

## ESRP Storage Program

**EMC CLARiiON CX4-960 (60,000 User)  
Exchange 2010 Mailbox Resiliency  
Storage Solution**

**Tested with:** ESRP - Storage Version 3.0  
**Tested Date:** December, 2009

**EMC Information Infrastructure Solutions**



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EMC CLARiiON CX4-960 (60,000 User) Exchange 2010 Mailbox Resiliency Storage Solution  
Part Number: H7202

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## Table of Contents

Overview.....	4
Disclaimer.....	4
Features.....	5
Solution description.....	7
Targeted customer profile.....	13
Best practices.....	18
Test results summary.....	22
Conclusion.....	27
Contact information.....	29
Appendix A: Test reports.....	30

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## Overview

This document provides information on the EMC® CLARiiON® CX4-960 (60,000 User) Exchange 2010 Mailbox Resiliency storage solution based on the *Microsoft Exchange Solution Reviewed Program (ESRP) - Storage* program. For any questions or comments regarding the contents of this document, see “[Contact information](#)” on [page 29](#).

*The ESRP - Storage* program was developed by Microsoft Corporation to provide a common storage testing framework for vendors to provide information on its storage solutions for Microsoft Exchange Server software. For more details on the Microsoft ESRP - Storage program, visit:

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

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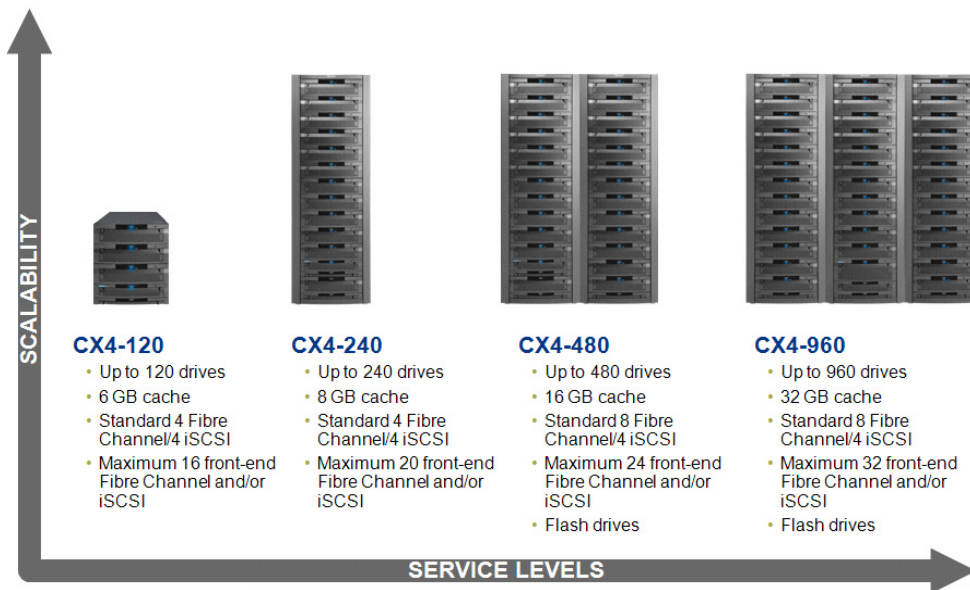
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## Features

The EMC CLARiiON CX4-960 midrange array delivers performance, scalability, and advanced data management features in one, easy-to-use storage solution. It can support up to 512 highly available, dual-connected hosts and scales up to 960 disk drives for a maximum capacity of 1,899 TB. [Figure 1](#) provides additional details about the EMC CLARiiON family.



**Figure 1** EMC CLARiiON storage array product family

Table 1 lists CLARiiON CX4-960 features and benefits.

**Table 1 CLARiiON CX4-960 features**

<b>Feature</b>	<b>Benefit</b>
CLARiiON Fully Automated Storage Tiering (FAST)	Automates storage tiering to lower costs and deliver higher service levels.
Flash drives	Extends tiering capabilities by establishing a new tier 0 for ultra-high performance.
UltraFlex™ technology	Leverages flexible connectivity options, online expansion, and the ability to integrate future technologies.
Fibre Channel (FC) and iSCSI connectivity	Integrates eight 4 Gb/s FC, and four 1 Gb/s iSCSI host ports.
CLARiiON Virtual Provisioning™	Provides increased capacity utilization while simplifying and accelerating the process of allocating storage capacity across tiers in a storage array.
Virtualization-aware management	Provides a real-time, dynamic view of the virtual environment with end-to-end mapping and reporting capabilities.
Virtual LUN technology	Enables administrators to easily manage tiered storage deployments with nondisruptive data migration within the array.

For more information on the EMC CLARiiON CX4 Series storage family visit:

<http://www.emc.com/products/series/cx4-series.htm>

And for information on EMC's solutions for Microsoft Exchange, visit:

<http://www.emc.com/exchange>

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## Solution description

This solution is intended for medium-to-large enterprise size businesses that are planning to deploy Exchange 2010 on the EMC CLARiiON CX4-960 array and would like to leverage the Database Availability Group (DAG) feature introduced in Exchange Server 2010. The solution design represents an Exchange 2010 environment supporting 60,000 users in a mailbox resiliency configuration across two intelligent CLARiiON CX4-960 storage arrays. The solution is designed to provide outstanding performance and flexibility for today and tomorrow's Exchange user needs.

The solution design provides a configuration with no single point of failure, where each Exchange database is RAID-protected by a CLARiiON CX4-960 array and replicated to a different server on a second array. All 60,000 users are distributed between two DAGs across 12 Mailbox Servers (six servers per DAG). Each DAG was designed with two copies of the Exchange databases (one half of the active/passive database copies on one CX4-960 storage array and the other half of the active/passive database copies residing on the secondary CX4-960 array).

Each Exchange Mailbox Server was designed to support 5,000 active users during normal operation, and a configuration of 10,000 users in case of Exchange server(s) switchover/failure within the DAG. That is, if the Exchange Mailbox server within the same DAG fails, its passive copies are activated on the other DAG member server with its databases on the secondary array.

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**Note:** This configuration can also be compared to a design where Exchange 2010 is deployed in a stand-alone configuration (no DAG), and where a single CLARiiON array provides service to all 60,000 users configured across six mailbox servers.

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Access the Windows Hardware Compatibility List link for EMC CLARiiON CX4-960:

<http://www.windowsservercatalog.com/item.aspx?itemId=d2b9a6b2-eff7-2a40-4b25-3a938ba0048e&bCatID=1282>

Figure 2 illustrates the layout of the physical architecture.

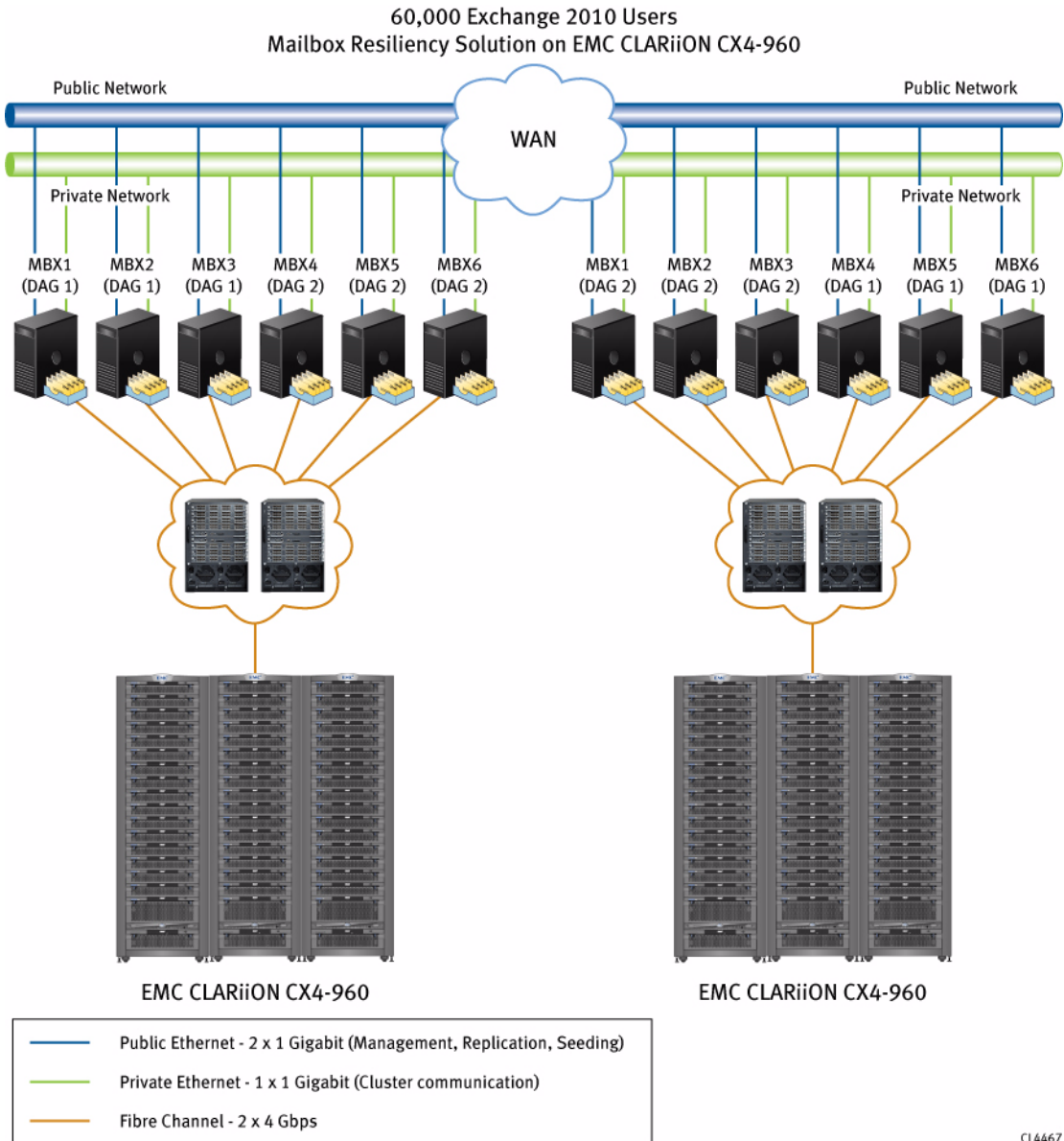


Figure 2 Physical architecture

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## Storage design for Exchange 2010

Sizing and configuring storage for use with Microsoft Exchange Server 2010 can be a complicated process, driven by many variables and factors, which vary from organization to organization. Properly configured Exchange storage, combined with properly sized server and network infrastructures, can guarantee smooth Exchange operation and best user experience. One of the methods that can be used to simplify the sizing and configuration of large amounts of EMC CLARiiON storage for use with Microsoft Exchange Server 2010 is to define a unit of measure—a Mailbox Server *building-block*.

A Mailbox Server building-block represents the required amount of disk and server resources required to support a specific number of Exchange 2010 users. The amount of required resources is derived from a specific user profile type, mailbox size, and disk requirements. Using the building-block approach takes out the guesswork and simplifies the implementation of Exchange 2010 Mailbox Server. Once the initial building-block is designed, it can be easily reproduced to support the required number of total users in your organization. By using this approach, Exchange administrators can now create their own building-blocks that are based on their company's specific Exchange environment requirements. This approach is very helpful when future growth is expected, as it makes Exchange environment expansion much easier, and straightforward. EMC's best practices involving the building-block approach for Exchange Server design has proven to be very successful throughout many customer implementations.

