

ESRP Storage Program
EMC CLARiiON CX3-20c (1,400 User) iSCSI with CCR
Storage Solution for Microsoft Exchange Server 2007

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

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Published June, 2008

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Part Number: H4430.1

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Overview

This document provides information on EMC's CLARiiON® CX3-20c (1,400 user) iSCSI with Clustered Continuous Replication (CCR) 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 CCR 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 1,400 Exchange 2007 users.

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 1,400 users had a profile of .42 IOPS with a 270 MB mailbox requirement.

Solution description

The solution described is for Microsoft Exchange 2007 Clustered Continuous Replication (CCR) that uses two CX3-20c arrays, each containing a single disk-array enclosure (DAE) that uses four drives for storage group database files, four drives for storage group log files, and five drives for streaming backup with one hot spare drive.

With Microsoft Exchange 2007 CCR (release to manufacturing version) I/O requirements for the passive drives were needed to handle 2-3 times the I/O of the active database drives. With Exchange 2007 SP1 this decreases to .5-1.

On each array the database drives are placed on drives 0_10-0_13. The log files are placed on the first four drives 0_0-0_3 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 available on EMC.com.

Figure 1 illustrates the building block layout for this ESRP submission.

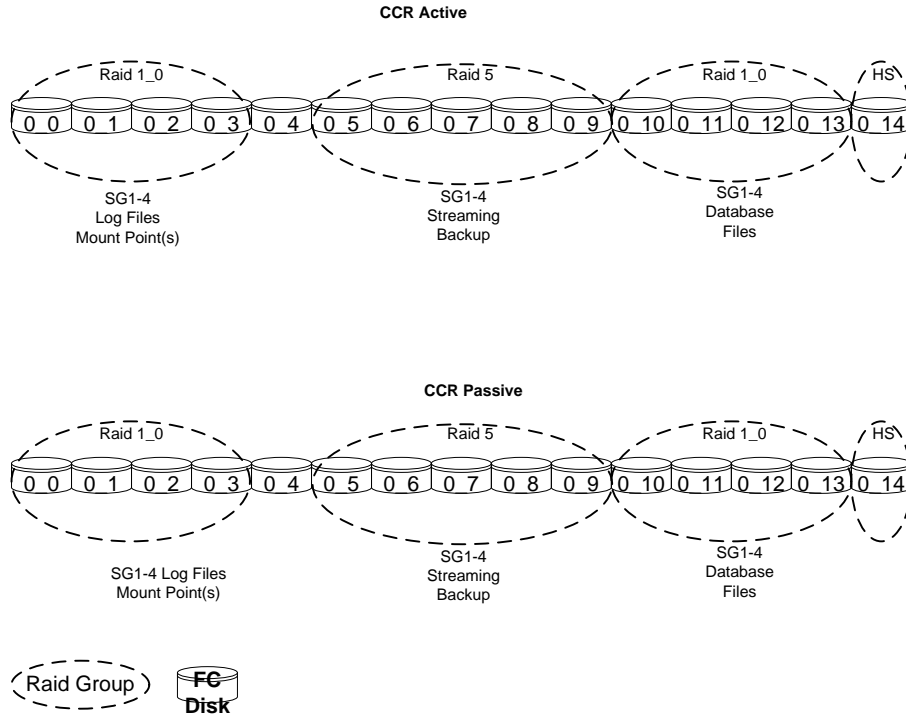


Figure 1 Building block layout

Figure 2 illustrates the physical architecture for the ESRP submission.

