

ESRP Storage Program
EMC CLARiiON CX3-20c (1,300 User) iSCSI with LCR
Storage Solution for Microsoft Exchange Server 2007

Tested with: ESRP – Storage Version 2.0
Tested Date: 12/06/07

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Overview

This document provides information on EMC's CLARiiON® CX3-20c (1,300 user) iSCSI with Local Continuous Replication (LCR) Storage Solution for Microsoft Exchange Server 2007, which is based on the *Microsoft Exchange Solution Reviewed Program (ESRP) – Storage program**. For any questions or comments regarding the contents of this document, see the Contact information section.

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

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Features

This document describes an approach that can be used to configure Exchange solutions for LCR around EMC's CLARiiON CX3-20c storage systems. Built on the innovative EMC® CLARiiON CX3 UltraScale™ architecture, the EMC CX3-20c offers exceptional performance, ease of use, and unmatched reliability. It meets the storage needs of a wide range of applications including:

- Mail / Messaging
- Databases
- File, print, and Web services
- Distributed applications
- Remote replication

In addition, the CX3-20c supports a wide range of server operating environments such as: Microsoft Windows, Linux, Solaris, AIX, HP-UX, and VMware ESX Server.

EMC's CLARiiON CX3-20c Fibre Channel (FC) / iSCSI array offers 4 GB/s FC and 1 GB/s iSCSI ports that are fully integrated in the same array, enabling customers to leverage their networked storage investments over a broader range of servers and applications with complete flexibility without additional hardware. A total of eight iSCSI ports (four per SP) and four FC ports (two per SP) are available on each CX3-20c array.

The CLARiiON CX3-20c FC / iSCSI array provides customers with an advantage, irrespective of whether they have iSCSI or FC deployed. For customers who are implementing networked storage for the first time and are considering iSCSI, the CLARiiON CX3-20c FC / iSCSI array provides scalable iSCSI storage as well as the flexibility and investment protection of integrated FC support.

For customers with existing FC deployments, the CX3-20c FC / iSCSI array offers the opportunity to expand the reach of their networked storage environment economically with iSCSI, while maintaining complete flexibility with how the incremental capacity is shared across server platforms and interconnects.

With the CX3-20c FC / iSCSI array, customers can choose drive options that meet their specific needs, thereby providing multiple levels of performance in one system. The CX3-20c supports both high-performance and high-capacity disk drives in the same system; it can scale from 365 GB to 59 TB, and can support 128 high-availability hosts.

It supports 4 GB/s (15k rpm) FC drives for demanding applications that require maximum performance. Customers can also choose from 2 GB/s FC (10k rpm) for applications that require balanced performance and costs. Alternatively, customers have the option to choose low-cost 2 GB/s FC drives (7.2k rpm) for Tier 2 applications that require high-capacity and low cost, such as disk-based backup.

The CX3-20c delivers tiered storage that allows customers to provide the right level of performance to the right applications. The system also delivers an exceptional 4 GB/s of performance throughout the entire system without compromises or bottlenecks. Performance-boosting features include four front-end and two back-end 4 GB/s ports, plus state-of-the art low latency, high bandwidth I/O interconnect technologies.

The performance results and best practices discussed in this document provide tested guidelines for configuring the CX3-20c for a high-performance Exchange environment. For this solution, an EMC CLARiiON CX3-20c Storage Solution for Microsoft Exchange Server was used and configured for 1,300 Exchange 2007 users with LCR enabled for all storage groups within the solution.

The server was connected to the CX3-20c through dedicated NICs (used for iSCSI) with the Microsoft iSCSI Software Initiator 2.0.5, and an iSCSI VLAN. Each of the 1,300 users had a profile of .42 IOPS with a 290 MB mailbox requirement.

Solution description

The solution described is for one CX3-20c array with a single disk-array enclosure (DAE) using four drives for storage group database files, four drives for storage group log files (both in a 2+2 RAID 10 configuration), and five drives for streaming backup in a RAID 5 configuration. One hot spare drive is for active database storage. An additional eight disks are used for LCR of the storage group databases and logs, with each in a 2+2 RAID 10 configuration.

The active and passive database drives are placed on drives 0_10-0_13 on the first and second DAE. Log files for the active and passive drives are placed on the first four drives 0_0-0_3, with each in a RAID 10 configuration. Streaming backup drives are placed on the 0_5-0_9 in a RAID 5 configuration, and drive 0_14 is configured as a dedicated hot spare.

Sizing and configuring storage for use with Microsoft Exchange Server is a complicated process, driven by many variables and factors that vary from one organization to another.

The sizing method described in this ESRP submission is known as the “building block,” which is used to simplify sizing and configuration when using a low number of disks to ensure the highest performance while remaining fault tolerant.

This unit of measure (or building block) is designed to be scalable - based on customer I/O and latency requirements. The building blocks are designed around the Exchange database drives in four-drive increments using RAID 1_0. The Exchange log files are placed onto a four-drive RAID 1_0 configuration that is capable of holding multiple building blocks of storage group log files.

The building block is also designed to expand into larger building block deployments. These deployments are detailed in EMC ESRP submission documents (for over 4,000 users) on EMC.com.

Figure 1 illustrates the building block layout for this ESRP submission

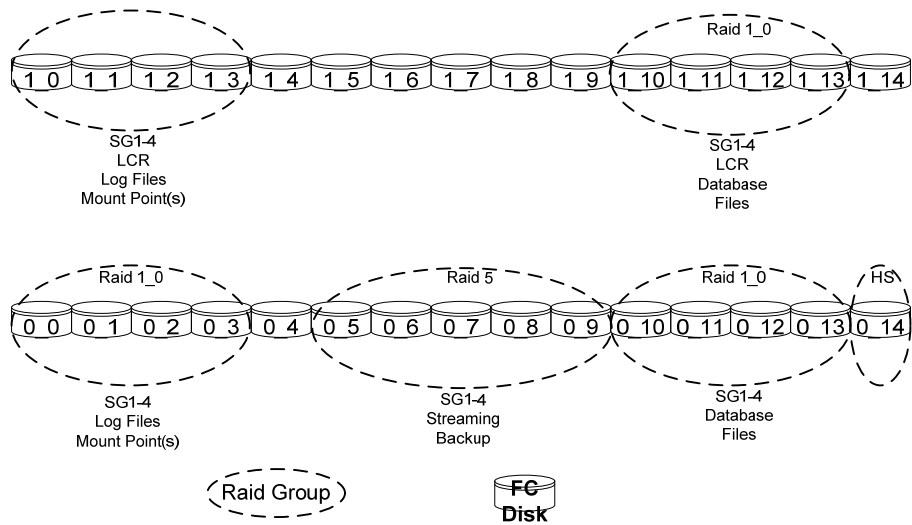


Figure 1 Building block layout

Figure 2 illustrates the physical architecture for the ESRP submission.