## Building-block applied in this solution

The building-block used in this solution was based on a user profile of 0.15 IOPS with a 1 GB mailbox. The design included ten 600 GB FC drives in a RAID 5 configuration supporting 2,500 users from both an I/O and space perspective.

To scale this configuration up to 10,000 users per server (in a switchover condition), four of the building-blocks with a total of 40 disks were used. Further, to scale up the configuration to 60,000 users, 24 of the building-blocks were used.

Figure 3 shows how database and log LUNs were configured within the building-block and distributed between CLARiiON SPs for best performance and high availability (HA). This building-block provides all the necessary requirements for performance, capacity, and data protection to support 2,500 users.

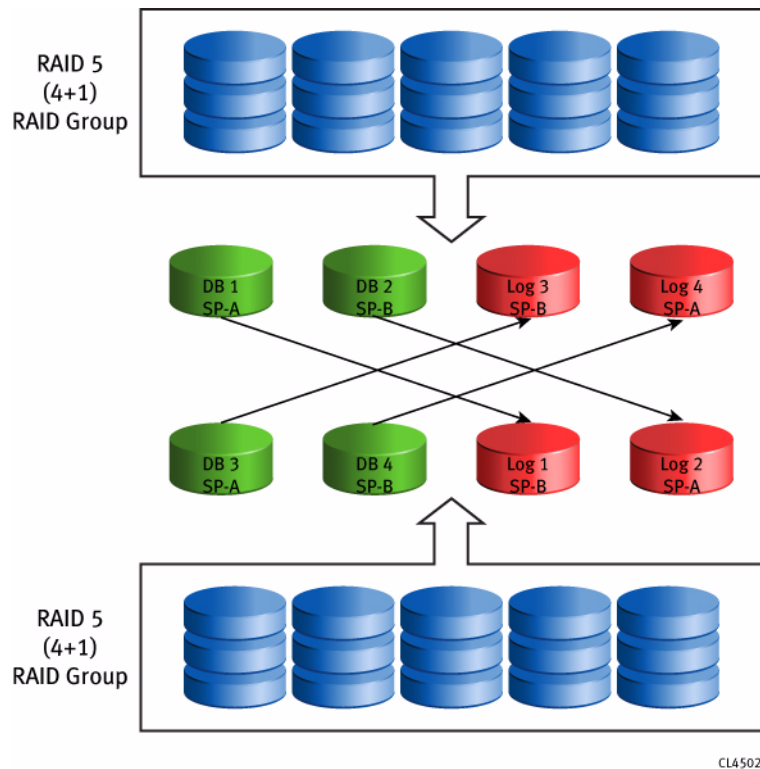


Figure 3 Building-block design used during testing

Table 2 summarizes the building-block created for this configuration based on the user profile and mailbox requirements for this solution.

**Table 2 Building-block characteristics**

Item	Description
User profile	.18 IOPS (.15 + 20% headroom)
Mailbox size	1 GB
Drive type and capacity	600 GB FC drives, 10k rpm
RAID type	RAID 5
Database LUN size	820 GB
Log LUN size	65 GB
Total disks required for performance and capacity	10

This flexible building-block design offers customers the capability to keep pace with an increasing user population. Users who share the same profile can easily be added to the environment, as shown in Table 3.

**Table 3 Building-block scaling**

Exchange users per server	Require...
2,500	One building-block with 10 spindles and two RAID 5 groups
5,000	Two building-blocks with 20 spindles and two RAID 5 RGs
7,500	Three building-blocks with 30 spindles and two RAID 5 RGs
10,000	Four building-blocks with 40 spindles and two RAID 5 RGs

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### **Additional factors that may impact server scalability**

The ESRP-Storage program focuses on storage solution testing to address performance and reliability issues with storage design. However, storage is not the only factor to take into consideration when designing a scaled-up Exchange solution. Other factors that affect the server scalability include:

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

These factors are 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, refer to Microsoft's Troubleshooting Microsoft Exchange Server Performance:

<http://technet.microsoft.com/en-us/library/dd335215.aspx>

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## Targeted customer profile

This solution is designed for medium-to-large organizations that are planning to consolidate their Exchange Server 2010 storage on high-performance and very highly-reliable storage systems like the CLARiiON CX4-960 midtier storage system. The configuration presented in this solution is designed to support 60,000 Exchange users with the following specifications:

- 12 Exchange servers with a 5,000 active/5,000 passive configuration (six tested, simulating 10,000 users in a switchover/failover condition)
- 150 messages user profile - 0.15 IOPS per user (0.18 tested for 20 percent headroom)
- 1 GB mailbox size
- Native Exchange 2010 DAG is used for mailbox resiliency and high availability as the primary data protection mechanism for Exchange data
- 24x7 background database maintenance (BDM) enabled
- Two CLARiiON CX4-960 midtier storage systems (one tested)

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**Note:** If more than two copies are required, EMC recommends having two RAID-protected DAG copies locally and having a third RAID-protected copy on a separate array.

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## Tested deployment

The following tables summarize the tested environment.

### Simulated Exchange configuration

Table 4 lists the simulated Exchange configuration details.

**Table 4 Simulated Exchange configuration**

Item	Description
Number of Exchange mailboxes simulated	60,000
Number of DAGs	2
Number of servers/DAG	6
Number of active mailboxes/server	10,000
Number of databases/host	16
Number of copies/database	2
Number of mailboxes/databases	625
Simulated profile: I/Os per second per mailbox (IOPS, includes 20% headroom)	0.18
BDM	Tested with 24x7 enabled
Database LUN size	820 GB
Log LUN size	65 GB
Total database size for performance testing	58,560 GB
% formatted storage capacity used by Exchange database **	56.82%

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

## Storage hardware

Table 5 lists the hardware used in the environment.

**Table 5 Hardware (list of all hardware used for the test)**

Item	Description
Storage connectivity (FC, SAS, SATA, iSCSI)	FC drives
Storage model and OS/firmware revision	CX4-960; FLARE® OS version: 29
Storage cache	32 GB available (16 GB per SP)
Number of storage controllers	2
Number of storage ports	16 available (12 used for testing)
Maximum bandwidth of storage connectivity to host	64 Gb/s (16 ports @ 4 Gb/s)
Switch type/model/firmware revision	Cisco MDS 9509 FC switch
HBA model and firmware	QLogic dual-port 8 GB HBAs QLA2562, Firmware: 4.06.01
Number of HBAs/host	1 dual-port HBA
Host server type	Dell PowerEdge R900 with Intel Xeon CPU X7350 @ 2.93 GHz, 2.92 GHz, 4 Core, 128 GB RAM
Total number of disks tested in solution	240
Maximum number of spindles that can be hosted in the storage	960

## Storage software

Table 6 lists the software used in the environment.

**Table 6**      **Software**

Item	Description
HBA driver	STOR Miniport 9.1.8.6
HBA QueueTarget setting	256
HBA QueueDepth setting	256
Multipathing	EMC PowerPath® 5.3 (64 Bit)
Host OS	Microsoft Windows Server© 2008 Enterprise Service Pack 2
ESE.dll file version	14.0.639.19
Replication solution name/versionFC	N/A

## Storage disk configuration (database/log disks)

Table 7 lists the disk configuration for databases and transaction logs for the environment. The transactional log disks use the same disks as the Mailbox Store database. As described earlier in [“Storage design for Exchange 2010” on page 9](#), database and log LUNs were placed on the same physical spindles but in different RAID groups.

**Table 7 Disk configuration (mailbox store and transaction logs)**

Item	Description
Disk type, speed and firmware revision	FC, 10k rpm
Raw capacity per disk (GB)	600 GB (536.81 GB usable)
Number of physical disks in test (databases and logs)	240
Total raw storage capacity (GB)	128,834 GB
Database LUN size (GB)	820 GB
Log LUN size (GB)	65 GB
Number of slices per LUN or number of disks per LUN	N/A
RAID level	RAID 5 (4+1)
Total formatted capacity (databases)	78,720 GB
Total formatted capacity (logs)	6,240 GB
Total formatted capacity (databases and logs)	84,960 GB
Storage capacity utilization (Total formatted capacity (databases and logs) / total raw capacity)	66%
Database capacity utilization (Total database size / total formatted database capacity)	61%

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## Best practices

In comparison to earlier versions of Microsoft Exchange, Exchange Server 2010 has made significant improvements in the areas of I/O and storage. For example, there have been many changes to the core schema, and the extensible storage engine (ESE) to reduce the I/O usage profile. Due to this I/O reduction, Exchange 2010 now supports a variety of different drive types such as SATA, SAS, FC and Flash drives.

These changes also allow for the use of RAID 5 as an optimal RAID configuration for Exchange databases and logs and even allow for RAID 0 (RAIDless) configurations under certain conditions. This allows for larger mailboxes at a reduced cost without performance degradation.

For Exchange 2010 Mailbox Server design best practices, visit <http://technet.microsoft.com/en-us/library/dd346703.aspx>. In addition to Microsoft recommendations, EMC recommends following the best practices described in this section to improve CLARiiON storage performance with Exchange 2010.

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## Mailbox servers

Follow these recommendations to ensure the best possible mailbox server performance:

- Format new NTFS volumes on Windows Server 2008, to be used for Exchange database and logs, with the allocation unit size (ALU) to 64 KB. This can be done from the drop-down list in Disk Manager or through the command prompt using `diskpart`.

**Note:** Partition alignment is no longer required when running Microsoft Windows Server 2008 as partitions are automatically aligned to a 1 MB offset.

- In SAN environments, use redundant HBAs connected to different fabrics. Install EMC PowerPath for optimal path management and maximum I/O performance. For more information on installing and configuring the PowerPath application, visit:

<http://www.emc.com/products/detail/software/powerpath-multipathing.htm>

- Verify that the host bus adapter (HBA) installed in the server can support your IOPS requirements, even in a failover situation. To avoid throttling, ensure that the queue depth is set according to EMC recommendations.

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## Core storage

Tuning the CX4-960 storage system parameters is important to ensure the optimal Exchange 2010 performance. The following list details the optimal configuration settings for Exchange 2010 on an EMC CX4-960 storage array for a large enterprise deployment of Exchange 2010:

- Plan for performance even in a failover situation. Balance LUNs across the array storage processors.
- Set the **Page Size** to 16 KB if the array is dedicated to an Exchange 2010 workload.
- Set the **Page Size** to 8 kb if there are other applications also sharing this array.
- Enable write cache for all LUNs.
- Isolate the Microsoft Exchange Server database workload from other I/O-intensive applications or workloads. This ensures the highest level of performance for Exchange and simplifies troubleshooting in the event of a disk related Microsoft Exchange performance issue.
- Always size the disks for IOPS before sizing for capacity. Once this is calculated, determine the capacity required.
- After identifying the actual IOPS numbers, always apply a 20 percent I/O overhead to your calculations to add some reserve.
- Logs and databases can be placed on the same physical spindles under the following specific conditions:
  - DAG is in place.
  - DAG contains a minimum of three database copies.
- When DAG is not being used, logs and databases should not share the same physical spindles. The exception to this is if there are multiple RAID groups in the storage configuration. Under these conditions, logs and databases may share the same spindles but logs for the same database should be placed on different spindles. This provides additional protection to RAID when DAG is not being used.
- Microsoft recommends a maximum database size of 100 GB in solutions where DAG is not being used. When DAG is being used with a minimum of two RAID-protected copies the maximum database size can be up to 2 TB. Backup (if applicable) and restore times should be accounted for when calculating database size.