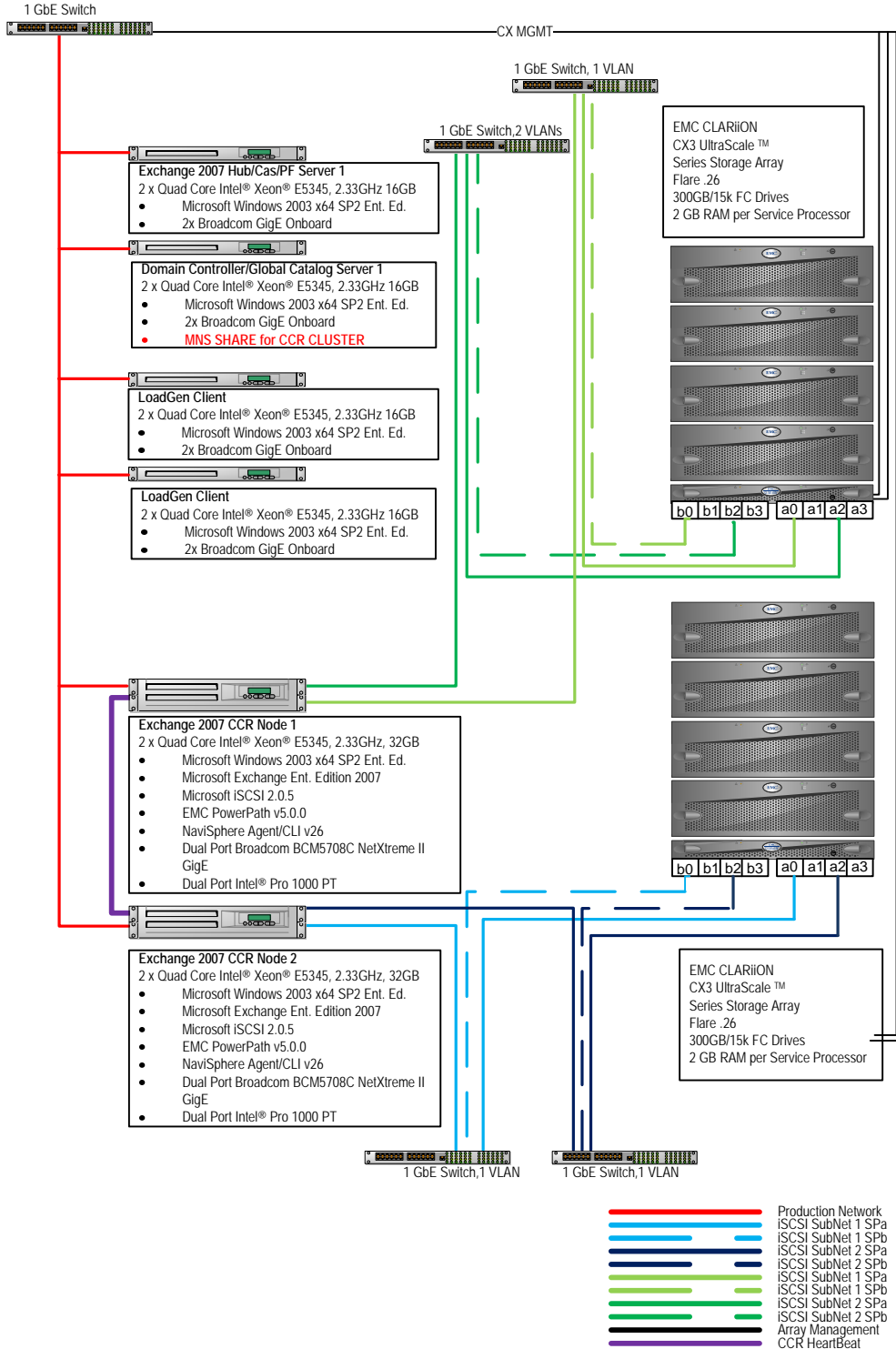


Figure 2 Physical architecture

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 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 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 1,400 Exchange mailboxes. The configuration used for testing is detailed in the following section:

- Number of mailbox servers presented to the storage array = 1
- User I/O profile for testing = 0.42
- User mailbox size for testing = 270 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
- Clustered Continuous Replication (CCR)

Tested deployment

The following tables summarize the testing environment.

Simulated Exchange configuration

Item	Description
Number of Exchange mailboxes simulated	1,400
Number of hosts	1
Number of mailboxes/host	1,400
Number of storage groups/host	4
Number of mailbox stores/storage group	1
Number of mailboxes/mailbox store	350
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 v2.0.0.39
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\ele5132.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
7. Clustered Continuous Replication
 - Dedicated heartbeat connection between cluster nodes
 - Network connection with MNS on a reliable server in the environment. It is also recommended to use local DC/GC or Hub/CAS servers

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	704.688
Average database disk reads/sec	358.634
Average database disk writes/sec	346.054
Average database disk read latency (ms)	0.01675
Average database disk write latency (ms)	0.005
Transaction log I/O	
Average log disk writes/sec	211.841
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

This test is to measure the maximum rate for the databases (streaming backup). The following table shows the average rate for a single database file.

Item	Description
MB read/sec per storage group	10.4925
MB read/sec total	41.97
File size/sec taken	393203.08/37479

Log read-only performance

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

Item	Description
Average time to play one log file (sec)	0.59413353

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	2:36:10
Average MB backed up/sec per storage group	10.49273472

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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Canada: (800) 543-4782 (543-4SVC)

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 7:41:33 PM

Test End Time 10/10/2007 9:48:29 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\5t\perf3\Performance_2007_10_10_19_41_43.blg
C:\Q4\Jetstress\4SG\5t\perf3\DBCchecksum_2007_10_10_21_48_29.blg

Database sizing and throughput

Achieved I/O per Second 704.687

Capacity Percentage 100%

Throughput Percentage 100%

Initial database size 412311683072

Final database size 419215507456

Database files (count) 4

Jetstress system parameters

Thread count 5 (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)	0.018	0.005	88.761	86.802	(n/a)
Database (t:\sg2db)	0.015	0.005	91.556	87.315	(n/a)
Database (s:\sg3db)	0.019	0.005	89.270	85.662	(n/a)
Database (s:\sg4db)	0.015	0.005	89.047	86.275	(n/a)
Log (s:\sg1lg)	0.000	0.002	0.000	53.449	11505.069
Log (s:\sg2lg)	0.000	0.002	0.000	52.912	11602.062
Log (t:\sg3lg)	0.000	0.002	0.000	52.927	11503.003
Log (t:\sg4lg)	0.000	0.002	0.000	52.553	11690.592

Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	1.821	0.482	3.516
Available MBytes	14705.298	14702.000	14800.000
Free System Page Table Entries	16757991.000	16757991.000	16757991.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	58304076.800	58122240.000	58933248.000
Pool Paged Bytes	43369412.267	43220992.000	44236800.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

```

10/10/2007 7:41:33 PM -- Command Line: "C:\PROGRA~1\EXCHAN~1\jetstresscmd.exe" /c
"C:\Q4\Jetstress\4SG\5t\perf3\Perf.xml"
10/10/2007 7:41:33 PM -- Jetstress testing begins ...
10/10/2007 7:41:33 PM -- Prepare testing begins ...
10/10/2007 7:41:38 PM -- Attaching databases ...
10/10/2007 7:41:38 PM -- Prepare testing ends.
10/10/2007 7:41:38 PM -- Dispatching transactions begins ...
10/10/2007 7:41:38 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
10/10/2007 7:41:38 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
10/10/2007 7:41:43 PM -- Database read latency thresholds: (average: 0.02 seconds/read,
maximum: 0.05 seconds/read).
10/10/2007 7:41:43 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum:
0.05 seconds/write).
10/10/2007 7:41:44 PM -- Operation mix: Sessions 5, Inserts 25%, Deletes 10%, Replaces 50%,
Reads 15%, Lazy Commits 80%.
10/10/2007 7:41:44 PM -- Performance logging begins (interval: 15000 ms).
10/10/2007 7:41:44 PM -- Attaining prerequisites:
10/10/2007 7:48:26 PM -- \Database(JetstressCmd)\Database Cache Size, Last: 966508500.0

```

(lower bound: 966367600.0, upper bound: none)
10/10/2007 9:48:27 PM -- Performance logging ends.
10/10/2007 9:48:27 PM -- JetInterop batch transaction stats: 41740, 42026, 41495, and 41724.
10/10/2007 9:48:27 PM -- Dispatching transactions ends.
10/10/2007 9:48:27 PM -- Shutting down databases ...
10/10/2007 9:48:29 PM -- Instance728.1 (complete), Instance728.2 (complete), Instance728.3 (complete), and Instance728.4 (complete)
10/10/2007 9:48:30 PM -- Performance logging begins (interval: 15000 ms).
10/10/2007 9:48:30 PM -- Verifying database checksums ...
10/10/2007 10:44:01 PM -- t:\sg1db (100% processed), t:\sg2db (100% processed), s:\sg3db (100% processed), and s:\sg4db (100% processed)
10/10/2007 10:44:02 PM -- Performance logging ends.
10/10/2007 10:44:02 PM --
C:\Q4\Jetstress\4SG\5t\perf3\DBChecksum_2007_10_10_21_48_29.blg has 222 samples.
10/10/2007 10:44:06 PM --
C:\Q4\Jetstress\4SG\5t\perf3\DBChecksum_2007_10_10_21_48_29.html is saved.
10/10/2007 10:44:06 PM -- Verifying log checksums ...
10/10/2007 10:44:11 PM -- s:\sg1lg (22 logs passed), s:\sg2lg (22 logs passed), t:\sg3lg (22 logs passed), and t:\sg4lg (22 logs passed)
10/10/2007 10:44:11 PM --
C:\Q4\Jetstress\4SG\5t\perf3\Performance_2007_10_10_19_41_43.blg has 506 samples.
10/10/2007 10:44:11 PM -- Creating test report ...
10/10/2007 10:44:15 PM -- Volume t:\sg1db has 0.0181 for Avg. Disk sec/Read.
10/10/2007 10:44:15 PM -- Volume t:\sg2db has 0.0152 for Avg. Disk sec/Read.
10/10/2007 10:44:15 PM -- Volume s:\sg3db has 0.0190 for Avg. Disk sec/Read.
10/10/2007 10:44:15 PM -- Volume s:\sg4db has 0.0151 for Avg. Disk sec/Read.
10/10/2007 10:44:15 PM -- Volume s:\sg1lg has 0.0021 for Avg. Disk sec/Write.
10/10/2007 10:44:15 PM -- Volume s:\sg1lg has 0.0000 for Avg. Disk sec/Read.
10/10/2007 10:44:15 PM -- Volume s:\sg2lg has 0.0021 for Avg. Disk sec/Write.
10/10/2007 10:44:15 PM -- Volume s:\sg2lg has 0.0000 for Avg. Disk sec/Read.
10/10/2007 10:44:15 PM -- Volume t:\sg3lg has 0.0021 for Avg. Disk sec/Write.
10/10/2007 10:44:15 PM -- Volume t:\sg3lg has 0.0000 for Avg. Disk sec/Read.
10/10/2007 10:44:15 PM -- Volume t:\sg4lg has 0.0021 for Avg. Disk sec/Write.
10/10/2007 10:44:15 PM -- Volume t:\sg4lg has 0.0000 for Avg. Disk sec/Read.
10/10/2007 10:44:15 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.
10/10/2007 10:44:15 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
10/10/2007 10:44:15 PM --
C:\Q4\Jetstress\4SG\5t\perf3\Performance_2007_10_10_19_41_43.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	12797538	0	0	0	99980 MBytes / 3113 seconds
t:\sg2db\Jetstress1.edb	12789346	0	0	0	99916 MBytes / 3330 seconds
s:\sg3db\Jetstress1.edb	12790626	0	0	0	99926 MBytes / 3314 seconds
s:\sg4db\Jetstress1.edb	12796258	0	0	0	99970 MBytes / 2731 seconds
(Sum)	51173768	0	0	0	399795 MBytes / 3331 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	0.000	514.756	0.001
t:\sg2db	0.152	0.003	480.257	0.002
s:\sg3db	0.147	0.001	483.331	0.002
s:\sg4db	0.139	0.005	587.126	0.004