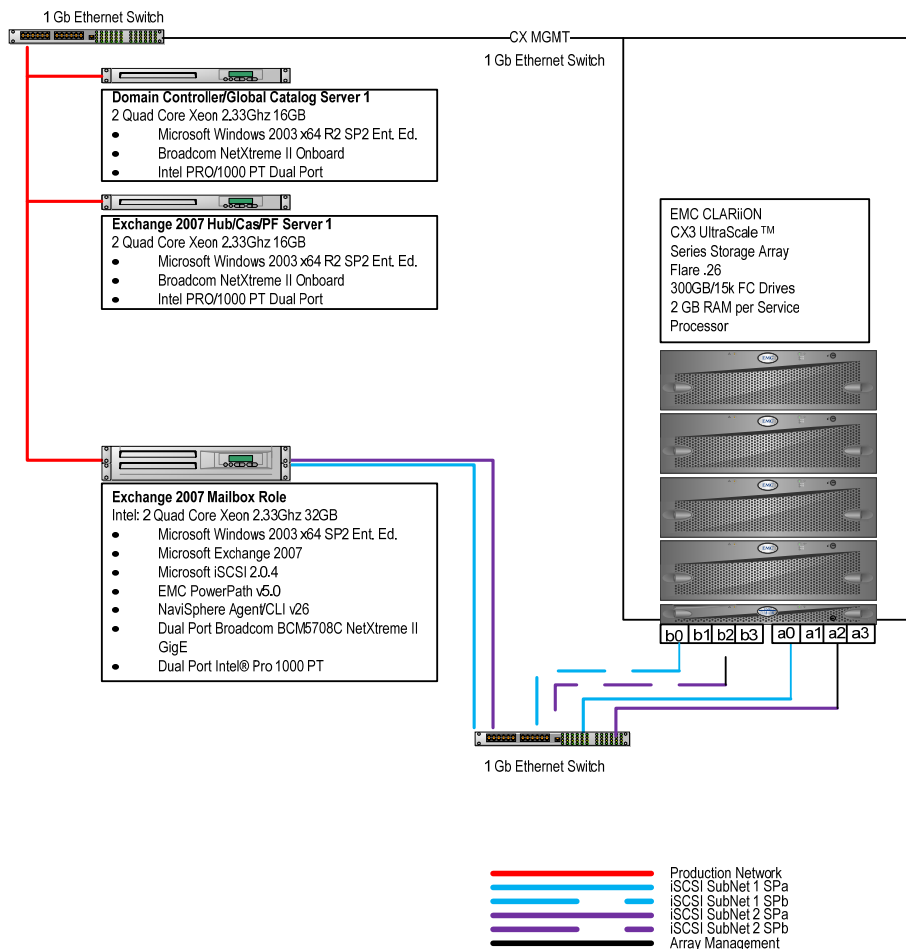


Figure 2 Physical architecture

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 scaling for an Exchange solution. Other factors that affect 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 of ESRP-Storage. Therefore, the number of mailboxes hosted per server as part of the tested configuration may not necessarily be viable for some customer deployments.

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 and medium-sized businesses hosting 1,300 Exchange mailboxes. The configuration used for testing is as below:

- Number of mailbox servers presented to the storage array = 1
- User I/O profile for testing = 0.42
- User mailbox size for testing = 290 MB
- Backup strategy for testing = streaming backup to disk
- Time for restore = less than 3 hours per SG and 100 GB database per SG tested
- Requirements for Local Continuous Replication (LCR)

Tested deployment

The following tables summarize the testing environment.

Simulated Exchange configuration

Item	Description
Number of Exchange mailboxes simulated	1,300
Number of hosts	1
Number of mailboxes/host	1,300
Number of storage groups/host	4
Number of mailbox stores/storage group	1
Number of mailboxes/mailbox store	325
Number of mailbox store LUNs/storage group	1
Simulated profile: I/Os per second per mailbox (IOPS, include 20% headroom)	0.5
Database LUN size	120 GB
Log LUN size	12 GB
Backup LUN size/storage group	Not applicable
Total database size for performance testing	100 GB
% Storage capacity used by Exchange database**	80%

**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

Item	Description
Storage connectivity (Fibre Channel, SAS, SATA, iSCSI)	iSCSI
Storage model and OS/firmware revision	CX3-20c FLARE® 26
Storage cache	2 GB/SP
Number of storage controllers	2
Number of storage ports	4 tested – 8 possible
Maximum bandwidth of storage connectivity to host	4*1 Gb/SP
Switch type/model/firmware revision	Dell 5324 Version 2.0.0.39
HBA model and firmware	Intel PRO/1000 PT Dual Port Server Adapter
Number of HBAs/host	2
Host server type	Dell PowerEdge 2950 4: Dual Core [01]: EM64T Family 6 Model 15 Stepping 7 GenuineIntel ~2328 Mhz [02]: EM64T Family 6 Model 15 Stepping 7 GenuineIntel ~2328 Mhz [03]: EM64T Family 6 Model 15 Stepping 7 GenuineIntel ~2328 Mhz [04]: EM64T Family 6 Model 15 Stepping 7 GenuineIntel ~2328 Mhz [05]: EM64T Family 6 Model 15 Stepping 7 GenuineIntel ~2328 Mhz [06]: EM64T Family 6 Model 15 Stepping 7 GenuineIntel ~2328 Mhz [07]: EM64T Family 6 Model 15 Stepping 7 GenuineIntel ~2328 Mhz [08]: EM64T Family 6 Model 15 Stepping 7 GenuineIntel ~2328 Mhz
Total number of disks tested in solution	14 with hotspare
Maximum number of spindles that can be hosted in the storage	15

Primary storage software

Item	Description
HBA driver	c:\windows\system32\drivers\le5132.sys 9.9.13.0 built by : winDDK 6/19/2007 10:47am 348,568
HBA QueueTarget Setting	Not applicable
HBA QueueDepth Setting	Not applicable
Multi-Pathing	Microsoft iSCSI Initiator 2.0 Build 3392 EMC powermt for PowerPath® 5.0.0 (build 94)
Host OS	Microsoft Windows Server 2003 Enterprise x64 Edition OS Version: 5.2.3790 Service Pack 2
ESE.dll file version	08.00.0685.024
Replication solution name/version	Not applicable

Primary storage disk configuration (mailbox store disks)

Item	Description
Disk type, speed and firmware revision	FC SCSI: 4 GB/s: 15,000 rpm, 630A
Raw capacity per disk (GB)	268.403 GB
Number of physical disks in test	4
Total raw storage capacity (GB)	1073.612 GB
Disk slice size (GB)	Not applicable
Number of slices per LUN or number of disks per LUN	Not applicable
Number of LUNs per RAID group	4
LUN size in GB	120
RAID level	RAID 1_0
Total formatted capacity	480 GB
Storage capacity utilization	44%
Database capacity utilization	80%