For more information on EMC solutions for Microsoft Exchange:

<http://www.emc.com/solutions/application-environment/microsoft/solutions-for-microsoft-exchange-unified-communications.htm>

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## Use EMC Proven Solutions

Each Microsoft application environment is unique in its size, scale, and criticality. EMC recommends specific configurations in their Proven Solutions documentation that aim to lower the risk of deploying critical applications customer environments and provide a blueprint for success whether you are looking for Exchange storage, virtualization, or protection solutions.

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## Storage validation tool

Jetstress 2010 was used to verify the performance and stability of the CLARiiON CX4-960 disk subsystem. Jetstress helps verify disk performance by simulating Exchange disk I/O load. Specifically, Jetstress simulates the Exchange database and log file loads produced by a specific number of users. This tool is designed to simulate Exchange I/O at the database level by interacting directly with the database technology of the ESE (also known as Jet) that Exchange is built on. It is also important to note that Jetstress testing focuses on storage solution testing, and highlights performance and reliability issues with storage design.

Jetstress can be configured to test the maximum I/O throughput available to your disk subsystem within the required performance constraints of Exchange, or it can accept a desired profile of user count and I/Os per second per user and validate that the disk subsystem is capable of maintaining an acceptable level of performance with such a profile.

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**Note:** The Jetstress tool is designed to test performance of the Exchange storage subsystem before placing it in the production environment. It is not designed to test server CPU and memory configuration and impact of MAPI user activity.

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The documentation for Jetstress describes how to configure and execute an I/O validation or evaluation on your server hardware. The Jetstress application is available from:

<http://go.microsoft.com/fwlink/?LinkId=178616>

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## Test results summary

This section provides a high-level summary of the test data from ESRP, as well as links to the detailed reports that are generated by the ESRP testing framework. The results are located in [“Appendix A: Test reports” on page 30](#).

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**Note:** 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.

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## Reliability

A number of the tests in the framework are designed to test reliability over a 24-hour period. The goal of these tests is to verify that the storage can handle a high I/O load for a long period of time. Following the stress test, both log and database files on production and DR hosts are analyzed for integrity to ensure there is no database/log corruption.

- No errors were reported in the event log file for the storage reliability testing.
- No errors were reported for the database and log checksum.
- The backup-to-disk test is not applicable.

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## Storage performance results

The primary storage performance testing is designed to exercise the storage with the maximum sustainable Exchange type of I/O for two 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 of the Achieved Transactional Database I/Os and log I/Os, and average of all the database and logs I/O latency during the two-hour test. Each server is listed separately and the aggregate numbers across all servers are listed as well.

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**Note:** The sum of Achieved Transactional Database I/Os only includes Database reads/sec I/Os and Database writes/sec I/Os. It does not include Background Database Maintenance (BDM) I/Os, log I/Os and log replication I/Os. For the total I/O summary, refer to the Jetstress performance test results in “[Microsoft Exchange Server 2010 Jetstress – 2-hour performance](#)” on page 30, and the Jetstress stress test results in “[Microsoft Exchange Server 2010 Jetstress – 24-hour stress](#)” on page 44.

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For more details about Exchange 2010 I/Os, see "Understanding Database and Log Performance Factors" at <http://technet.microsoft.com/en-us/library/ee832791.aspx>.

For more details about Mailbox Server storage performance and thresholds, review the "Mailbox Server Counters" topic: <http://technet.microsoft.com/en-us/library/ff367871.aspx>.

### Individual server metrics

The information in this table includes the sum of I/Os across Achieved Transactional Database I/Os, Transaction Log I/Os and the average I/O latencies across all databases and logs on a per-server basis.

Database I/O	Target values	Server 1	Server 2	Server 3	Server 4	Server 5	Server 6
Achieved transactional I/O per sec	1,800	1916.16	1928.73	1931.57	1943.54	1936.02	1920.44
I/O database reads/sec	N/A	1129.513	1136.791	1138.638	1145.47	1141.013	1132.301
I/O database writes/sec	N/A	786.65	791.93	792.93	798.07	795.01	788.14
I/O database reads average latency (msec)	< 20 msec	16.415	16.387	15.921	15.953	16.161	16.520
I/O database writes average latency (msec)	< 20 msec**	14.544	14.039	13.982	13.776	14.025	14.177
<b>Transaction log I/O</b>							
I/O log writes/sec	N/A	519.53	526.28	523.7	530.21	524.1	522.65
I/O log writes average latency (msec)	< 10 msec	6.849	6.533	6.770	6.536	6.798	6.697

\*\* General recommendations are < 20 msec. This counter is not a good indicator for client latency since database writes are asynchronous, see <http://technet.microsoft.com/en-us/library/ff367871.aspx>.

### Aggregate performance across all servers metrics

The information in this table includes the sum of I/Os across all servers in the solution, and the average latency across all servers in the solution.

<b>Database I/O</b>	<b>Target values</b>	<b>I/Os across all servers</b>
Achieved transactional I/O per sec	10,800	11576.46
I/O database reads/sec	N/A	6823.726
I/O database writes/sec	N/A	4752.7
I/O database reads average latency (msec)	< 20 msec	16.226
I/O database writes average latency (msec)	< 20 msec **	14.090
<b>Transaction log I/O</b>		
I/O log writes/sec	N/A	3146.5
I/O log writes average latency (msec)	< 10 msec	6.697

\*\* General recommendations are < 20 msec. This counter is not a good indicator for client latency since database writes are asynchronous, see <http://technet.microsoft.com/en-us/library/ff367871.aspx>.

## Database backup/recovery performance

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

### Database read-only performance

This test is used to measure the maximum rate at which databases could be backed up via Volume Shadow Copy Service (VSS). The following table shows the average rate for a single database file.

	Server 1	Server 2	Server 3	Server 4	Server 5	Server 6
<b>MB read/sec per database</b>	12.67	12.83	13.04	13.05	12.76	12.68
<b>MB read/sec total per server</b>	202.78	205.26	208.61	208.85	204.21	202.80

### Transaction log recovery/replay performance

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

	Server 1	Server 2	Server 3	Server 4	Server 5	Server 6
<b>Average time to play one log file (sec)</b>	3	3	3	4	4	3

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## Conclusion

The testing described in this document validated the ESRP for Exchange Server 2010 on the EMC CLARiiON CX4-960 midtier storage array that combines CLARiiON five 9s availability with innovative technologies like Fully Automated Storage Tiering, Flash drives, Virtual Provisioning, a 64-bit operating system, and multi-core processors. This solution was tested under a very heavy user profile of Exchange Server 2010 with mailbox resiliency. The high performance achieved makes CLARiiON CX4-960 an ideal candidate for Exchange Server 2010 deployments. Furthermore, the robust connectivity and the built-in high reliability features ensure maximum availability for your Exchange Server environment.

EMC recommends using the building-block approach when designing storage solutions supporting Exchange Server 2010. In this solution, a building-block of 2,500 users with a 150 messages user profile of .15 IOPS and 1 GB mailbox was utilized to scale the configuration up to 60,000 users utilizing 24 of the building-blocks on the CLARiiON CX4-960 storage array. This configuration was defined and tested to meet all of the Microsoft Exchange Server recommended metrics.

In addition, the performance results outlined in this Microsoft-approved ESRP document demonstrate that the IOPS and latencies achieved will provide additional headroom to accommodate future user growth. Comparatively, EMC has recently completed a similar solution titled Performance Validation and Test Results for Microsoft Exchange Server 2010 Enabled by EMC CLARiiON CX4-960 to show that the CX4-960 can handle an increased Exchange 2010 load. This earlier solution targeted a customer profile based on 80,000 users across eight servers. It is important to note that BDM was not used during that solution.

For a detailed account, see the white paper *Performance Validation and Test Results for Microsoft Exchange Server 2010 Enabled by EMC CLARiiON CX4-960—A Detailed Review*:

<http://www.emc.com/collateral/hardware/white-papers/h6918-validation-exchange-clariion-cx4-960-wp.pdf>

**Note:** 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.

## 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, use the following numbers:

United States: **(800) 782-4362 (SVC-4EMC)**

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

Worldwide: **(508) 497-7901**

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

<http://www.EMC.com>

or

<http://www.Powerlink.EMC.com>

## Appendix A: Test reports

The test results included in this section are a representative sample of the test results for the EX-N1 machines as follows:

- [“Microsoft Exchange Server 2010 Jetstress – 2-hour performance” on page 30](#)
- [“Microsoft Exchange Server 2010 Jetstress – 24-hour stress” on page 44](#)
- [“Microsoft Exchange Server 2010 Jetstress – database backup” on page 57](#)
- [“Microsoft Exchange Server 2010 Jetstress – SoftRecovery” on page 62](#)

### Microsoft Exchange Server 2010 Jetstress – 2-hour performance

#### Performance test result report

##### Test summary

<b>Overall Test Result</b>	<b>Pass</b>
<b>Machine Name</b>	EX-N1
<b>Test Description</b>	N/A
<b>Test Start Time</b>	12/1/2009 10:28:03 PM
<b>Test End Time</b>	12/2/2009 12:35:54 AM
<b>Collection Start Time</b>	12/1/2009 10:31:30 PM
<b>Collection End Time</b>	12/2/2009 12:31:17 AM
<b>Jetstress Version</b>	14.01.0040.000
<b>Ese Version</b>	14.00.0639.019
<b>Operating System</b>	Windows Server 2008 Enterprise Service Pack 2 (6.0.6002.131072)
<b>Performance Log</b>	<ul style="list-style-type: none"> <li>• C:\Program Files\Exchange Jetstress\Performance_2009_12_1_22_28_41.blg</li> <li>• C:\Program Files\Exchange Jetstress\DBChecksum_2009_12_2_0_35_54.blg</li> </ul>

**Database sizing and throughput**

<b>Achieved Transactional I/O per Second</b>	1916.161
<b>Target Transactional I/O per Second</b>	1800
<b>Initial Database Size (bytes)</b>	10534893125632
<b>Final Database Size (bytes)</b>	10541520125952
<b>Database Files (Count)</b>	16

**Jetstress system parameters**

<b>Thread Count</b>	6 (per database)
<b>Minimum Database Cache</b>	512.0 MB
<b>Maximum Database Cache</b>	4096.0 MB
<b>Insert Operations</b>	40%
<b>Delete Operations</b>	20%
<b>Replace Operations</b>	5%
<b>Read Operations</b>	35%
<b>Lazy Commits</b>	70%
<b>Run Background Database Maintenance</b>	True
<b>Number of Copies per Database</b>	2