Memory system performance (of checksum)

Counter	Average	Minimum	Maximum
% Processor Time	9.164	4.961	10.820
Available MBytes	15545.766	15523.000	15722.000
Free System Page Table Entries	16757921.000	16757921.000	16757921.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	79374797.261	74317824.000	81223680.000
Pool Paged Bytes	43436234.955	43225088.000	43773952.000

Test Log

10/10/2007 7:41:33 PM -- Command Line: "C:\PROGRA~1\EXCHAN~1\jetstresscmd.exe" /c "C:\Q4\Jetstress\4SG\5t\perf3\Perf.xml"
 10/10/2007 7:41:33 PM -- Jetstress testing begins ...
 10/10/2007 7:41:33 PM -- Prepare testing begins ...
 10/10/2007 7:41:38 PM -- Attaching databases ...
 10/10/2007 7:41:38 PM -- Prepare testing ends.
 10/10/2007 7:41:38 PM -- Dispatching transactions begins ...
 10/10/2007 7:41:38 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
 10/10/2007 7:41:38 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)

10/10/2007 7:41:43 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).
10/10/2007 7:41:43 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).
10/10/2007 7:41:44 PM -- Operation mix: Sessions 5, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
10/10/2007 7:41:44 PM -- Performance logging begins (interval: 15000 ms).
10/10/2007 7:41:44 PM -- Attaining prerequisites:
10/10/2007 7:48:26 PM -- \Database(JetstressCmd)\Database Cache Size, Last: 966508500.0 (lower bound: 966367600.0, upper bound: none)
10/10/2007 9:48:27 PM -- Performance logging ends.
10/10/2007 9:48:27 PM -- JetInterop batch transaction stats: 41740, 42026, 41495, and 41724.
10/10/2007 9:48:27 PM -- Dispatching transactions ends.
10/10/2007 9:48:27 PM -- Shutting down databases ...
10/10/2007 9:48:29 PM -- Instance728.1 (complete), Instance728.2 (complete), Instance728.3 (complete), and Instance728.4 (complete)
10/10/2007 9:48:30 PM -- Performance logging begins (interval: 15000 ms).
10/10/2007 9:48:30 PM -- Verifying database checksums ...
10/10/2007 10:44:01 PM -- t:\sg1db (100% processed), t:\sg2db (100% processed), s:\sg3db (100% processed), and s:\sg4db (100% processed)
10/10/2007 10:44:02 PM -- Performance logging ends.
10/10/2007 10:44:02 PM --
C:\Q4\Jetstress\4SG\5t\perf3\DBChecksum_2007_10_10_21_48_29.blg has 222 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 10/14/2007 5:33:04 PM

Test End Time 10/15/2007 5:40:14 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\5t\stress\Stress_2007_10_14_17_33_14.blg
C:\Q4\Jetstress\4SG\5t\stress\DBCchecksum_2007_10_15_17_40_14.blg

Database sizing and throughput

Achieved I/O per Second 672.88

Capacity Percentage 100%

Throughput Percentage 100%

Initial database size 412311683072

Final database size 480094257152

Database files (count) 4

Jetstress system parameters

Thread count 5 (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)	0.019	0.005	88.469	79.661	(n/a)
Database (T:\SG2DB)	0.015	0.005	88.609	79.794	(n/a)
Database (S:\SG3DB)	0.019	0.005	88.465	79.664	(n/a)
Database (S:\SG4DB)	0.015	0.005	88.700	79.518	(n/a)
Log (S:\SG1LG)	0.000	0.002	0.000	46.739	11440.571
Log (S:\SG2LG)	0.000	0.002	0.000	46.542	11537.210
Log (T:\SG3LG)	0.000	0.002	0.000	47.194	11410.250
Log (T:\SG4LG)	0.000	0.002	0.000	46.512	11492.882

Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	1.803	0.221	3.815
Available MBytes	14749.513	14700.000	15669.000
Free System Page Table Entries	16757881.000	16757881.000	16757881.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	57649101.511	57171968.000	57958400.000
Pool Paged Bytes	43030442.667	41930752.000	43286528.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

```

10/14/2007 5:33:04 PM -- Command Line: "C:\PROGRA~1\EXCHAN~1\jetstresscmd.exe" /c
"C:\Q4\Jetstress\4SG\5t\stress\stress.xml"
10/14/2007 5:33:04 PM -- Jetstress testing begins ...
10/14/2007 5:33:04 PM -- Prepare testing begins ...
10/14/2007 5:33:09 PM -- Attaching databases ...
10/14/2007 5:33:09 PM -- Prepare testing ends.
10/14/2007 5:33:09 PM -- Dispatching transactions begins ...
10/14/2007 5:33:09 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
10/14/2007 5:33:09 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
10/14/2007 5:33:14 PM -- Database read latency thresholds: (average: 0.02 seconds/read,
maximum: 0.1 seconds/read).
10/14/2007 5:33:14 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum:
0.1 seconds/write).
10/14/2007 5:33:15 PM -- Operation mix: Sessions 5, Inserts 25%, Deletes 10%, Replaces 50%,
Reads 15%, Lazy Commits 80%.
10/14/2007 5:33:15 PM -- Performance logging begins (interval: 15000 ms).
10/14/2007 5:33:15 PM -- Attaining prerequisites:
10/14/2007 5:40:07 PM -- \Database(JetstressCmd)\Database Cache Size, Last: 967999500.0