Primary storage disk configuration (transactional log disks)

Item	Description
Disk type, speed and firmware revision	FC SCSI: 4 GB/s, 15,000 rpm, 630A
Raw capacity per disk (GB)	268.403 GB
Number of spindles in test	4
Total raw storage capacity (GB)	1073.612 GB
Disk slice size (GB)	Not applicable
Number of slices per LUN or number of disks per LUN	Not applicable
Number of LUNs per RAID group	4
LUN size in GB	12
RAID level	RAID 1_0
Total formatted capacity	48 GB

Streaming backup

Disk configuration (streaming backup to disk)

Item	Description
Disk type, speed and firmware revision	FC SCSI: 4 GB/s, 15,000 rpm, 630A
Raw capacity per disk (GB)	268.403 GB
Number of spindles in test	5
Total raw storage capacity (GB)	1342.015 GB
Disk slice size (GB)	Not applicable
Number of slices per LUN or number of disks per LUN	Not applicable
Number of LUNs per RAID group	1
RAID level	RAID 5
Total formatted capacity	1073.612 GB

Best practices

Microsoft Exchange server is a disk-intensive application. Based on the testing that is run using the ESRP framework, EMC recommends Exchange 2007 best practices to improve storage performance.

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

Core storage/replication

1. Use diskpart (in Microsoft Windows 2003 SP2 x64) to align all disks used with Microsoft Exchange, using a value of 64 for CLARiiON. This aligns all of the Exchange-related NTFS partitions on a 64 KB boundary.
2. Isolate the Microsoft Exchange database workload from other I/O intensive applications or workloads. This ensures the highest levels of performance for Microsoft Exchange and makes troubleshooting efforts easier in the event of a disk-related Microsoft Exchange performance issue.
3. TcpAckFrequency = 1 for each iSCSI connection. Refer to:
<http://support.microsoft.com/kb/328890>.
4. Size and configure the environment for spindle performance as a primary consideration, with storage capacity as secondary.
5. iSCSI configuration with PowerPath 5.0 uses a balanced path approach. Log in with NIC0 to A0(SPa) and B0(SPb), NIC1 to A2(SPa) and B2(SPb).
6. Tuning the CX3-20c storage system parameters is important for obtaining best performance. The following list details the optimal parameters for Exchange:
 - Cache page size of 8 KB
 - Balance read and write caching
 - Read and write cache enabled for all LUNs
 - Read cache minimum of 50 - 100 MB for prefetch

See the following Microsoft documentation for storage-based replication best practices and support criteria:

Deployment Guidelines for Data Replication:

<http://www.microsoft.com/technet/prodtechnol/exchange/guides/E2k3DataRepl/bedf62a9-dff7-49a8-bd27-b2f1c46d5651.mspx>

Multi-site data replication support for Exchange:

<http://support.microsoft.com/?kbid=895847>

Backup strategy

This solution used RAID 5 for the backup-to-disk LUNs (to maximize space), and then used EMC NetWorker[®] or NTBackup for backup to CDL or tape for long-term storage of databases.

Test result summary

This section provides a high-level summary of the test data from ESRP. The [Microsoft Exchange Server Jetstress 2-hour performance test results](#), [Microsoft Exchange Server Jetstress 24-hour performance test results](#), [Microsoft Exchange Server Jetstress soft recovery test results](#), and the [Microsoft Exchange Server Jetstress streaming backup test results](#) contain detailed HTML reports that are generated by the ESRP testing framework.

Reliability

A number of tests in the framework are to check the 24-hour reliability tests. The goal is to verify that the storage can handle high I/O load for a long period of time. Both the log and database files are analyzed for integrity after the stress test to ensure there was no database or log corruption.

- No errors reported in the saved eventlog file
- No errors reported during the database and log
- Event ID: 215 as expected at the end of the Jetstress run for streaming backup
- No errors during database checksum on the remote storage database

Primary storage performance results

The primary storage performance testing is designed to exercise the storage with the maximum sustainable Exchange type of I/O for 2 hours. The test is to show how long it takes for the storage to respond to an I/O under load. The data below is the sum of all logical disk I/Os, and the average of all the logical disk I/O latency in the 2-hour test duration. Each server is listed separately and the aggregate numbers across all servers is also listed.

Individual server metrics

The following table details the sum of I/O across storage groups and the average latency across all storage groups on a per server basis.

Database I/O	
Average database disk transfers/sec	656.452
Average database disk reads/sec	332.893
Average database disk writes/sec	323.559
Average database disk read latency (ms)	0.01475
Average database disk write latency (ms)	0.005
Transaction log I/O	
Average log disk writes/sec	203.007
Average log disk write latency (ms)	0.002

Streaming backup performance

For the 1.0 release, only streaming backup is supported for framework testing. There are two tests in this section: the first test is to measure the read I/O performance metrics by running checksum on all the databases and log files, the second test is to measure the end-to-end performance when the databases are backed up to disks.

Database read-only performance

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

Item	Description
MB read/sec per storage group	10.61
MB read/sec total	42.44
File size/sec taken	393203.08/37065

Log read-only performance

This test is to measure the maximum rate that 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.

Item	Description
Average time to play one log file (sec)	0.589855161

Backup-to-disk performance

This test runs a backup on all the database files, and stores them on disks. The following table lists the average rate that each storage group can be backed up

Item	Description
Total database size per storage group (GB)	383.9873828
Time taken to back up each storage group	2:34:26
Average MB backed up/sec per storage group	10.60950409

Conclusion

This document has been developed by EMC, and reviewed by the Microsoft Exchange Product team. The test results/data presented in this document are based on the tests introduced in the ESRP test framework. The customers should not quote the data directly for their predeployment verification. It is still necessary to go through the exercises to validate the storage design for a specific customer environment.