**Database configuration**

<b>Instance2808.1</b>	Log Path: H:\L1 Database: G:\DB1\Jetstress001001.edb
<b>Instance2808.2</b>	Log Path: H:\L2 Database: G:\DB2\Jetstress002001.edb
<b>Instance2808.3</b>	Log Path: H:\L3 Database: G:\DB3\Jetstress003001.edb
<b>Instance2808.4</b>	Log Path: H:\L4 Database: G:\DB4\Jetstress004001.edb
<b>Instance2808.5</b>	Log Path: H:\L5 Database: G:\DB5\Jetstress005001.edb
<b>Instance2808.6</b>	Log Path: H:\L6 Database: G:\DB6\Jetstress006001.edb
<b>Instance2808.7</b>	Log Path: H:\L7 Database: G:\DB7\Jetstress007001.edb
<b>Instance2808.8</b>	Log Path: H:\L8 Database: G:\DB8\Jetstress008001.edb
<b>Instance2808.9</b>	Log Path: H:\L9 Database: G:\DB9\Jetstress009001.edb
<b>Instance2808.10</b>	Log Path: H:\L10 Database: G:\DB10\Jetstress010001.edb
<b>Instance2808.11</b>	Log Path: H:\L11 Database: G:\DB11\Jetstress011001.edb
<b>Instance2808.12</b>	Log Path: H:\L12 Database: G:\DB12\Jetstress012001.edb
<b>Instance2808.13</b>	Log Path: H:\L13 Database: G:\DB13\Jetstress013001.edb
<b>Instance2808.14</b>	Log Path: H:\L14 Database: G:\DB14\Jetstress014001.edb
<b>Instance2808.15</b>	Log Path: H:\L15 Database: G:\DB15\Jetstress015001.edb
<b>Instance2808.16</b>	Log Path: H:\L16 Database: G:\DB16\Jetstress016001.edb

## Transactional I/O performance

MSEXchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance2808.1	16.478	15.800	70.632	49.279	34260.400	35679.331	0.000	6.782	0.000	32.430	0.000	5956.642
Instance2808.2	16.582	15.532	70.686	49.147	34177.221	35708.451	0.000	6.908	0.000	32.435	0.000	6000.464
Instance2808.3	16.391	15.662	69.961	48.719	34339.332	35719.642	0.000	6.803	0.000	32.371	0.000	5975.202
Instance2808.4	16.483	15.397	69.815	48.530	34336.179	35695.124	0.000	6.906	0.000	32.082	0.000	5973.050
Instance2808.5	16.288	16.351	70.964	49.500	34287.134	35667.990	0.000	6.771	0.000	32.851	0.000	5898.688
Instance2808.6	16.369	16.369	70.196	48.903	34237.243	35682.294	0.000	6.876	0.000	32.202	0.000	5925.951
Instance2808.7	16.273	16.273	70.954	49.366	34444.896	35695.796	0.000	6.794	0.000	32.742	0.000	5935.557
Instance2808.8	16.400	16.400	69.720	48.439	34321.597	35715.699	0.000	6.918	0.000	32.113	0.000	6002.493
Instance2808.9	16.529	14.592	71.459	49.835	34417.880	35661.194	0.000	6.816	0.000	32.791	0.000	5980.969
Instance2808.10	16.610	14.385	70.850	49.250	34495.250	35644.370	0.000	6.907	0.000	32.494	0.000	5937.576
Instance2808.11	16.370	14.248	70.644	49.265	34312.539	35648.208	0.000	6.778	0.000	32.199	0.000	5926.819
Instance2808.12	16.491	13.944	70.804	49.365	34236.054	35668.197	0.000	6.901	0.000	32.275	0.000	5971.564
Instance2808.13	16.273	13.618	70.504	49.102	34326.158	35726.646	0.000	6.817	0.000	32.538	0.000	5999.617
Instance2808.14	16.317	13.404	70.510	49.125	34515.163	35671.541	0.000	6.932	0.000	32.482	0.000	5944.690
Instance2808.15	16.421	12.979	71.338	49.733	34230.865	35747.193	0.000	6.768	0.000	33.051	0.000	5967.185
Instance2808.16	16.421	12.789	70.476	49.089	34368.188	35759.668	0.000	6.900	0.000	32.471	0.000	5999.202

## Background database maintenance I/O performance

MSExchange Database ==> Instances	Database Maintenance I/O Reads/sec	Database Maintenance I/O Reads Average Bytes
Instance2808.1	29.004	261514.983
Instance2808.2	29.118	261531.321
Instance2808.3	29.078	261563.404
Instance2808.4	29.065	261531.445
Instance2808.5	29.060	261531.437
Instance2808.6	29.101	261486.770
Instance2808.7	29.136	261485.595
Instance2808.8	29.103	261532.489
Instance2808.9	29.093	261479.276
Instance2808.10	29.088	261476.642
Instance2808.11	29.173	261509.143
Instance2808.12	29.140	261497.533
Instance2808.13	29.142	261516.665
Instance2808.14	29.231	261491.462
Instance2808.15	29.172	261557.344
Instance2808.16	29.157	261527.141

## Log replication I/O performance

MSExchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance2808.1	0.800	231054.232
Instance2808.2	0.806	229573.532
Instance2808.3	0.801	232563.122
Instance2808.4	0.792	228583.174
Instance2808.5	0.803	229532.424
Instance2808.6	0.790	230543.942
Instance2808.7	0.805	231056.035
Instance2808.8	0.799	230050.035
Instance2808.9	0.813	230569.814
Instance2808.10	0.800	230078.194
Instance2808.11	0.791	231067.689
Instance2808.12	0.799	230633.409
Instance2808.13	0.809	230075.173
Instance2808.14	0.800	229537.232
Instance2808.15	0.818	229375.413
Instance2808.16	0.808	231553.412

## Total I/O performance

MSEXchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance2808.1	16.478	15.800	99.637	49.279	100414.497	35679.331	8.474	6.782	0.800	32.430	231054.232	5956.642
Instance2808.2	16.582	15.532	99.804	49.147	100508.078	35708.451	8.544	6.908	0.806	32.435	229573.532	6000.464
Instance2808.3	16.391	15.662	99.038	48.719	101052.701	35719.642	8.542	6.803	0.801	32.371	232563.122	5975.202
Instance2808.4	16.483	15.397	98.880	48.530	101117.481	35695.124	8.689	6.906	0.792	32.082	228583.174	5973.050
Instance2808.5	16.288	15.351	100.023	49.500	100307.845	35667.990	8.511	6.771	0.803	32.851	229532.424	5898.688
Instance2808.6	16.369	15.186	99.297	48.903	100837.458	35682.294	8.586	6.876	0.790	32.202	230543.942	5925.951
Instance2808.7	16.273	15.055	100.090	49.366	100535.814	35695.796	8.566	6.794	0.805	32.742	231056.035	5935.557
Instance2808.8	16.400	14.756	98.823	48.439	101234.028	35715.699	8.736	6.918	0.799	32.113	230050.035	6002.493
Instance2808.9	16.529	14.592	100.552	49.835	100113.405	35661.194	8.625	6.816	0.813	32.791	230569.814	5980.969
Instance2808.10	16.610	14.385	99.938	49.250	100560.385	35644.370	8.377	6.907	0.800	32.494	230078.194	5937.576
Instance2808.11	16.370	14.248	99.816	49.265	100713.863	35648.208	8.559	6.778	0.791	32.199	231067.689	5926.819
Instance2808.12	16.491	13.944	99.945	49.365	100497.521	35668.197	8.521	6.901	0.799	32.275	230633.409	5971.564
Instance2808.13	16.273	13.618	99.646	49.102	100768.669	35726.646	8.557	6.817	0.809	32.538	230075.173	5999.617
Instance2808.14	16.359	13.404	99.740	49.125	101034.407	35671.541	8.260	6.932	0.800	32.482	229537.232	5944.690
Instance2808.15	16.317	12.979	100.510	49.733	100209.927	35747.193	8.328	6.768	0.818	33.051	229375.413	5967.185
Instance2808.16	16.421	12.789	99.633	49.089	100845.637	35759.668	8.210	6.900	0.808	32.471	231553.412	5999.202

## Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	5.526	3.493	7.435
Available MBytes	120595.733	120562.000	120799.000
Free System Page Table Entries	33558749.560	33558294.000	33558846.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	102200757.607	100241408.000	102895616.000
Pool Paged Bytes	165743572.239	160821248.000	166592512.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

## Test log

```

12/1/2009 10:28:03 PM -- Jetstress testing begins ...
12/1/2009 10:28:03 PM -- Prepare testing begins ...
12/1/2009 10:28:20 PM -- Attaching databases ...
12/1/2009 10:28:20 PM -- Prepare testing ends.
12/1/2009 10:28:22 PM -- Dispatching transactions begins ...
12/1/2009 10:28:22 PM -- Database cache settings: (minimum: 512.0 MB,
maximum: 4.0 GB)
12/1/2009 10:28:22 PM -- Database flush thresholds: (start: 40.9 MB,
stop: 81.9 MB)
12/1/2009 10:28:41 PM -- Database read latency thresholds: (average: 20
msec/read, maximum: 100 msec/read).
12/1/2009 10:28:41 PM -- Log write latency thresholds: (average: 10
msec/write, maximum: 100 msec/write).
12/1/2009 10:28:46 PM -- Operation mix: Sessions 6, Inserts 40%, Deletes
20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
12/1/2009 10:28:46 PM -- Performance logging begins (interval: 15000
ms).
12/1/2009 10:28:46 PM -- Attaining prerequisites:
12/1/2009 10:31:30 PM -- \MSEExchange Database(JetstressWin)\Database
Cache Size, Last: 3886309000.0 (lower bound: 3865470000.0, upper bound:
none)
12/2/2009 12:31:30 AM -- Performance logging ends.
12/2/2009 12:35:38 AM -- JetInterop batch transaction stats: 28908,
28908, 28868, 28806, 29085, 28828, 28926, 28753, 29178, 28879, 28865,
28877, 29085, 29025, 29167 and 29012.
12/2/2009 12:35:38 AM -- Dispatching transactions ends.
12/2/2009 12:35:38 AM -- Shutting down databases ...
12/2/2009 12:35:54 AM -- Instance2808.1 (complete), Instance2808.2
(complete), Instance2808.3 (complete), Instance2808.4 (complete),
Instance2808.5 (complete), Instance2808.6 (complete), Instance2808.7
(complete), Instance2808.8 (complete), Instance2808.9 (complete),