```

(lower bound: 966367600.0, upper bound: none)
10/15/2007 5:40:08 PM -- Performance logging ends.
10/15/2007 5:40:08 PM -- JetInterop batch transaction stats: 411126, 411549, 412377, and 411838.
10/15/2007 5:40:09 PM -- Dispatching transactions ends.
10/15/2007 5:40:09 PM -- Shutting down databases ...
10/15/2007 5:40:14 PM -- Instance1940.1 (complete), Instance1940.2 (complete), Instance1940.3 (complete), and Instance1940.4 (complete)
10/15/2007 5:40:14 PM -- Performance logging begins (interval: 15000 ms).
10/15/2007 5:40:14 PM -- Verifying database checksums ...
10/15/2007 6:43:16 PM -- T:\SG1DB (100% processed), T:\SG2DB (100% processed), S:\SG3DB (100% processed), and S:\SG4DB (100% processed)
10/15/2007 6:43:17 PM -- Performance logging ends.
10/15/2007 6:43:17 PM --
C:\Q4\Jetstress\4SG\5t\stress\DBChecksum_2007_10_15_17_40_14.blg has 252 samples.
10/15/2007 6:43:22 PM --
C:\Q4\Jetstress\4SG\5t\stress\DBChecksum_2007_10_15_17_40_14.html is saved.
10/15/2007 6:43:22 PM -- Verifying log checksums ...
10/15/2007 6:43:27 PM -- S:\SG1LG (21 logs passed), S:\SG2LG (21 logs passed), T:\SG3LG (22 logs passed), and T:\SG4LG (22 logs passed)
10/15/2007 6:43:27 PM -- C:\Q4\Jetstress\4SG\5t\stress\Stress_2007_10_14_17_33_14.blg has 5787 samples.
10/15/2007 6:43:27 PM -- Creating test report ...
10/15/2007 6:44:34 PM -- Volume T:\SG1DB has 0.0186 for Avg. Disk sec/Read.
10/15/2007 6:44:34 PM -- Volume T:\SG2DB has 0.0155 for Avg. Disk sec/Read.
10/15/2007 6:44:34 PM -- Volume S:\SG3DB has 0.0193 for Avg. Disk sec/Read.
10/15/2007 6:44:34 PM -- Volume S:\SG4DB has 0.0154 for Avg. Disk sec/Read.
10/15/2007 6:44:34 PM -- Volume S:\SG1LG has 0.0021 for Avg. Disk sec/Write.
10/15/2007 6:44:34 PM -- Volume S:\SG1LG has 0.0000 for Avg. Disk sec/Read.
10/15/2007 6:44:34 PM -- Volume S:\SG2LG has 0.0021 for Avg. Disk sec/Write.
10/15/2007 6:44:34 PM -- Volume S:\SG2LG has 0.0000 for Avg. Disk sec/Read.
10/15/2007 6:44:34 PM -- Volume T:\SG3LG has 0.0021 for Avg. Disk sec/Write.
10/15/2007 6:44:34 PM -- Volume T:\SG3LG has 0.0000 for Avg. Disk sec/Read.
10/15/2007 6:44:34 PM -- Volume T:\SG4LG has 0.0021 for Avg. Disk sec/Write.
10/15/2007 6:44:34 PM -- Volume T:\SG4LG has 0.0000 for Avg. Disk sec/Read.
10/15/2007 6:44:34 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.
10/15/2007 6:44:34 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
10/15/2007 6:44:34 PM -- C:\Q4\Jetstress\4SG\5t\stress\Stress_2007_10_14_17_33_14.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	14643058	0	0	0	114398 MBytes / 3530 seconds
T:\SG2DB\Jetstress1.edb	14657394	0	0	0	114510 MBytes / 3781 seconds
S:\SG3DB\Jetstress1.edb	14664562	0	0	0	114566 MBytes / 3761 seconds
S:\SG4DB\Jetstress1.edb	14640242	0	0	0	114376 MBytes / 3147 seconds
(Sum)	58605256	0	0	0	457853 MBytes / 3781 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	519.384	0.002
T:\SG2DB	0.153	0.001	484.555	0.002
S:\SG3DB	0.146	0.001	486.088	0.002
S:\SG4DB	0.139	0.001	583.106	0.002

Memory system performance (of checksum)

Counter	Average	Minimum	Maximum
% Processor Time	9.353	3.320	11.328
Available MBytes	15535.079	15513.000	15712.000
Free System Page Table Entries	16757811.000	16757811.000	16757811.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	78839531.683	73830400.000	80453632.000
Pool Paged Bytes	45264879.746	44724224.000	45289472.000