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

Contact information

EMC recommends that you consult with EMC Professional Services to assist with the design and deployment of a similar solution. For information regarding this or any other EMC Solution, please use the following numbers:

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Worldwide: (508) 497-7901

For additional information on EMC products and services available to customers and partners, please refer to:

<http://EMC.com> or <http://powerlink.EMC.com>

Microsoft Exchange Server Jetstress 2-hour performance test results

Performance test result report

Test summary

Overall Test Result **Pass**

Machine Name 6TTRGD1

Test Description

Test Start Time 10/10/2007 9:18:27 AM

Test End Time 10/10/2007 11:26:25 AM

Jetstress Version 08.01.0177.000

Ese Version 08.00.0685.024

Operating System Microsoft Windows Server 2003 R2 Service Pack 2 (5.2.3790.131072)

Performance Log C:\Q4\Jetstress\4SG\4t\perf3\Performance_2007_10_10_9_18_36.blg
C:\Q4\Jetstress\4SG\4t\perf3\DBCchecksum_2007_10_10_11_26_25.blg

Database sizing and throughput

Achieved I/O per Second 656.452

Capacity Percentage 100%

Throughput Percentage 100%

Initial database size 412311683072

Final database size 418789785600

Database files (count) 4

Jetstress system parameters

Thread count 4 (per-storage group)

Log buffers 9000

Minimum database cache 128.0 MB

Maximum database cache 1024.0 MB

Insert operations 25%

Delete operations 10%

Replace operations 50%

Read operations 15%

Lazy commits 80%

Disk subsystem performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (t:\sg1db)	0.016	0.005	82.522	81.179	(n/a)
Database (t:\sg2db)	0.014	0.005	82.561	81.041	(n/a)
Database (s:\sg3db)	0.016	0.005	82.840	80.098	(n/a)
Database (s:\sg4db)	0.013	0.005	84.970	81.241	(n/a)
Log (s:\sg1lg)	0.000	0.002	0.000	50.695	11278.627
Log (s:\sg2lg)	0.000	0.002	0.000	50.659	11275.889
Log (t:\sg3lg)	0.000	0.002	0.000	50.749	11168.127
Log (t:\sg4lg)	0.000	0.002	0.000	50.904	11197.638

Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	1.701	0.443	3.021
Available MBytes	14749.165	14710.000	15531.000
Free System Page Table Entries	16758231.167	16757761.000	16758281.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	57161147.733	56885248.000	57540608.000
Pool Paged Bytes	41741525.333	41103360.000	44101632.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

10/10/2007 9:18:26 AM -- Command Line:
 "C:\PROGRA~1\EXCHAN~1\jetstresscmd.exe" /c "C:\Q4\Jetstress\4SG\4t\perf3\Perf.xml"
 10/10/2007 9:18:26 AM -- Jetstress testing begins ...
 10/10/2007 9:18:27 AM -- Prepare testing begins ...
 10/10/2007 9:18:31 AM -- Attaching databases ...
 10/10/2007 9:18:31 AM -- Prepare testing ends.
 10/10/2007 9:18:31 AM -- Dispatching transactions begins ...
 10/10/2007 9:18:31 AM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
 10/10/2007 9:18:31 AM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
 10/10/2007 9:18:36 AM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).
 10/10/2007 9:18:36 AM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).
 10/10/2007 9:18:37 AM -- Operation mix: Sessions 4, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
 10/10/2007 9:18:37 AM -- Performance logging begins (interval: 15000 ms).
 10/10/2007 9:18:37 AM -- Attaining prerequisites:
 10/10/2007 9:26:16 AM -- \Database(JetstressCmd)\Database Cache Size, Last: 967335900.0

(lower bound: 966367600.0, upper bound: none)
10/10/2007 11:26:18 AM -- Performance logging ends.
10/10/2007 11:26:18 AM -- JetInterop batch transaction stats: 39012, 39101, 38997, and 39461.
10/10/2007 11:26:18 AM -- Dispatching transactions ends.
10/10/2007 11:26:18 AM -- Shutting down databases ...
10/10/2007 11:26:25 AM -- Instance2332.1 (complete), Instance2332.2 (complete),
Instance2332.3 (complete), and Instance2332.4 (complete)
10/10/2007 11:26:26 AM -- Performance logging begins (interval: 15000 ms).
10/10/2007 11:26:26 AM -- Verifying database checksums ...
10/10/2007 12:21:38 PM -- t:\sg1db (100% processed), t:\sg2db (100% processed), s:\sg3db
(100% processed), and s:\sg4db (100% processed)
10/10/2007 12:21:39 PM -- Performance logging ends.
10/10/2007 12:21:39 PM --
C:\Q4\Jetstress\4SG\4t\perf3\DBChecksum_2007_10_10_11_26_25.blg has 220 samples.
10/10/2007 12:21:43 PM --
C:\Q4\Jetstress\4SG\4t\perf3\DBChecksum_2007_10_10_11_26_25.html is saved.
10/10/2007 12:21:43 PM -- Verifying log checksums ...
10/10/2007 12:21:48 PM -- s:\sg1lg (21 logs passed), s:\sg2lg (21 logs passed), t:\sg3lg (21 logs
passed), and t:\sg4lg (22 logs passed)
10/10/2007 12:21:48 PM -- C:\Q4\Jetstress\4SG\4t\perf3\Performance_2007_10_10_9_18_36.blg
has 510 samples.
10/10/2007 12:21:48 PM -- Creating test report ...
10/10/2007 12:21:54 PM -- Volume t:\sg1db has 0.0162 for Avg. Disk sec/Read.
10/10/2007 12:21:54 PM -- Volume t:\sg2db has 0.0137 for Avg. Disk sec/Read.
10/10/2007 12:21:54 PM -- Volume s:\sg3db has 0.0163 for Avg. Disk sec/Read.
10/10/2007 12:21:54 PM -- Volume s:\sg4db has 0.0133 for Avg. Disk sec/Read.
10/10/2007 12:21:54 PM -- Volume s:\sg1lg has 0.0019 for Avg. Disk sec/Write.
10/10/2007 12:21:54 PM -- Volume s:\sg1lg has 0.0000 for Avg. Disk sec/Read.
10/10/2007 12:21:54 PM -- Volume s:\sg2lg has 0.0019 for Avg. Disk sec/Write.
10/10/2007 12:21:54 PM -- Volume s:\sg2lg has 0.0000 for Avg. Disk sec/Read.
10/10/2007 12:21:54 PM -- Volume t:\sg3lg has 0.0019 for Avg. Disk sec/Write.
10/10/2007 12:21:54 PM -- Volume t:\sg3lg has 0.0000 for Avg. Disk sec/Read.
10/10/2007 12:21:54 PM -- Volume t:\sg4lg has 0.0019 for Avg. Disk sec/Write.
10/10/2007 12:21:54 PM -- Volume t:\sg4lg has 0.0000 for Avg. Disk sec/Read.
10/10/2007 12:21:54 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.
10/10/2007 12:21:54 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
10/10/2007 12:21:54 PM --
C:\Q4\Jetstress\4SG\4t\perf3\Performance_2007_10_10_9_18_36.xml has 479 samples queried.