```

Instance2808.10 (complete), Instance2808.11 (complete), Instance2808.12 (complete), Instance2808.13 (complete), Instance2808.14 (complete), Instance2808.15 (complete) and Instance2808.16 (complete)  
 12/2/2009 12:35:56 AM -- Performance logging begins (interval: 30000 ms).  
 12/2/2009 12:35:56 AM -- Verifying database checksums ...  
 12/2/2009 1:07:02 PM -- G:\DB1 (100% processed), G:\DB2 (100% processed), G:\DB3 (100% processed), G:\DB4 (100% processed), G:\DB5 (100% processed), G:\DB6 (100% processed), G:\DB7 (100% processed), G:\DB8 (100% processed), G:\DB9 (100% processed), G:\DB10 (100% processed), G:\DB11 (100% processed), G:\DB12 (100% processed), G:\DB13 (100% processed), G:\DB14 (100% processed), G:\DB15 (100% processed) and G:\DB16 (100% processed)  
 12/2/2009 1:07:02 PM -- Performance logging ends.  
 12/2/2009 1:07:02 PM -- C:\Program Files\Exchange  
Jetstress\DBChecksum 2009 12 2 0 35 54.blg has 1488 samples.  
 12/2/2009 1:21:51 PM -- C:\Program Files\Exchange  
Jetstress\DBChecksum 2009 12 2 0 35 54.html is saved.  
 12/2/2009 1:21:51 PM -- Verifying log checksums ...  
 12/2/2009 1:21:53 PM -- H:\L1 (15 log(s) processed), H:\L2 (15 log(s) processed), H:\L3 (15 log(s) processed), H:\L4 (15 log(s) processed), H:\L5 (15 log(s) processed), H:\L6 (15 log(s) processed), H:\L7 (14 log(s) processed), H:\L8 (15 log(s) processed), H:\L9 (16 log(s) processed), H:\L10 (16 log(s) processed), H:\L11 (16 log(s) processed), H:\L12 (15 log(s) processed), H:\L13 (16 log(s) processed), H:\L14 (16 log(s) processed), H:\L15 (15 log(s) processed) and H:\L16 (16 log(s) processed)  
 12/2/2009 1:21:53 PM -- C:\Program Files\Exchange  
Jetstress\Performance 2009 12 1 22 28 41.blg has 478 samples.  
 12/2/2009 1:21:53 PM -- Creating test report ...  
 12/2/2009 1:22:29 PM -- Instance2808.1 has 16.5 for I/O Database Reads Average Latency.  
 12/2/2009 1:22:29 PM -- Instance2808.1 has 6.8 for I/O Log Writes Average Latency.  
 12/2/2009 1:22:29 PM -- Instance2808.1 has 6.8 for I/O Log Reads Average Latency.  
 12/2/2009 1:22:29 PM -- Instance2808.2 has 16.6 for I/O Database Reads Average Latency.  
 12/2/2009 1:22:29 PM -- Instance2808.2 has 6.9 for I/O Log Writes Average Latency.  
 12/2/2009 1:22:29 PM -- Instance2808.2 has 6.9 for I/O Log Reads Average Latency.  
 12/2/2009 1:22:29 PM -- Instance2808.3 has 16.4 for I/O Database Reads Average Latency.  
 12/2/2009 1:22:29 PM -- Instance2808.3 has 6.8 for I/O Log Writes Average Latency.  
 12/2/2009 1:22:29 PM -- Instance2808.3 has 6.8 for I/O Log Reads Average Latency.  
 12/2/2009 1:22:29 PM -- Instance2808.4 has 16.5 for I/O Database Reads Average Latency.  
 12/2/2009 1:22:29 PM -- Instance2808.4 has 6.9 for I/O Log Writes Average Latency.

12/2/2009 1:22:29 PM -- Instance2808.4 has 6.9 for I/O Log Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.5 has 16.3 for I/O Database Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.5 has 6.8 for I/O Log Writes Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.5 has 6.8 for I/O Log Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.6 has 16.4 for I/O Database Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.6 has 6.9 for I/O Log Writes Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.6 has 6.9 for I/O Log Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.7 has 16.3 for I/O Database Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.7 has 6.8 for I/O Log Writes Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.7 has 6.8 for I/O Log Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.8 has 16.4 for I/O Database Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.8 has 6.9 for I/O Log Writes Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.8 has 6.9 for I/O Log Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.9 has 16.5 for I/O Database Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.9 has 6.8 for I/O Log Writes Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.9 has 6.8 for I/O Log Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.10 has 16.6 for I/O Database Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.10 has 6.9 for I/O Log Writes Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.10 has 6.9 for I/O Log Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.11 has 16.4 for I/O Database Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.11 has 6.8 for I/O Log Writes Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.11 has 6.8 for I/O Log Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.12 has 16.5 for I/O Database Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.12 has 6.9 for I/O Log Writes Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.12 has 6.9 for I/O Log Reads Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.13 has 16.3 for I/O Database Reads

Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.13 has 6.8 for I/O Log Writes  
Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.13 has 6.8 for I/O Log Reads Average  
Latency.  
12/2/2009 1:22:29 PM -- Instance2808.14 has 16.4 for I/O Database Reads  
Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.14 has 6.9 for I/O Log Writes  
Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.14 has 6.9 for I/O Log Reads Average  
Latency.  
12/2/2009 1:22:29 PM -- Instance2808.15 has 16.3 for I/O Database Reads  
Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.15 has 6.8 for I/O Log Writes  
Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.15 has 6.8 for I/O Log Reads Average  
Latency.  
12/2/2009 1:22:29 PM -- Instance2808.16 has 16.4 for I/O Database Reads  
Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.16 has 6.9 for I/O Log Writes  
Average Latency.  
12/2/2009 1:22:29 PM -- Instance2808.16 has 6.9 for I/O Log Reads Average  
Latency.  
12/2/2009 1:22:29 PM -- Test has 0 Maximum Database Page Fault  
Stalls/sec.  
12/2/2009 1:22:29 PM -- Test has 0 Database Page Fault Stalls/sec samples

higher than 0.

12/2/2009 1:22:29 PM -- C:\Program Files\Exchange  
 Jetstress\Performance 2009 12 1 22 28 41.xml has 467 samples queried.

## Test Result Report

### Checksum statistics - All

Database	Seen pages	Bad pages	Correctable pages	Wrong-page number pages	File length / Seconds taken
G:\DB1\Jetstress001001.edb	20106802	0	0	0	628337 MBytes / 45062 sec
G:\DB2\Jetstress002001.edb	20106034	0	0	0	628313 MBytes / 45003 sec
G:\DB3\Jetstress003001.edb	20106802	0	0	0	628337 MBytes / 45064 sec
G:\DB4\Jetstress004001.edb	20106546	0	0	0	628329 MBytes / 45012 sec
G:\DB5\Jetstress005001.edb	20106290	0	0	0	628321 MBytes / 45063 sec
G:\DB6\Jetstress006001.edb	20105778	0	0	0	628305 MBytes / 45008 sec
G:\DB7\Jetstress007001.edb	20106290	0	0	0	628321 MBytes / 45062 sec
G:\DB8\Jetstress008001.edb	20106802	0	0	0	628337 MBytes / 45007 sec
G:\DB9\Jetstress009001.edb	20106546	0	0	0	628329 MBytes / 45064 sec
G:\DB10\Jetstress010001.edb	2010604	0	0	0	628313 MBytes / 45013 sec
G:\DB11\Jetstress011001.edb	20106290	0	0	0	628321 MBytes / 45066 sec
G:\DB12\Jetstress012001.edb	20106802	0	0	0	628337 MBytes / 45019 sec
G:\DB13\Jetstress013001.edb	20105778	0	0	0	628305 MBytes / 45065 sec

G:\DB14\Jetstress014001.edb	20106290	0	0	0	628321 MBytes / 45009 sec
G:\DB15\Jetstress015001.edb	20106034	0	0	0	628313 MBytes / 45062 sec
G:\DB16\Jetstress016001.edb	20106546	0	0	0	628329 MBytes / 45011 sec
<b>(Sum)</b>	321701664				10053177 MBytes / 45066 sec

**Disk subsystem performance (of checksum)**

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/Sec	Disk Writes/Sec	Avg. Disk Bytes/Read
G:\DB1	0.083	0.000	223.060	0.000	65536.000
G:\DB2	0.083	0.000	223.374	0.000	65536.000
G:\DB3	0.083	0.000	223.037	0.000	65536.000
G:\DB4	0.083	0.000	223.311	0.000	65536.000
G:\DB5	0.083	0.000	223.049	0.000	65536.000
G:\DB6	0.083	0.000	223.344	0.000	65536.000
G:\DB7	0.083	0.000	223.059	0.000	65536.000
G:\DB8	0.083	0.000	223.358	0.000	65536.000
G:\DB9	0.083	0.000	223.019	0.000	65536.000
G:\DB10	0.083	0.000	223.302	0.000	65536.000
G:\DB11	0.083	0.000	223.002	0.000	65536.000
G:\DB12	0.083	0.000	223.271	0.000	65536.000
G:\DB13	0.083	0.000	223.006	0.000	65536.000
G:\DB14	0.083	0.000	223.344	0.000	65536.000
G:\DB15	0.083	0.000	223.052	0.000	65536.000
G:\DB16	0.083	0.000	223.318	0.000	65536.000

### Memory system performance (of checksum)

Counter	Average	Minimum	Maximum
% Processor Time	3.091	2.492	4.427
Available MBytes	124804.81	124760.000	124812.000
Free System Page Table Entries	33558742.277	33558130.000	33559591.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	110404258.409	109690880.000	112832512.000
Pool Paged Bytes	166401659.871	164745216.000	205488128.000

### Test log

```

Test Log 12/1/2009 10:28:03 PM -- Jetstress testing begins ...
12/1/2009 10:28:03 PM -- Prepare testing begins ...
12/1/2009 10:28:20 PM -- Attaching databases ...
12/1/2009 10:28:20 PM -- Prepare testing ends.
12/1/2009 10:28:22 PM -- Dispatching transactions begins ...
12/1/2009 10:28:22 PM -- Database cache settings: (minimum: 512.0 MB, maximum:
4.0 GB)
12/1/2009 10:28:22 PM -- Database flush thresholds: (start: 40.9 MB, stop: 81.9
MB)
12/1/2009 10:28:41 PM -- Database read latency thresholds: (average: 20
msec/read, maximum: 100 msec/read).
12/1/2009 10:28:41 PM -- Log write latency thresholds: (average: 10 msec/write,
maximum: 100 msec/write).
12/1/2009 10:28:46 PM -- Operation mix: Sessions 6, Inserts 40%, Deletes 20%,
Replaces 5%, Reads 35%, Lazy Commits 70%.
12/1/2009 10:28:46 PM -- Performance logging begins (interval: 15000 ms).
12/1/2009 10:28:46 PM -- Attaining prerequisites:
12/1/2009 10:31:30 PM -- \MSExchange Database(JetstressWin)\Database Cache Size,
Last: 3886309000.0 (lower bound: 3865470000.0, upper bound: none)
12/2/2009 12:31:30 AM -- Performance logging ends.
12/2/2009 12:35:38 AM -- JetInterop batch transaction stats: 28908, 28908, 28868,
28806, 29085, 28828, 28926, 28753, 29178, 28879, 28865, 28877, 29085, 29025,
29167 and 29012.
12/2/2009 12:35:38 AM -- Dispatching transactions ends.
12/2/2009 12:35:38 AM -- Shutting down databases ...
12/2/2009 12:35:54 AM -- Instance2808.1 (complete), Instance2808.2 (complete),
Instance2808.3 (complete), Instance2808.4 (complete), Instance2808.5 (complete),
Instance2808.6 (complete), Instance2808.7 (complete), Instance2808.8 (complete),
Instance2808.9 (complete), Instance2808.10 (complete), Instance2808.11
(complete), Instance2808.12 (complete), Instance2808.13 (complete),
Instance2808.14 (complete), Instance2808.15 (complete) and Instance2808.16
(complete)
12/2/2009 12:35:56 AM -- Performance logging begins (interval: 30000 ms).
12/2/2009 12:35:56 AM -- Verifying database checksums ...
12/2/2009 1:07:02 PM -- G:\DB1 (100% processed), G:\DB2 (100% processed), G:\DB3
(100% processed), G:\DB4 (100% processed), G:\DB5 (100% processed), G:\DB6 (100%

```

processed), G:\DB7 (100% processed), G:\DB8 (100% processed), G:\DB9 (100% processed), G:\DB10 (100% processed), G:\DB11 (100% processed), G:\DB12 (100% processed), G:\DB13 (100% processed), G:\DB14 (100% processed), G:\DB15 (100% processed) and G:\DB16 (100% processed)  
 12/2/2009 1:07:02 PM -- Performance logging ends.  
 12/2/2009 1:07:02 PM -- C:\Program Files\Exchange  
 Jetstress\DBChecksum 2009 12 2 0 35 54.blg has 1488 samples.