Test Log

10/14/2007 5:33:04 PM -- Command Line: "C:\PROGRA~1\EXCHAN~1\jetstresscmd.exe" /c "C:\Q4\Jetstress\4SG\5t\stress\stress.xml"
 10/14/2007 5:33:04 PM -- Jetstress testing begins ...
 10/14/2007 5:33:04 PM -- Prepare testing begins ...
 10/14/2007 5:33:09 PM -- Attaching databases ...
 10/14/2007 5:33:09 PM -- Prepare testing ends.
 10/14/2007 5:33:09 PM -- Dispatching transactions begins ...
 10/14/2007 5:33:09 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
 10/14/2007 5:33:09 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)

10/14/2007 5:33:14 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.1 seconds/read).
10/14/2007 5:33:14 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.1 seconds/write).
10/14/2007 5:33:15 PM -- Operation mix: Sessions 5, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
10/14/2007 5:33:15 PM -- Performance logging begins (interval: 15000 ms).
10/14/2007 5:33:15 PM -- Attaining prerequisites:
10/14/2007 5:40:07 PM -- \Database(JetstressCmd)\Database Cache Size, Last: 967999500.0 (lower bound: 966367600.0, upper bound: none)
10/15/2007 5:40:08 PM -- Performance logging ends.
10/15/2007 5:40:08 PM -- JetInterop batch transaction stats: 411126, 411549, 412377, and 411838.
10/15/2007 5:40:09 PM -- Dispatching transactions ends.
10/15/2007 5:40:09 PM -- Shutting down databases ...
10/15/2007 5:40:14 PM -- Instance1940.1 (complete), Instance1940.2 (complete), Instance1940.3 (complete), and Instance1940.4 (complete)
10/15/2007 5:40:14 PM -- Performance logging begins (interval: 15000 ms).
10/15/2007 5:40:14 PM -- Verifying database checksums ...
10/15/2007 6:43:16 PM -- T:\SG1DB (100% processed), T:\SG2DB (100% processed), S:\SG3DB (100% processed), and S:\SG4DB (100% processed)
10/15/2007 6:43:17 PM -- Performance logging ends.
10/15/2007 6:43:17 PM --
C:\Q4\Jetstress\4SG\5t\stress\DBChecksum_2007_10_15_17_40_14.blg has 252 samples.

Microsoft Exchange Server Jetstress soft recovery test results

Soft recovery test result report

Soft recovery statistics - All

Database Instance	Log files replayed	Elapsed seconds
Instance3008.1	517	319
Instance3008.2	500	280
Instance3008.3	510	318.75
Instance3008.4	510	292.5

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)	0.106	0.037	368.251	6.488	(n/a)
Database (T:\SG2DB)	0.079	0.024	360.498	6.562	(n/a)
Database (S:\SG3DB)	0.108	0.036	358.509	6.466	(n/a)
Database (S:\SG4DB)	0.077	0.024	373.988	6.671	(n/a)
Log (S:\SG1LG)	0.001	0.001	53.267	1.801	4107.342
Log (S:\SG2LG)	0.001	0.001	52.228	2.114	3716.382
Log (T:\SG3LG)	0.001	0.001	52.954	1.791	3562.860
Log (T:\SG4LG)	0.001	0.001	53.272	2.006	3729.888

Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	4.754	0.391	10.449
Available MBytes	14902.308	14699.000	15758.000
Free System Page Table Entries	16757881.000	16757881.000	16757881.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	60299354.164	60096512.000	61014016.000
Pool Paged Bytes	42811108.629	42598400.000	43171840.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

10/14/2007 3:05:36 PM -- Command Line: "C:\PROGRA~1\EXCHAN~1\jetstresscmd.exe" /c "C:\Q4\Jetstress\4SG\5t\soft\soft.xml"

10/14/2007 3:05:36 PM -- Jetstress testing begins ...

10/14/2007 3:05:37 PM -- Prepare testing begins ...

10/14/2007 3:05:41 PM -- Attaching databases ...

10/14/2007 3:05:41 PM -- Prepare testing ends.

10/14/2007 3:05:41 PM -- Dispatching transactions begins ...

10/14/2007 3:05:41 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)

10/14/2007 3:05:41 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)

10/14/2007 3:05:46 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

10/14/2007 3:05:46 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

10/14/2007 3:05:47 PM -- Operation mix: Sessions 5, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.

10/14/2007 3:05:47 PM -- Performance logging begins (interval: 15000 ms).

10/14/2007 3:05:47 PM -- Generating log files ...

10/14/2007 3:33:07 PM -- S:\SG1LG (103.4% generated), S:\SG2LG (100.2% generated), T:\SG3LG (102.2% generated), and T:\SG4LG (102.2% generated)

10/14/2007 3:33:08 PM -- Performance logging ends.

10/14/2007 3:33:08 PM -- JetInterop batch transaction stats: 10055, 9861, 10039, and 10203.

10/14/2007 3:33:08 PM -- Dispatching transactions ends.

10/14/2007 3:33:08 PM -- Shutting down databases ...