Microsoft Exchange Server Jetstress

Test result report

Checksum statistics - All

Database	Seen pages	Bad pages	Correctable pages	Wrong page no pages	File length / seconds taken
t:\sg1db\Jetstress1.edb	12784226	0	0	0	99876 MBytes / 3111 seconds
t:\sg2db\Jetstress1.edb	12783714	0	0	0	99872 MBytes / 3312 seconds
s:\sg3db\Jetstress1.edb	12777826	0	0	0	99826 MBytes / 3293 seconds
s:\sg4db\Jetstress1.edb	12776034	0	0	0	99812 MBytes / 2690 seconds
(Sum)	51121800	0	0	0	399389 MBytes / 3312 seconds

Disk subsystem performance (of checksum)

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec
t:\sg1db	0.139	0.002	514.578	0.001
t:\sg2db	0.153	0.001	478.952	0.001
s:\sg3db	0.147	0.001	484.757	0.002
s:\sg4db	0.138	0.000	595.764	0.001

Memory system performance (of checksum)

Counter	Average	Minimum	Maximum
% Processor Time	9.222	6.341	10.846
Available MBytes	15549.436	15526.000	15725.000
Free System Page Table Entries	16757551.000	16757551.000	16757551.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	78774923.636	73814016.000	80322560.000
Pool Paged Bytes	44197925.236	44158976.000	44728320.000

Test Log

10/10/2007 9:18:26 AM -- Command Line:
"C:\PROGRA~1\EXCHAN~1\jetstresscmd.exe" /c "C:\Q4\Jetstress\4SG\4t\perf3\Perf.xml"
10/10/2007 9:18:26 AM -- Jetstress testing begins ...
10/10/2007 9:18:27 AM -- Prepare testing begins ...
10/10/2007 9:18:31 AM -- Attaching databases ...
10/10/2007 9:18:31 AM -- Prepare testing ends.
10/10/2007 9:18:31 AM -- Dispatching transactions begins ...
10/10/2007 9:18:31 AM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
10/10/2007 9:18:31 AM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)

10/10/2007 9:18:36 AM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).
10/10/2007 9:18:36 AM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).
10/10/2007 9:18:37 AM -- Operation mix: Sessions 4, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
10/10/2007 9:18:37 AM -- Performance logging begins (interval: 15000 ms).
10/10/2007 9:18:37 AM -- Attaining prerequisites:
10/10/2007 9:26:16 AM -- \Database(JetstressCmd)\Database Cache Size, Last: 967335900.0 (lower bound: 966367600.0, upper bound: none)
10/10/2007 11:26:18 AM -- Performance logging ends.
10/10/2007 11:26:18 AM -- JetInterop batch transaction stats: 39012, 39101, 38997, and 39461.
10/10/2007 11:26:18 AM -- Dispatching transactions ends.
10/10/2007 11:26:18 AM -- Shutting down databases ...
10/10/2007 11:26:25 AM -- Instance2332.1 (complete), Instance2332.2 (complete), Instance2332.3 (complete), and Instance2332.4 (complete)
10/10/2007 11:26:26 AM -- Performance logging begins (interval: 15000 ms).
10/10/2007 11:26:26 AM -- Verifying database checksums ...
10/10/2007 12:21:38 PM -- t:\sg1db (100% processed), t:\sg2db (100% processed), s:\sg3db (100% processed), and s:\sg4db (100% processed)
10/10/2007 12:21:39 PM -- Performance logging ends.
10/10/2007 12:21:39 PM --
C:\Q4\Jetstress\4SG\4t\perf3\DBChecksum_2007_10_10_11_26_25.blg has 220 samples.

Microsoft Exchange Server Jetstress 24-hour performance test results

Stress test result report

Test summary

Overall Test Result **Pass**

Machine Name 6TTRGD1

Test Description

Test Start Time 10/16/2007 11:33:34 PM

Test End Time 10/17/2007 11:41:12 PM

Jetstress Version 08.01.0177.000

Ese Version 08.00.0685.024

Operating System Microsoft Windows Server 2003 R2 Service Pack 2 (5.2.3790.131072)

Performance Log C:\Q4\Jetstress\4SG\4t\stress 2\Stress_2007_10_16_23_33_43.blg
C:\Q4\Jetstress\4SG\4t\stress 2\DBChecksum_2007_10_17_23_41_12.blg

Database sizing and throughput

Achieved I/O per Second 629.997

Capacity Percentage 100%

Throughput Percentage 100%

Initial database size 412311683072

Final database size 475778318336

Database files (count) 4

Jetstress system parameters

Thread count 4 (per-storage group)

Log buffers 9000

Minimum database cache 128.0 MB

Maximum database cache 1024.0 MB

Insert operations 25%

Delete operations 10%

Replace operations 50%

Read operations 15%

Lazy commits 80%

Disk subsystem performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (T:\SG1DB)	0.016	0.005	82.985	75.032	(n/a)
Database (T:\SG2DB)	0.014	0.005	82.520	74.981	(n/a)
Database (S:\SG3DB)	0.017	0.005	82.597	74.791	(n/a)
Database (S:\SG4DB)	0.014	0.005	82.460	74.631	(n/a)
Log (S:\SG1LG)	0.000	0.002	0.000	44.942	11140.424
Log (S:\SG2LG)	0.000	0.002	0.000	44.808	11265.852
Log (T:\SG3LG)	0.000	0.002	0.000	45.123	11153.860
Log (T:\SG4LG)	0.000	0.002	0.000	44.592	11227.815

Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	1.690	0.065	14.766
Available MBytes	14717.778	14677.000	15628.000
Free System Page Table Entries	16757673.528	16757521.000	16757901.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	58008336.356	57475072.000	58634240.000
Pool Paged Bytes	46150850.844	42946560.000	49774592.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

10/16/2007 11:33:33 PM -- Command Line:
 "C:\PROGRA~1\EXCHAN~1\jetstresscmd.exe" /c "C:\Q4\Jetstress\4SG\4t\stress 2\stress.xml"
 10/16/2007 11:33:33 PM -- Jetstress testing begins ...
 10/16/2007 11:33:34 PM -- Prepare testing begins ...
 10/16/2007 11:33:38 PM -- Attaching databases ...
 10/16/2007 11:33:38 PM -- Prepare testing ends.
 10/16/2007 11:33:38 PM -- Dispatching transactions begins ...
 10/16/2007 11:33:38 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
 10/16/2007 11:33:38 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
 10/16/2007 11:33:43 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.1 seconds/read).
 10/16/2007 11:33:43 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.1 seconds/write).
 10/16/2007 11:33:44 PM -- Operation mix: Sessions 4, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
 10/16/2007 11:33:44 PM -- Performance logging begins (interval: 15000 ms).
 10/16/2007 11:33:44 PM -- Attaining prerequisites:

10/16/2007 11:41:08 PM -- \Database(JetstressCmd)\Database Cache Size, Last: 966844400.0 (lower bound: 966367600.0, upper bound: none)

10/17/2007 11:41:09 PM -- Performance logging ends.

10/17/2007 11:41:09 PM -- JetInterop batch transaction stats: 384976, 385610, 385372, and 384452.