## Microsoft Exchange Server 2010 Jetstress – 24-hour stress

### Performance test result report

#### Test summary

<b>Overall Test Result</b>	Pass
<b>Machine Name</b>	EX-N1
<b>Test Description</b>	N/A
<b>Test Start Time</b>	12/2/2009 2:02:33 PM
<b>Test End Time</b>	12/3/2009 2:08:32 PM
<b>Collection Start Time</b>	12/2/2009 2:06:03 PM
<b>Collection End Time</b>	12/3/2009 2:05:55 PM
<b>Jetstress Version</b>	14.01.0040.000
<b>Ese Version</b>	14.00.0639.019
<b>Operating System</b>	Windows Server (R) 2008 Enterprise Service Pack 2 (6.0.6002.131072)
<b>Performance Log</b>	<ul style="list-style-type: none"> <li>• C:\Program Files\Exchange Jetstress\Performance_2009_12_2_14_3_11.blg</li> <li>• C:\Program Files\Exchange Jetstress\DBChecksum_2009_12_3_14_8_32.blg</li> </ul>

**Database sizing and throughput**

<b>Achieved Transactional I/O per Second</b>	1927.416
<b>Target Transactional I/O per Second</b>	1800
<b>Initial Database Size (bytes)</b>	10541520125952
<b>Final Database Size (bytes)</b>	10616992432128
<b>Database Files (Count)</b>	16

**Jetstress system parameters**

<b>Thread Count</b>	6 (per database)
<b>Minimum Database Cache</b>	512.0 MB
<b>Maximum Database Cache</b>	4096.0 MB
<b>Insert Operations</b>	40%
<b>Delete Operations</b>	20%
<b>Replace Operations</b>	5%
<b>Read Operations</b>	35%
<b>Lazy Commits</b>	70%
<b>Run Background Database Maintenance</b>	True
<b>Number of Copies per Database</b>	2

**Database configuration**

<b>Instance3396.1</b>	Log Path: H:\L1 Database: G:\DB1\Jetstress001001.edb
<b>Instance3396.2</b>	Log Path: H:\L2 Database: G:\DB2\Jetstress002001.edb
<b>Instance3396.3</b>	Log Path: H:\L3 Database: G:\DB3\Jetstress003001.edb
<b>Instance3396.4</b>	Log Path: H:\L4 Database: G:\DB4\Jetstress004001.edb
<b>Instance3396.5</b>	Log Path: H:\L5 Database: G:\DB5\Jetstress005001.edb
<b>Instance3396.6</b>	Log Path: H:\L6 Database: G:\DB6\Jetstress006001.edb
<b>Instance3396.7</b>	Log Path: H:\L7 Database: G:\DB7\Jetstress007001.edb
<b>Instance3396.8</b>	Log Path: H:\L8 Database: G:\DB8\Jetstress008001.edb
<b>Instance3396.9</b>	Log Path: H:\L9 Database: G:\DB9\Jetstress009001.edb
<b>Instance3396.10</b>	Log Path: H:\L10 Database: G:\DB10\Jetstress010001.edb
<b>Instance3396.11</b>	Log Path: H:\L11 Database: G:\DB11\Jetstress011001.edb
<b>Instance3396.12</b>	Log Path: H:\L12 Database: G:\DB12\Jetstress012001.edb
<b>Instance3396.13</b>	Log Path: H:\L13 Database: G:\DB13\Jetstress013001.edb
<b>Instance3396.14</b>	Log Path: H:\L14 Database: G:\DB14\Jetstress014001.edb
<b>Instance3396.15</b>	Log Path: H:\L15 Database: G:\DB15\Jetstress015001.edb
<b>Instance3396.16</b>	Log Path: H:\L16 Database: G:\DB16\Jetstress016001.edb

## Transactional I/O performance

MSExchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance3396.1	16.509	15.816	70.869	49.781	34343.225	35367.612	0.000	6.835	0.00	32.311	0.000	5939.706
Instance3396.2	16.588	15.601	70.656	49.568	34302.043	35395.694	0.000	6.963	0.00	32.16	0.000	5956.545
Instance3396.3	16.513	15.640	70.703	49.616	34359.674	35378.196	0.000	6.834	0.00	32.23	0.000	5947.655
Instance3396.4	16.573	15.365	70.865	49.757	34294.406	35393.278	0.000	6.953	0.00	32.26	0.000	5952.568
Instance3396.5	16.281	15.358	70.636	49.554	34403.184	35381.627	0.000	6.832	0.00	32.24	0.000	5921.978
Instance3396.6	16.373	15.086	70.691	49.613	34335.888	35388.545	0.000	6.955	0.00	32.24	0.000	5954.486
Instance3396.7	16.356	15.000	70.972	49.849	34393.800	35384.160	0.000	6.837	0.00	32.36	0.000	5947.196
Instance3396.8	16.420	14.746	70.764	49.676	34330.119	35375.371	0.000	6.956	0.00	32.19	0.000	5946.155
Instance3396.9	16.426	14.551	70.612	49.528	34405.447	35392.595	0.000	6.842	0.00	32.28	0.000	5949.469
Instance3396.10	16.516	14.280	71.069	49.918	34312.187	35389.487	0.000	6.961	0.00	32.35	0.000	5951.903
Instance3396.11	16.338	14.032	70.588	49.528	34433.862	35393.623	0.000	6.837	0.00	32.22	0.000	5959.593
Instance3396.12	16.423	13.776	70.972	49.828	34347.533	35391.369	0.000	6.958	0.00	32.35	0.000	5950.834
Instance3396.13	16.272	13.425	70.564	49.502	34353.458	35389.713	0.000	6.839	0.00	32.22	0.000	5944.424
Instance3396.14	16.358	13.163	70.899	49.785	34375.230	35388.787	0.000	6.965	0.00	32.24	0.000	5962.965
Instance3396.15	16.216	12.666	70.730	49.648	34390.667	35383.879	0.000	6.838	0.00	32.29	0.000	5945.096
Instance3396.16	16.308	12.402	70.898	49.778	34392.307	35391.036	0.000	6.961	0.00	32.27	0.000	5970.477

## Background database maintenance I/O performance

MSExchange Database ==> Instances	Database Maintenance I/O Reads/sec	Database Maintenance I/O Reads Average Bytes
Instance3396.1	29.280	261454.689
Instance3396.2	29.341	261467.776
Instance3396.3	29.264	261465.843
Instance3396.4	29.402	261459.773
Instance3396.5	29.339	261470.736
Instance3396.6	29.376	261475.465
Instance3396.7	29.395	261447.724
Instance3396.8	29.454	261458.314
Instance3396.9	29.389	261461.996
Instance3396.10	29.455	261463.772
Instance3396.11	29.425	261461.387
Instance3396.12	29.486	261460.183
Instance3396.13	29.414	261471.532
Instance3396.14	29.478	261447.279
Instance3396.15	29.467	261466.789
Instance3396.16	29.513	261469.193

### Log replication I/O performance

MSExchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance3396.1	0.795	230687.817
Instance3396.2	0.793	230588.174
Instance3396.3	0.795	230362.193
Instance3396.4	0.796	230236.858
Instance3396.5	0.791	230541.317
Instance3396.6	0.796	230663.889
Instance3396.7	0.798	230635.305
Instance3396.8	0.793	230338.274
Instance3396.9	0.796	230099.185
Instance3396.10	0.798	230229.660
Instance3396.11	0.795	230397.720
Instance3396.12	0.798	230307.775
Instance3396.13	0.794	230124.654
Instance3396.14	0.797	230537.063
Instance3396.15	0.796	230513.054
Instance3396.16	0.799	230906.651

## Total I/O performance

MSEXchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance3396.1	16.509	15.816	100.149	49.781	100742.879	35367.612	8.727	6.835	0.795	32.311	230687.817	5939.706
Instance3396.2	16.588	15.601	99.997	49.568	100957.431	35395.694	8.669	6.963	0.793	32.158	230588.174	5956.545
Instance3396.3	16.513	15.640	99.967	49.616	100841.477	35378.196	8.367	6.834	0.795	32.229	230362.193	5947.655
Instance3396.4	16.573	15.365	100.266	49.757	100907.859	35393.278	8.626	6.953	0.796	32.256	230236.858	5952.568
Instance3396.5	16.281	15.358	99.975	49.554	101040.070	35381.627	8.466	6.832	0.791	32.240	230541.317	5921.978
Instance3396.6	16.373	15.086	100.067	49.613	101015.564	35388.545	8.389	6.955	0.796	32.241	230663.889	5954.486
Instance3396.7	16.356	15.000	100.367	49.849	100891.931	35384.160	8.645	6.837	0.798	32.366	230635.305	5947.196
Instance3396.8	16.420	14.746	100.218	49.676	101082.813	35375.371	8.583	6.956	0.793	32.192	230338.274	5946.155
Instance3396.9	16.426	14.551	100.001	49.528	101134.200	35392.595	8.636	6.842	0.796	32.279	230099.185	5949.469
Instance3396.10	16.516	14.280	100.524	49.918	100870.988	35389.487	8.380	6.961	0.798	32.347	230229.660	5951.903
Instance3396.11	16.338	14.032	100.013	49.528	101227.250	35393.623	8.581	6.837	0.795	32.217	230397.720	5959.593
Instance3396.12	16.423	13.776	100.458	49.828	101008.619	35391.369	8.547	6.958	0.798	32.348	230307.775	5950.834
Instance3396.13	16.272	13.425	99.978	49.502	101172.517	35389.713	8.529	6.839	0.794	32.222	230124.654	5944.424
Instance3396.14	16.358	13.163	100.376	49.785	101059.575	35388.787	8.425	6.965	0.797	32.241	230537.063	5962.965
Instance3396.15	16.216	12.666	100.197	49.648	101171.320	35383.879	8.579	6.838	0.796	32.290	230513.054	5945.096
Instance3396.16	16.308	12.402	100.411	49.778	101135.364	35391.036	8.329	6.961	0.799	32.272	230906.651	5970.477

## Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	4.808	2.501	8.109
Available MBytes	120523.795	120495.000	120782.000
Free System Page Table Entries	33559387.525	33558819.000	33560078.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	103566069.440	100925440.000	104542208.000
Pool Paged Bytes	167239307.107	164438016.000	170119168.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