10/14/2007 3:33:13 PM -- Instance3008.1 (complete), Instance3008.2 (complete), Instance3008.3 (complete), and Instance3008.4 (complete)

10/14/2007 3:33:13 PM -- C:\Q4\Jetstress\4SG\5t\soft\Performance_2007_10_14_15_5_46.blg has 109 samples.

10/14/2007 3:33:13 PM -- Creating test report ...

10/14/2007 3:33:13 PM -- Volume T:\SG1DB has 0.0168 for Avg. Disk sec/Read.

10/14/2007 3:33:13 PM -- Volume T:\SG2DB has 0.0143 for Avg. Disk sec/Read.

10/14/2007 3:33:13 PM -- Volume S:\SG3DB has 0.0184 for Avg. Disk sec/Read.

10/14/2007 3:33:13 PM -- Volume S:\SG4DB has 0.0141 for Avg. Disk sec/Read.

10/14/2007 3:33:13 PM -- Volume S:\SG1LG has 0.0021 for Avg. Disk sec/Write.

10/14/2007 3:33:13 PM -- Volume S:\SG1LG has 0.0018 for Avg. Disk sec/Read.

10/14/2007 3:33:13 PM -- Volume S:\SG2LG has 0.0020 for Avg. Disk sec/Write.

10/14/2007 3:33:13 PM -- Volume S:\SG2LG has 0.0009 for Avg. Disk sec/Read.

10/14/2007 3:33:13 PM -- Volume T:\SG3LG has 0.0020 for Avg. Disk sec/Write.

10/14/2007 3:33:13 PM -- Volume T:\SG3LG has 0.0008 for Avg. Disk sec/Read.

10/14/2007 3:33:13 PM -- Volume T:\SG4LG has 0.0020 for Avg. Disk sec/Write.

10/14/2007 3:33:13 PM -- Volume T:\SG4LG has 0.0010 for Avg. Disk sec/Read.

10/14/2007 3:33:13 PM -- Test has 0.13336696430733 Maximum Database Page Fault Stalls/sec.

10/14/2007 3:33:13 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.

10/14/2007 3:33:13 PM -- C:\Q4\Jetstress\4SG\5t\soft\Performance_2007_10_14_15_5_46.xml has 108 samples queried.

10/14/2007 3:33:14 PM -- C:\Q4\Jetstress\4SG\5t\soft\Performance_2007_10_14_15_5_46.html is saved.

10/14/2007 3:33:14 PM -- Performance logging begins (interval: 2000 ms).

10/14/2007 3:33:15 PM -- Recovering databases ...

10/14/2007 3:38:35 PM -- Performance logging ends.

10/14/2007 3:38:35 PM -- Instance3008.1 (319), Instance3008.2 (280), Instance3008.3 (318.75),

and Instance3008.4 (292.5)

10/14/2007 3:38:35 PM -- C:\Q4\Jetstress\4SG\5t\soft\SoftRecovery_2007_10_14_15_33_14.blg

has 159 samples.

10/14/2007 3:38:35 PM -- Creating test report ...

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 3:05:37 PM

Test End Time 10/14/2007 3:33:13 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\5t\soft\Performance_2007_10_14_15_5_46.blg

Database sizing and throughput

Achieved I/O per Second 734.647

Capacity Percentage 100%

Throughput Percentage 100%

Initial database size 412311683072

Final database size 413957947392

Database files (count) 4

Jetstress system parameters

Thread count 5 (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)	0.017	0.005	95.487	90.876	(n/a)
Database (T:\SG2DB)	0.014	0.005	92.442	88.039	(n/a)
Database (S:\SG3DB)	0.018	0.005	92.919	88.849	(n/a)
Database (S:\SG4DB)	0.014	0.005	95.981	90.053	(n/a)
Log (S:\SG1LG)	0.002	0.002	0.078	59.059	11738.354
Log (S:\SG2LG)	0.001	0.002	0.076	58.108	11568.482
Log (T:\SG3LG)	0.001	0.002	0.077	59.549	11504.885
Log (T:\SG4LG)	0.001	0.002	0.077	59.871	11494.368

Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	2.099	0.742	3.477
Available MBytes	14835.743	14714.000	15678.000
Free System Page Table Entries	16757881.550	16757881.000	16757911.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	57727145.101	55537664.000	58335232.000
Pool Paged Bytes	42546955.743	41799680.000	42684416.000
Database Page Fault Stalls/sec	0.001	0.000	0.133

Test Log

10/14/2007 3:05:36 PM -- Command Line: "C:\PROGRA~1\EXCHAN~1\jetstresscmd.exe" /c "C:\Q4\Jetstress\4SG\5t\soft\soft.xml"

10/14/2007 3:05:36 PM -- Jetstress testing begins ...

10/14/2007 3:05:37 PM -- Prepare testing begins ...

10/14/2007 3:05:41 PM -- Attaching databases ...

10/14/2007 3:05:41 PM -- Prepare testing ends.

10/14/2007 3:05:41 PM -- Dispatching transactions begins ...

10/14/2007 3:05:41 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)

10/14/2007 3:05:41 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)

10/14/2007 3:05:46 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

10/14/2007 3:05:46 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

10/14/2007 3:05:47 PM -- Operation mix: Sessions 5, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.