10/17/2007 11:41:09 PM -- Dispatching transactions ends.

10/17/2007 11:41:09 PM -- Shutting down databases ...

10/17/2007 11:41:12 PM -- Instance2180.1 (complete), Instance2180.2 (complete), Instance2180.3 (complete), and Instance2180.4 (complete)

10/17/2007 11:41:12 PM -- Performance logging begins (interval: 15000 ms).

10/17/2007 11:41:12 PM -- Verifying database checksums ...

10/18/2007 12:43:40 AM -- T:\SG1DB (100% processed), T:\SG2DB (100% processed), S:\SG3DB (100% processed), and S:\SG4DB (100% processed)

10/18/2007 12:43:41 AM -- Performance logging ends.

10/18/2007 12:43:41 AM -- [C:\Q4\Jetstress\4SG\4t\stress 2\DBChecksum 2007 10 17 23 41 12.blg](#) has 249 samples.

10/18/2007 12:43:46 AM -- [C:\Q4\Jetstress\4SG\4t\stress 2\DBChecksum 2007 10 17 23 41 12.html](#) is saved.

10/18/2007 12:43:46 AM -- Verifying log checksums ...

10/18/2007 12:43:51 AM -- S:\SG1LG (22 logs passed), S:\SG2LG (21 logs passed), T:\SG3LG (22 logs passed), and T:\SG4LG (22 logs passed)

10/18/2007 12:43:51 AM -- [C:\Q4\Jetstress\4SG\4t\stress 2\Stress 2007 10 16 23 33 43.blg](#) has 5789 samples.

10/18/2007 12:43:51 AM -- Creating test report ...

10/18/2007 12:44:59 AM -- Volume T:\SG1DB has 0.0163 for Avg. Disk sec/Read.

10/18/2007 12:44:59 AM -- Volume T:\SG2DB has 0.0139 for Avg. Disk sec/Read.

10/18/2007 12:44:59 AM -- Volume S:\SG3DB has 0.0170 for Avg. Disk sec/Read.

10/18/2007 12:44:59 AM -- Volume S:\SG4DB has 0.0138 for Avg. Disk sec/Read.

10/18/2007 12:44:59 AM -- Volume S:\SG1LG has 0.0019 for Avg. Disk sec/Write.

10/18/2007 12:44:59 AM -- Volume S:\SG1LG has 0.0000 for Avg. Disk sec/Read.

10/18/2007 12:44:59 AM -- Volume S:\SG2LG has 0.0019 for Avg. Disk sec/Write.

10/18/2007 12:44:59 AM -- Volume S:\SG2LG has 0.0000 for Avg. Disk sec/Read.

10/18/2007 12:44:59 AM -- Volume T:\SG3LG has 0.0019 for Avg. Disk sec/Write.

10/18/2007 12:44:59 AM -- Volume T:\SG3LG has 0.0000 for Avg. Disk sec/Read.

10/18/2007 12:44:59 AM -- Volume T:\SG4LG has 0.0019 for Avg. Disk sec/Write.

10/18/2007 12:44:59 AM -- Volume T:\SG4LG has 0.0000 for Avg. Disk sec/Read.

10/18/2007 12:44:59 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.

10/18/2007 12:44:59 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.

10/18/2007 12:44:59 AM -- [C:\Q4\Jetstress\4SG\4t\stress 2\Stress 2007 10 16 23 33 43.xml](#) has 5759 samples queried.

Microsoft Exchange Server Jetstress

Test result report

Checksum statistics - All

Database	Seen pages	Bad pages	Correctable pages	Wrong page no pages	File length / seconds taken
T:\SG1DB\Jetstress1.edb	14501490	0	0	0	113292 MBytes / 3514 seconds
T:\SG2DB\Jetstress1.edb	14535794	0	0	0	113560 MBytes / 3747 seconds
S:\SG3DB\Jetstress1.edb	14523762	0	0	0	113466 MBytes / 3733 seconds
S:\SG4DB\Jetstress1.edb	14517362	0	0	0	113416 MBytes / 3131 seconds
(Sum)	58078408	0	0	0	453737 MBytes / 3747 seconds

Disk subsystem performance (of checksum)

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec
T:\SG1DB	0.139	0.001	516.396	0.002
T:\SG2DB	0.154	0.001	482.163	0.003
S:\SG3DB	0.146	0.001	484.504	0.002
S:\SG4DB	0.138	0.001	581.501	0.003

Memory system performance (of checksum)

Counter	Average	Minimum	Maximum
% Processor Time	9.291	3.060	11.289
Available MBytes	15529.116	15509.000	15709.000
Free System Page Table Entries	16757301.000	16757301.000	16757301.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	79627868.530	74559488.000	81514496.000
Pool Paged Bytes	49329986.827	49307648.000	49852416.000

Test Log

10/16/2007 11:33:33 PM -- Command Line:

"C:\PROGRA~1\EXCHAN~1\jetstresscmd.exe" /c "C:\Q4\Jetstress\4SG\4t\stress 2\stress.xml"

10/16/2007 11:33:33 PM -- Jetstress testing begins ...

10/16/2007 11:33:34 PM -- Prepare testing begins ...

10/16/2007 11:33:38 PM -- Attaching databases ...

10/16/2007 11:33:38 PM -- Prepare testing ends.

10/16/2007 11:33:38 PM -- Dispatching transactions begins ...

10/16/2007 11:33:38 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)

10/16/2007 11:33:38 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)

10/16/2007 11:33:43 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.1 seconds/read).
10/16/2007 11:33:43 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.1 seconds/write).
10/16/2007 11:33:44 PM -- Operation mix: Sessions 4, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
10/16/2007 11:33:44 PM -- Performance logging begins (interval: 15000 ms).
10/16/2007 11:33:44 PM -- Attaining prerequisites:
10/16/2007 11:41:08 PM -- \Database(JetstressCmd)\Database Cache Size, Last: 966844400.0 (lower bound: 966367600.0, upper bound: none)
10/17/2007 11:41:09 PM -- Performance logging ends.
10/17/2007 11:41:09 PM -- JetInterop batch transaction stats: 384976, 385610, 385372, and 384452.
10/17/2007 11:41:09 PM -- Dispatching transactions ends.
10/17/2007 11:41:09 PM -- Shutting down databases ...
10/17/2007 11:41:12 PM -- Instance2180.1 (complete), Instance2180.2 (complete), Instance2180.3 (complete), and Instance2180.4 (complete)
10/17/2007 11:41:12 PM -- Performance logging begins (interval: 15000 ms).
10/17/2007 11:41:12 PM -- Verifying database checksums ...
10/18/2007 12:43:40 AM -- T:\SG1DB (100% processed), T:\SG2DB (100% processed), S:\SG3DB (100% processed), and S:\SG4DB (100% processed)
10/18/2007 12:43:41 AM -- Performance logging ends.
10/18/2007 12:43:41 AM -- [C:\Q4\Jetstress\4SG\4t\stress 2\DBChecksum 2007 10 17 23 41 12.blg](#) has 249 samples.