## Test log

```

Test Log 12/2/2009 2:02:33 PM -- Jetstress testing begins ...
12/2/2009 2:02:33 PM -- Prepare testing begins ...
12/2/2009 2:02:50 PM -- Attaching databases ...
12/2/2009 2:02:50 PM -- Prepare testing ends.
12/2/2009 2:02:52 PM -- Dispatching transactions begins ...
12/2/2009 2:02:53 PM -- Database cache settings: (minimum: 512.0 MB, maximum: 4.0
GB)
12/2/2009 2:02:53 PM -- Database flush thresholds: (start: 40.9 MB, stop: 81.9
MB)
12/2/2009 2:03:11 PM -- Database read latency thresholds: (average: 20 msec/read,
maximum: 100 msec/read).
12/2/2009 2:03:11 PM -- Log write latency thresholds: (average: 10 msec/write,
maximum: 100 msec/write).
12/2/2009 2:03:17 PM -- Operation mix: Sessions 6, Inserts 40%, Deletes 20%,
Replaces 5%, Reads 35%, Lazy Commits 70%.
12/2/2009 2:03:17 PM -- Performance logging begins (interval: 15000 ms).
12/2/2009 2:03:17 PM -- Attaining prerequisites:
12/2/2009 2:06:03 PM -- \MSExchange Database(JetstressWin)\Database Cache Size,
Last: 3886502000.0 (lower bound: 3865470000.0, upper bound: none)
12/3/2009 2:06:03 PM -- Performance logging ends.
12/3/2009 2:08:15 PM -- JetInterop batch transaction stats: 328435, 328270,
327709, 327968, 327117, 328305, 329595, 328295, 328823, 329464, 327765, 329930,
327850, 328500, 328805 and 329002.
12/3/2009 2:08:15 PM -- Dispatching transactions ends.
12/3/2009 2:08:15 PM -- Shutting down databases ...
12/3/2009 2:08:32 PM -- Instance3396.1 (complete), Instance3396.2 (complete),
Instance3396.3 (complete), Instance3396.4 (complete), Instance3396.5 (complete),
Instance3396.6 (complete), Instance3396.7 (complete), Instance3396.8 (complete),
Instance3396.9 (complete), Instance3396.10 (complete), Instance3396.11
(complete), Instance3396.12 (complete), Instance3396.13 (complete),
Instance3396.14 (complete), Instance3396.15 (complete) and Instance3396.16
(complete)
12/3/2009 2:08:34 PM -- Performance logging begins (interval: 30000 ms).
12/3/2009 2:08:34 PM -- Verifying database checksums ...
12/4/2009 2:50:53 AM -- G:\DB1 (100% processed), G:\DB2 (100% processed), G:\DB3

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(100% processed), G:\DB4 (100% processed), G:\DB5 (100% processed), G:\DB6 (100% processed), G:\DB7 (100% processed), G:\DB8 (100% processed), G:\DB9 (100% processed), G:\DB10 (100% processed), G:\DB11 (100% processed), G:\DB12 (100% processed), G:\DB13 (100% processed), G:\DB14 (100% processed), G:\DB15 (100% processed) and G:\DB16 (100% processed)

12/4/2009 2:50:53 AM -- Performance logging ends.

12/4/2009 2:50:53 AM -- C:\Program Files\Exchange  
Jetstress\DBChecksum 2009 12 3 14 8 32.blg has 1507 samples.

12/4/2009 3:06:28 AM -- C:\Program Files\Exchange  
Jetstress\DBChecksum 2009 12 3 14 8 32.html is saved.

12/4/2009 3:06:28 AM -- Verifying log checksums ...

12/4/2009 3:06:31 AM -- H:\L1 (15 log(s) processed), H:\L2 (16 log(s) processed), H:\L3 (15 log(s) processed), H:\L4 (16 log(s) processed), H:\L5 (15 log(s) processed), H:\L6 (15 log(s) processed), H:\L7 (15 log(s) processed), H:\L8 (15 log(s) processed), H:\L9 (15 log(s) processed), H:\L10 (15 log(s) processed), H:\L11 (14 log(s) processed), H:\L12 (15 log(s) processed), H:\L13 (15 log(s) processed), H:\L14 (15 log(s) processed), H:\L15 (13 log(s) processed) and H:\L16 (15 log(s) processed)

12/4/2009 3:06:31 AM -- C:\Program Files\Exchange  
Jetstress\Stress 2009 12 2 14 3 11.blg has 5634 samples.

12/4/2009 3:06:31 AM -- Creating test report ...

12/4/2009 3:13:46 AM -- Instance3396.1 has 16.5 for I/O Database Reads Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.1 has 6.8 for I/O Log Writes Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.1 has 6.8 for I/O Log Reads Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.2 has 16.6 for I/O Database Reads Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.2 has 7.0 for I/O Log Writes Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.2 has 7.0 for I/O Log Reads Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.3 has 16.5 for I/O Database Reads Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.3 has 6.8 for I/O Log Writes Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.3 has 6.8 for I/O Log Reads Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.4 has 16.6 for I/O Database Reads Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.4 has 7.0 for I/O Log Writes Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.4 has 7.0 for I/O Log Reads Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.5 has 16.3 for I/O Database Reads Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.5 has 6.8 for I/O Log Writes Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.5 has 6.8 for I/O Log Reads Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.6 has 16.4 for I/O Database Reads Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.6 has 7.0 for I/O Log Writes Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.6 has 7.0 for I/O Log Reads Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.7 has 16.4 for I/O Database Reads Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.7 has 6.8 for I/O Log Writes Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.7 has 6.8 for I/O Log Reads Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.8 has 16.4 for I/O Database Reads Average Latency.

12/4/2009 3:13:46 AM -- Instance3396.8 has 7.0 for I/O Log Writes Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.8 has 7.0 for I/O Log Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.9 has 16.4 for I/O Database Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.9 has 6.8 for I/O Log Writes Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.9 has 6.8 for I/O Log Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.10 has 16.5 for I/O Database Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.10 has 7.0 for I/O Log Writes Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.10 has 7.0 for I/O Log Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.11 has 16.3 for I/O Database Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.11 has 6.8 for I/O Log Writes Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.11 has 6.8 for I/O Log Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.12 has 16.4 for I/O Database Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.12 has 7.0 for I/O Log Writes Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.12 has 7.0 for I/O Log Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.13 has 16.3 for I/O Database Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.13 has 6.8 for I/O Log Writes Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.13 has 6.8 for I/O Log Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.14 has 16.4 for I/O Database Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.14 has 7.0 for I/O Log Writes Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.14 has 7.0 for I/O Log Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.15 has 16.2 for I/O Database Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.15 has 6.8 for I/O Log Writes Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.15 has 6.8 for I/O Log Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.16 has 16.3 for I/O Database Reads Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.16 has 7.0 for I/O Log Writes Average Latency.  
 12/4/2009 3:13:46 AM -- Instance3396.16 has 7.0 for I/O Log Reads Average Latency.  
 12/4/2009 3:13:47 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
 12/4/2009 3:13:47 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
 12/4/2009 3:13:47 AM -- C:\Program Files\Exchange Jetstress\Stress 2009 12 2 14 3 11.xml has 5623 samples queried.

## Test Result Report

### Checksum statistics - All

Database	Seen pages	Bad pages	Correctable pages	Wrong-page number pages	File length / Seconds taken
G:\DB1\Jetstress001001.edb	20250930	0	0	0	632841 MBytes / 45736 sec
G:\DB2\Jetstress002001.edb	20249650	0	0	0	632801 MBytes / 45643 sec
G:\DB3\Jetstress003001.edb	20250418	0	0	0	632825 MBytes / 45733 sec
G:\DB4\Jetstress004001.edb	20250418	0	0	0	632825 MBytes / 45642 sec
G:\DB5\Jetstress005001.edb	20249394	0	0	0	632793 MBytes / 45727 sec
G:\DB6\Jetstress006001.edb	20249906	0	0	0	632809 MBytes / 45630 sec
G:\DB7\Jetstress007001.edb	20250418	0	0	0	632825 MBytes / 45733 sec
G:\DB8\Jetstress008001.edb	20250162	0	0	0	632817 MBytes / 45641 sec
G:\DB9\Jetstress009001.edb	20250418	0	0	0	632825 MBytes / 45735 sec
G:\DB10\Jetstress010001.edb	20250674	0	0	0	632833 MBytes / 45640 sec
G:\DB11\Jetstress011001.edb	20249906	0	0	0	632809 MBytes / 45737 sec
G:\DB12\Jetstress012001.edb	20251186	0	0	0	632849 MBytes / 45638 sec
G:\DB13\Jetstress013001.edb	20249650	0	0	0	632801 MBytes / 45736 sec
G:\DB14\Jetstress014001.edb	20250674	0	0	0	632833 MBytes / 45639 sec

G:\DB15\Jetstress015001.edb	20249906	0	0	0	632809 MBytes / 45738 sec
G:\DB16\Jetstress016001.edb	20251186	0	0	0	632849 MBytes / 45640 sec
<b>(Sum)</b>	324004896	0	0	0	10125153 MBytes / 45738 sec

### Disk subsystem performance (of checksum)

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/Sec	Disk Writes/Sec	Avg. Disk Bytes/Read
G:\DB1	0.084	0.000	221.306	0.000	65536.000
G:\DB2	0.084	0.000	221.765	0.000	65536.000
G:\DB3	0.084	0.000	221.329	0.000	65536.000
G:\DB4	0.084	0.000	221.780	0.000	65536.000
G:\DB5	0.084	0.000	221.355	0.000	65536.000
G:\DB6	0.084	0.000	221.845	0.000	65536.000
G:\DB7	0.084	0.000	221.329	0.000	65536.000
G:\DB8	0.084	0.000	221.789	0.000	65536.000
G:\DB9	0.084	0.000	221.313	0.000	65536.000
G:\DB10	0.084	0.000	221.799	0.000	65536.000
G:\DB11	0.084	0.000	221.293	0.000	65536.000
G:\DB12	0.084	0.000	221.819	0.000	65536.000
G:\DB13	0.084	0.000	221.299	0.000	65536.000
G:\DB14	0.084	0.000	221.809	0.000	65536.000
G:\DB15	0.084	0.000	221.284	0.000	65536.000
G:\DB16	0.084	0.000	221.802	0.000	65536.000

**Memory system performance (of checksum)**

Counter	Average	Minimum	Maximum
% Processor Time	9.295	2.727	62.473
Available MBytes	124725.758	124706.000	124738.000
Free System Page Table Entries	33559397.743	33558723.000	33559918.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	111051371.700	110649344.000	114065408.000
Pool Paged Bytes	168807605.425	166268928.000	169959424.000

**Test log**