10/14/2007 3:05:47 PM -- Performance logging begins (interval: 15000 ms).

10/14/2007 3:05:47 PM -- Generating log files ...

10/14/2007 3:33:07 PM -- S:\SG1LG (103.4% generated), S:\SG2LG (100.2% generated), T:\SG3LG (102.2% generated), and T:\SG4LG (102.2% generated)
10/14/2007 3:33:08 PM -- Performance logging ends.
10/14/2007 3:33:08 PM -- JetInterop batch transaction stats: 10055, 9861, 10039, and 10203.
10/14/2007 3:33:08 PM -- Dispatching transactions ends.
10/14/2007 3:33:08 PM -- Shutting down databases ...
10/14/2007 3:33:13 PM -- Instance3008.1 (complete), Instance3008.2 (complete), Instance3008.3 (complete), and Instance3008.4 (complete)
10/14/2007 3:33:13 PM -- C:\Q4\Jetstress\4SG\5t\soft\Performance_2007_10_14_15_5_46.blg has 109 samples.
10/14/2007 3:33:13 PM -- Creating test report ...
10/14/2007 3:33:13 PM -- Volume T:\SG1DB has 0.0168 for Avg. Disk sec/Read.
10/14/2007 3:33:13 PM -- Volume T:\SG2DB has 0.0143 for Avg. Disk sec/Read.
10/14/2007 3:33:13 PM -- Volume S:\SG3DB has 0.0184 for Avg. Disk sec/Read.
10/14/2007 3:33:13 PM -- Volume S:\SG4DB has 0.0141 for Avg. Disk sec/Read.
10/14/2007 3:33:13 PM -- Volume S:\SG1LG has 0.0021 for Avg. Disk sec/Write.
10/14/2007 3:33:13 PM -- Volume S:\SG1LG has 0.0018 for Avg. Disk sec/Read.
10/14/2007 3:33:13 PM -- Volume S:\SG2LG has 0.0020 for Avg. Disk sec/Write.
10/14/2007 3:33:13 PM -- Volume S:\SG2LG has 0.0009 for Avg. Disk sec/Read.
10/14/2007 3:33:13 PM -- Volume T:\SG3LG has 0.0020 for Avg. Disk sec/Write.
10/14/2007 3:33:13 PM -- Volume T:\SG3LG has 0.0008 for Avg. Disk sec/Read.
10/14/2007 3:33:13 PM -- Volume T:\SG4LG has 0.0020 for Avg. Disk sec/Write.
10/14/2007 3:33:13 PM -- Volume T:\SG4LG has 0.0010 for Avg. Disk sec/Read.
10/14/2007 3:33:13 PM -- Test has 0.13336696430733 Maximum Database Page Fault Stalls/sec.
10/14/2007 3:33:13 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
10/14/2007 3:33:13 PM -- C:\Q4\Jetstress\4SG\5t\soft\Performance_2007_10_14_15_5_46.xml has 108 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
Instance220.1	98300.77	02:38:50	10.31
Instance220.2	98300.77	02:34:28	10.61
Instance220.3	98300.77	02:34:27	10.61
Instance220.4	98300.77	02:36:54	10.44

Jetstress system parameters

Thread count	5 (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
Instance220.1	7.059	0.062	82.951	0.000	0.000	0.000	0.000	0.000	0.000
Instance220.2	6.420	0.000	85.345	0.000	0.000	0.000	0.000	0.000	0.000
Instance220.3	6.489	0.052	85.362	0.000	0.000	0.000	0.000	0.000	0.000
Instance220.4	6.892	0.038	84.016	0.000	0.000	0.000	0.000	0.000	0.000

Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	32.269	14.023	52.586
Available MBytes	15249.123	14984.000	15707.000
Free System Page Table Entries	16757897.422	16757871.000	16758021.000
Transition Pages RePurposed/sec	10260.504	0.000	23310.828
Pool Nonpaged Bytes	71174562.760	57368576.000	78237696.000
Pool Paged Bytes	571314647.105	45928448.000	846970880.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

10/14/2007 11:14:16 AM -- Command Line: "C:\PROGRA~1\EXCHAN~1\jetstresscmd.exe" /c "C:\Q4\Jetstress\4SG\5t\b2d\b2d.xml"

10/14/2007 11:14:16 AM -- Jetstress testing begins ...

10/14/2007 11:14:16 AM -- Prepare testing begins ...

10/14/2007 11:14:21 AM -- Attaching databases ...

10/14/2007 11:14:21 AM -- Prepare testing ends.

10/14/2007 11:14:26 AM -- Performance logging begins (interval: 15000 ms).

10/14/2007 11:14:26 AM -- Streaming backup databases ...

10/14/2007 1:53:18 PM -- Performance logging ends.

10/14/2007 1:53:18 PM -- Instance220.1 (100% processed), Instance220.2 (100% processed), Instance220.3 (100% processed), and Instance220.4 (100% processed)

10/14/2007 1:53:18 PM --

[C:\Q4\Jetstress\4SG\5t\b2d\StreamingBackup_2007_10_14_11_14_21.blg](#) has 626 samples.

10/14/2007 1:53:18 PM -- Creating test report ...