Microsoft Exchange Server Jetstress soft recovery test results

Soft recovery test result report

Test summary

Overall Test Result **Pass**

Machine Name 6TTRGD1

Test Description

Test Start Time 10/14/2007 9:17:16 AM

Test End Time 10/14/2007 9:47:19 AM

Jetstress Version 08.01.0177.000

Ese Version 08.00.0685.024

Operating System Microsoft Windows Server 2003 R2 Service Pack 2 (5.2.3790.131072)

Performance Log C:\Q4\Jetstress\4SG\4t\soft\Performance_2007_10_14_9_17_26.blg

Database sizing and throughput

Achieved I/O per Second 679.941

Capacity Percentage 100%

Throughput Percentage 100%

Initial database size 412311683072

Final database size 413991501824

Database files (count) 4

Jetstress system parameters

Thread count 4 (per-storage group)

Log buffers 9000

Minimum database cache 128.0 MB

Maximum database cache 1024.0 MB

Insert operations 25%

Delete operations 10%

Replace operations 50%

Read operations 15%

Lazy commits 80%

Disk subsystem performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (T:\SG1DB)	0.015	0.005	85.412	81.712	(n/a)
Database (T:\SG2DB)	0.013	0.005	89.380	85.910	(n/a)
Database (S:\SG3DB)	0.016	0.005	87.039	83.892	(n/a)
Database (S:\SG4DB)	0.013	0.005	85.491	81.106	(n/a)
Log (S:\SG1LG)	0.001	0.002	0.070	55.898	11007.934
Log (S:\SG2LG)	0.001	0.002	0.072	57.454	11330.661
Log (T:\SG3LG)	0.001	0.002	0.071	56.023	11407.518
Log (T:\SG4LG)	0.001	0.002	0.070	54.493	11452.523

Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	1.950	0.651	3.086
Available MBytes	14845.975	14719.000	15695.000
Free System Page Table Entries	16758092.597	16758091.000	16758131.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	56130379.294	53923840.000	56578048.000
Pool Paged Bytes	41136747.563	40415232.000	41242624.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

10/14/2007 9:17:16 AM -- Command Line:
 "C:\PROGRA~1\EXCHAN~1\jetstresscmd.exe" /c "C:\Q4\Jetstress\4SG\4t\soft\soft.xml"
 10/14/2007 9:17:16 AM -- Jetstress testing begins ...
 10/14/2007 9:17:16 AM -- Prepare testing begins ...
 10/14/2007 9:17:21 AM -- Attaching databases ...
 10/14/2007 9:17:21 AM -- Prepare testing ends.
 10/14/2007 9:17:21 AM -- Dispatching transactions begins ...
 10/14/2007 9:17:21 AM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
 10/14/2007 9:17:21 AM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
 10/14/2007 9:17:26 AM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).
 10/14/2007 9:17:26 AM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).
 10/14/2007 9:17:26 AM -- Operation mix: Sessions 4, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
 10/14/2007 9:17:26 AM -- Performance logging begins (interval: 15000 ms).
 10/14/2007 9:17:26 AM -- Generating log files ...
 10/14/2007 9:47:16 AM -- S:\SG1LG (101.0% generated), S:\SG2LG (106.0% generated),

T:\SG3LG (104.2% generated), and T:\SG4LG (100.2% generated)
10/14/2007 9:47:17 AM -- Performance logging ends.
10/14/2007 9:47:17 AM -- JetInterop batch transaction stats: 9950, 10189, 10011, and 9795.
10/14/2007 9:47:17 AM -- Dispatching transactions ends.
10/14/2007 9:47:17 AM -- Shutting down databases ...
10/14/2007 9:47:19 AM -- Instance2128.1 (complete), Instance2128.2 (complete),
Instance2128.3 (complete), and Instance2128.4 (complete)
10/14/2007 9:47:19 AM -- C:\Q4\Jetstress\4SG\4t\soft\Performance_2007_10_14_9_17_26.blg
has 119 samples.
10/14/2007 9:47:19 AM -- Creating test report ...
10/14/2007 9:47:20 AM -- Volume T:\SG1DB has 0.0153 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Volume T:\SG2DB has 0.0129 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Volume S:\SG3DB has 0.0161 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Volume S:\SG4DB has 0.0128 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Volume S:\SG1LG has 0.0019 for Avg. Disk sec/Write.
10/14/2007 9:47:20 AM -- Volume S:\SG1LG has 0.0011 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Volume S:\SG2LG has 0.0019 for Avg. Disk sec/Write.
10/14/2007 9:47:20 AM -- Volume S:\SG2LG has 0.0006 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Volume T:\SG3LG has 0.0019 for Avg. Disk sec/Write.
10/14/2007 9:47:20 AM -- Volume T:\SG3LG has 0.0014 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Volume T:\SG4LG has 0.0019 for Avg. Disk sec/Write.
10/14/2007 9:47:20 AM -- Volume T:\SG4LG has 0.0011 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
10/14/2007 9:47:20 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
10/14/2007 9:47:20 AM -- C:\Q4\Jetstress\4SG\4t\soft\Performance_2007_10_14_9_17_26.xml
has 118 samples queried.

Microsoft Exchange Server Jetstress

Soft recovery test result report

Test summary

Overall Test Result **Pass**

Machine Name 6TTRGD1

Test Description

Test Start Time 10/14/2007 9:17:16 AM

Test End Time 10/14/2007 9:47:19 AM

Jetstress Version 08.01.0177.000

Ese Version 08.00.0685.024

Operating System Microsoft Windows Server 2003 R2 Service Pack 2 (5.2.3790.131072)

Performance Log C:\Q4\Jetstress\4SG\4t\soft\Performance_2007_10_14_9_17_26.blg

Database sizing and throughput

Achieved I/O per Second 679.941

Capacity Percentage 100%

Throughput Percentage 100%

Initial database size 412311683072

Final database size 413991501824

Database files (count) 4

Jetstress system parameters

Thread count 4 (per-storage group)

Log buffers 9000

Minimum database cache 128.0 MB

Maximum database cache 1024.0 MB

Insert operations 25%

Delete operations 10%

Replace operations 50%

Read operations 15%

Lazy commits 80%

Disk subsystem performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (T:\SG1DB)	0.015	0.005	85.412	81.712	(n/a)
Database (T:\SG2DB)	0.013	0.005	89.380	85.910	(n/a)
Database (S:\SG3DB)	0.016	0.005	87.039	83.892	(n/a)
Database (S:\SG4DB)	0.013	0.005	85.491	81.106	(n/a)
Log (S:\SG1LG)	0.001	0.002	0.070	55.898	11007.934
Log (S:\SG2LG)	0.001	0.002	0.072	57.454	11330.661
Log (T:\SG3LG)	0.001	0.002	0.071	56.023	11407.518
Log (T:\SG4LG)	0.001	0.002	0.070	54.493	11452.523

Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	1.950	0.651	3.086
Available MBytes	14845.975	14719.000	15695.000
Free System Page Table Entries	16758092.597	16758091.000	16758131.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	56130379.294	53923840.000	56578048.000
Pool Paged Bytes	41136747.563	40415232.000	41242624.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

10/14/2007 9:17:16 AM -- Command Line:
 "C:\PROGRA~1\EXCHAN~1\jetstresscmd.exe" /c "C:\Q4\Jetstress\4SG\4t\soft\soft.xml"
 10/14/2007 9:17:16 AM -- Jetstress testing begins ...
 10/14/2007 9:17:16 AM -- Prepare testing begins ...
 10/14/2007 9:17:21 AM -- Attaching databases ...
 10/14/2007 9:17:21 AM -- Prepare testing ends.
 10/14/2007 9:17:21 AM -- Dispatching transactions begins ...
 10/14/2007 9:17:21 AM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
 10/14/2007 9:17:21 AM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
 10/14/2007 9:17:26 AM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).
 10/14/2007 9:17:26 AM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).
 10/14/2007 9:17:26 AM -- Operation mix: Sessions 4, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
 10/14/2007 9:17:26 AM -- Performance logging begins (interval: 15000 ms).
 10/14/2007 9:17:26 AM -- Generating log files ...
 10/14/2007 9:47:16 AM -- S:\SG1LG (101.0% generated), S:\SG2LG (106.0% generated),

T:\SG3LG (104.2% generated), and T:\SG4LG (100.2% generated)
10/14/2007 9:47:17 AM -- Performance logging ends.
10/14/2007 9:47:17 AM -- JetInterop batch transaction stats: 9950, 10189, 10011, and 9795.
10/14/2007 9:47:17 AM -- Dispatching transactions ends.
10/14/2007 9:47:17 AM -- Shutting down databases ...
10/14/2007 9:47:19 AM -- Instance2128.1 (complete), Instance2128.2 (complete),
Instance2128.3 (complete), and Instance2128.4 (complete)
10/14/2007 9:47:19 AM -- C:\Q4\Jetstress\4SG\4t\soft\Performance_2007_10_14_9_17_26.blg
has 119 samples.
10/14/2007 9:47:19 AM -- Creating test report ...
10/14/2007 9:47:20 AM -- Volume T:\SG1DB has 0.0153 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Volume T:\SG2DB has 0.0129 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Volume S:\SG3DB has 0.0161 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Volume S:\SG4DB has 0.0128 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Volume S:\SG1LG has 0.0019 for Avg. Disk sec/Write.
10/14/2007 9:47:20 AM -- Volume S:\SG1LG has 0.0011 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Volume S:\SG2LG has 0.0019 for Avg. Disk sec/Write.
10/14/2007 9:47:20 AM -- Volume S:\SG2LG has 0.0006 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Volume T:\SG3LG has 0.0019 for Avg. Disk sec/Write.
10/14/2007 9:47:20 AM -- Volume T:\SG3LG has 0.0014 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Volume T:\SG4LG has 0.0019 for Avg. Disk sec/Write.
10/14/2007 9:47:20 AM -- Volume T:\SG4LG has 0.0011 for Avg. Disk sec/Read.
10/14/2007 9:47:20 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
10/14/2007 9:47:20 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
10/14/2007 9:47:20 AM --
C:\Q4\Jetstress\4SG\4t\soft\Performance_2007_10_14_9_17_26.xml has 118 samples
queried.

Microsoft Exchange Server Jetstress streaming backup test results

Streaming backup test result report

Streaming backup statistics - All

Database Instance	Database Size (MBytes)	Elapsed Backup Time	MBytes Transferred/sec
Instance2968.1	98300.77	02:36:47	10.45
Instance2968.2	98300.77	02:33:10	10.70
Instance2968.3	98300.77	02:33:00	10.71
Instance2968.4	98300.77	02:34:48	10.58

Jetstress system parameters

Thread count	4 (per-storage group)
Log buffers	9000
Minimum database cache	128.0 MB
Maximum database cache	1024.0 MB
Insert operations	25%
Delete operations	10%
Replace operations	50%
Read operations	15%
Lazy commits	80%

Disk subsystem performance

Database ==> Instances	Database Reads Latency	Database Writes Latency	Database Reads/sec	Database Writes/sec	Log Reads Latency	Log Writes Latency	Log Reads/sec	Log Writes/sec	Log Writes Bytes
Instance2968.1	6.529	0.000	84.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2968.2	6.011	0.000	86.099	0.000	0.000	0.000	0.000	0.000	0.000
Instance2968.3	6.044	0.012	86.172	0.000	0.000	0.000	0.000	0.000	0.000
Instance2968.4	6.397	0.000	85.120	0.000	0.000	0.000	0.000	0.000	0.000

Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	34.679	14.505	58.507
Available MBytes	15271.642	15002.000	15753.000
Free System Page Table Entries	16757981.600	16757951.000	16758211.000
Transition Pages RePurposed/sec	10390.271	0.000	23357.585
Pool Nonpaged Bytes	70788638.703	56868864.000	77885440.000
Pool Paged Bytes	569515998.807	43520000.000	847196160.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

10/14/2007 12:04:45 AM -- Command Line:

"C:\PROGRA~1\EXCHAN~1\jetstresscmd.exe" /c "C:\Q4\Jetstress\4SG\4t\b2d\b2d.xml"

10/14/2007 12:04:45 AM -- Jetstress testing begins ...

10/14/2007 12:04:45 AM -- Prepare testing begins ...

10/14/2007 12:04:50 AM -- Attaching databases ...

10/14/2007 12:04:50 AM -- Prepare testing ends.

10/14/2007 12:04:55 AM -- Performance logging begins (interval: 15000 ms).

10/14/2007 12:04:55 AM -- Streaming backup databases ...

10/14/2007 2:41:44 AM -- Performance logging ends.

10/14/2007 2:41:44 AM -- Instance2968.1 (100% processed), Instance2968.2 (100% processed), Instance2968.3 (100% processed), and Instance2968.4 (100% processed)

10/14/2007 2:41:44 AM --

C:\Q4\Jetstress\4SG\4t\b2d\StreamingBackup_2007_10_14_0_4_50.blg has 617 samples.

10/14/2007 2:41:44 AM -- Creating test report ...