4:38:46 PM -- Performance logging ends.
4/7/2010 4:38:46 PM -- Instance4008.1 (4763.0003658), Instance4008.2 (4781.2991979),

Instance4008.3 (4682.3794242), Instance4008.4 (4779.4427946), Instance4008.5 (4738.6019229), Instance4008.6 (4723.4854964), Instance4008.7 (4793.7636198), Instance4008.8 (4782.3599998), Instance4008.9 (4774.4039858), Instance4008.10 (4772.5475825), Instance4008.11 (4765.9175709), Instance4008.12 (4775.9951886), Instance4008.13 (4732.5023122), Instance4008.14 (4769.8955779), Instance4008.15 (4765.9175709), Instance4008.16 (4708.8994707), Instance4008.17 (4774.4039858), Instance4008.18 (4768.3043751), Instance4008.19 (4781.8295988), Instance4008.20 (4798.0068272), Instance4008.21 (4779.1775942), Instance4008.22 (4753.7183495), Instance4008.23 (4771.2215802) and Instance4008.24 (4657.9809813)
4/7/2010 4:38:47 PM -- C:\Jetstress\Results\sapex_7200_10ios_softrecovery\SoftRecovery_2010_4_7_15_18_35.blg has 1191 samples.
4/7/2010 4:38:47 PM -- Creating test report ...