```

Test Log 12/2/2009 2:02:33 PM -- Jetstress testing begins ...
12/2/2009 2:02:33 PM -- Prepare testing begins ...
12/2/2009 2:02:50 PM -- Attaching databases ...
12/2/2009 2:02:50 PM -- Prepare testing ends.
12/2/2009 2:02:52 PM -- Dispatching transactions begins ...
12/2/2009 2:02:53 PM -- Database cache settings: (minimum: 512.0 MB, maximum: 4.0
GB)
12/2/2009 2:02:53 PM -- Database flush thresholds: (start: 40.9 MB, stop: 81.9
MB)
12/2/2009 2:03:11 PM -- Database read latency thresholds: (average: 20 msec/read,
maximum: 100 msec/read).
12/2/2009 2:03:11 PM -- Log write latency thresholds: (average: 10 msec/write,
maximum: 100 msec/write).
12/2/2009 2:03:17 PM -- Operation mix: Sessions 6, Inserts 40%, Deletes 20%,
Replaces 5%, Reads 35%, Lazy Commits 70%.
12/2/2009 2:03:17 PM -- Performance logging begins (interval: 15000 ms).
12/2/2009 2:03:17 PM -- Attaining prerequisites:
12/2/2009 2:06:03 PM -- \MSExchange Database(JetstressWin)\Database Cache Size,
Last: 3886502000.0 (lower bound: 3865470000.0, upper bound: none)
12/3/2009 2:06:03 PM -- Performance logging ends.
12/3/2009 2:08:15 PM -- JetInterop batch transaction stats: 328435, 328270,
327709, 327968, 327117, 328305, 329595, 328295, 328823, 329464, 327765, 329930,
327850, 328500, 328805 and 329002.
12/3/2009 2:08:15 PM -- Dispatching transactions ends.
12/3/2009 2:08:15 PM -- Shutting down databases ...
12/3/2009 2:08:32 PM -- Instance3396.1 (complete), Instance3396.2 (complete),
Instance3396.3 (complete), Instance3396.4 (complete), Instance3396.5 (complete),
Instance3396.6 (complete), Instance3396.7 (complete), Instance3396.8 (complete),
Instance3396.9 (complete), Instance3396.10 (complete), Instance3396.11
(complete), Instance3396.12 (complete), Instance3396.13 (complete),
Instance3396.14 (complete), Instance3396.15 (complete) and Instance3396.16
(complete)
12/3/2009 2:08:34 PM -- Performance logging begins (interval: 30000 ms).
12/3/2009 2:08:34 PM -- Verifying database checksums ...
12/4/2009 2:50:53 AM -- G:\DB1 (100% processed), G:\DB2 (100% processed), G:\DB3
(100% processed), G:\DB4 (100% processed), G:\DB5 (100% processed), G:\DB6 (100%

```

processed), G:\DB7 (100% processed), G:\DB8 (100% processed), G:\DB9 (100% processed), G:\DB10 (100% processed), G:\DB11 (100% processed), G:\DB12 (100% processed), G:\DB13 (100% processed), G:\DB14 (100% processed), G:\DB15 (100% processed) and G:\DB16 (100% processed)  
 12/4/2009 2:50:53 AM -- Performance logging ends.  
 12/4/2009 2:50:53 AM -- C:\Program Files\Exchange  
Jetstress\DBChecksum\_2009\_12\_3\_14\_8\_32.blg has 1507 samples.

## Microsoft Exchange Server 2010 Jetstress – database backup

### Test result report

#### Database backup statistics - All

Database Instance	Database Size (MBytes)	Elapsed Backup Time	MBytes Transferred/sec
Instance3416.1	633329.59	13:53:20	12.67
Instance3416.2	633297.59	13:52:31	12.68
Instance3416.3	633297.59	13:53:20	12.67
Instance3416.4	633305.59	13:52:28	12.68
Instance3416.5	633273.59	13:53:21	12.67
Instance3416.6	633297.59	13:52:37	12.68
Instance3416.7	633297.59	13:53:17	12.67
Instance3416.8	633313.59	13:52:30	12.68
Instance3416.9	633305.59	13:52:30	12.67
Instance3416.10	633313.59	13:52:29	12.68
Instance3416.11	633289.59	13:53:24	12.66
Instance3416.12	633337.59	13:52:32	12.68
Instance3416.13	633281.59	13:53:23	12.66
Instance3416.14	633313.59	13:52:38	12.68
Instance3416.15	633289.59	13:53:03	12.67
Instance3416.16	633329.59	13:52:20	12.68

**Jetstress system parameters**

<b>Thread Count</b>	6 (per database)
<b>Minimum Database Cache</b>	512.0 MB
<b>Maximum Database Cache</b>	4096.0 MB
<b>Insert Operations</b>	40%
<b>Delete Operations</b>	20%
<b>Replace Operations</b>	5%
<b>Read Operations</b>	35%
<b>Lazy Commits</b>	70%

## Database configuration

<b>Instance3416.1</b>	Log Path: H:\L1 Database: G:\DB1\Jetstress001001.edb
<b>Instance3416.2</b>	Log Path: H:\L2 Database: G:\DB2\Jetstress002001.edb
<b>Instance3416.3</b>	Log Path: H:\L3 Database: G:\DB3\Jetstress003001.edb
<b>Instance3416.4</b>	Log Path: H:\L4 Database: G:\DB4\Jetstress004001.edb
<b>Instance3416.5</b>	Log Path: H:\L5 Database: G:\DB5\Jetstress005001.edb
<b>Instance3416.6</b>	Log Path: H:\L6 Database: G:\DB6\Jetstress006001.edb
<b>Instance3416.7</b>	Log Path: H:\L7 Database: G:\DB7\Jetstress007001.edb
<b>Instance3416.8</b>	Log Path: H:\L8 Database: G:\DB8\Jetstress008001.edb
<b>Instance3416.9</b>	Log Path: H:\L9 Database: G:\DB9\Jetstress009001.edb
<b>Instance3416.10</b>	Log Path: H:\L10 Database: G:\DB10\Jetstress010001.edb
<b>Instance3416.11</b>	Log Path: H:\L11 Database: G:\DB11\Jetstress011001.edb
<b>Instance3416.12</b>	Log Path: H:\L12 Database: G:\DB12\Jetstress012001.edb
<b>Instance3416.13</b>	Log Path: H:\L13 Database: G:\DB13\Jetstress013001.edb
<b>Instance3416.14</b>	Log Path: H:\L14 Database: G:\DB14\Jetstress014001.edb
<b>Instance3416.15</b>	Log Path: H:\L15 Database: G:\DB15\Jetstress015001.edb
<b>Instance3416.16</b>	Log Path: H:\L16 Database: G:\DB16\Jetstress016001.edb

## Transactional I/O performance

MSExchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance3416.1	34.541	0.000	50.637	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3416.2	34.488	0.000	50.686	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3416.3	34.537	0.000	50.631	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3416.4	34.491	0.000	50.692	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3416.5	34.541	0.000	50.625	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3416.6	34.491	0.000	50.698	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3416.7	34.531	0.000	50.639	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3416.8	34.483	0.000	50.688	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3416.9	34.551	0.000	50.632	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3416.10	34.492	0.000	50.690	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3416.11	34.552	0.000	50.611	0.000	22144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3416.12	34.495	0.000	50.686	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3416.13	34.548	0.000	50.617	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3416.14	34.489	0.000	50.699	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3416.15	34.537	0.000	50.634	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3416.16	34.484	0.000	50.710	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

## Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	1.564	1.320	2.909
Available MBytes	124789.806	124781.000	124808.000
Free System Page Table Entries	33559201.188	33558589.000	33559670
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	134695343.942	134680576.000	134746112
Pool Paged Bytes	168613111.001	165593088.000	169734144
Database Page Fault Stalls/sec	0.000	0.000	0.000

## Test log

```

12/5/2009 8:56:57 AM -- Jetstress testing begins ...12/5/2009 8:56:57 AM
-- Prepare testing begins ...
12/5/2009 8:57:14 AM -- Attaching databases ...
12/5/2009 8:57:14 AM -- Prepare testing ends.
12/5/2009 8:57:36 AM -- Performance logging begins (interval: 30000 ms).
12/5/2009 8:57:36 AM -- Backing up databases ...
12/5/2009 10:51:01 PM -- Performance logging ends.
12/5/2009 10:51:01 PM -- Instance3416.1 (100% processed), Instance3416.2
(100% processed), Instance3416.3 (100% processed), Instance3416.4 (100%
processed), Instance3416.5 (100% processed), Instance3416.6 (100%
processed), Instance3416.7 (100% processed), Instance3416.8 (100%
processed), Instance3416.9 (100% processed), Instance3416.10 (100%
processed), Instance3416.11 (100% processed), Instance3416.12 (100%
processed), Instance3416.13 (100% processed), Instance3416.14 (100%
processed), Instance3416.15 (100% processed) and Instance3416.16 (100%
processed)
12/5/2009 10:51:01 PM -- C:\Program Files\Exchange
Jetstress\DatabaseBackup 2009 12 5 8 57 16.blg has 1650 samples.
12/5/2009 10:51:01 PM -- Creating test report ...

```

## Microsoft Exchange Server 2010 Jetstress – SoftRecovery

### SoftRecovery test result report

#### SoftRecovery statistics - All

Database Instance	Log files replayed	Elapsed seconds
Instance2956.1	502	1555.6731722
Instance2956.2	512	1936.8304155
Instance2956.3	500	1915.0838761
Instance2956.4	503	1750.8616234
Instance2956.5	504	1891.4809248
Instance2956.6	516	1758.5524727
Instance2956.7	501	1772.3585612
Instance2956.8	505	1501.0260219
Instance2956.9	512	1660.6930454
Instance2956.10	502	1919.3271033
Instance2956.11	500	1777.3973935
Instance2956.12	505	1400.7797793
Instance2956.13	506	1811.3432111
Instance2956.14	506	1717.4462092
Instance2956.15	503	1597.3098391
Instance2956.16	511	1872.1212007

**Database configuration**

<b>Instance2956.1</b>	Log Path: H:\L1 Database: G:\DB1\Jetstress001001.edb
<b>Instance2956.2</b>	Log Path: H:\L2 Database: G:\DB2\Jetstress002001.edb
<b>Instance2956.3</b>	Log Path: H:\L3 Database: G:\DB3\Jetstress003001.edb
<b>Instance2956.4</b>	Log Path: H:\L4 Database: G:\DB4\Jetstress004001.edb
<b>Instance2956.5</b>	Log Path: H:\L5 Database: G:\DB5\Jetstress005001.edb
<b>Instance2956.6</b>	Log Path: H:\L6 Database: G:\DB6\Jetstress006001.edb
<b>Instance2956.7</b>	Log Path: H:\L7 Database: G:\DB7\Jetstress007001.edb
<b>Instance2956.8</b>	Log Path: H:\L8 Database: G:\DB8\Jetstress008001.edb
<b>Instance2956.9</b>	Log Path: H:\L9 Database: G:\DB9\Jetstress009001.edb
<b>Instance2956.10</b>	Log Path: H:\L10 Database: G:\DB10\Jetstress010001.edb
<b>Instance2956.11</b>	Log Path: H:\L11 Database: G:\DB11\Jetstress011001.edb
<b>Instance2956.12</b>	Log Path: H:\L12 Database: G:\DB12\Jetstress012001.edb
<b>Instance2956.13</b>	Log Path: H:\L13 Database: G:\DB13\Jetstress013001.edb
<b>Instance2956.14</b>	Log Path: H:\L14 Database: G:\DB14\Jetstress014001.edb
<b>Instance2956.15</b>	Log Path: H:\L15 Database: G:\DB15\Jetstress015001.edb
<b>Instance2956.16</b>	Log Path: H:\L16 Database: G:\DB16\Jetstress016001.edb

## Transactional I/O performance

MSEExchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance2956.1	91.874	22.088	233.611	1.932	35729.115	21541.081	10.617	0.000	2.897	0.000	143174.450	0.000
Instance2956.2	84.140	19.376	218.655	1.581	35331.578	19309.714	8.980	0.000	2.373	0.000	128512.469	0.000
Instance2956.3	74.426	17.965	223.384	1.566	35162.140	17752.415	7.371	0.002	2.349	0.002	118292.806	1.156
Instance2956.4	86.284	18.915	219.528	1.723	35470.844	20308.069	10.059	0.007	2.586	0.008	131981.411	1.264
Instance2956.5	76.259	18.517	219.286	1.589	35205.218	18895.963	8.739	0.000	2.388	0.000	123773.549	0.000
Instance2956.6	88.266	21.684	221.294	1.749	35697.207	20984.433	10.504	0.000	2.625	0.000	140540.739	0.000
Instance2956.7	81.070	19.054	218.069	1.682	35513.890	19308.284	9.287	0.000	2.521	0.000	128655.350	0.000
Instance2956.8	94.952	22.324	240.311	2.025	35772.981	20963.965	10.570	0.023	3.040	0.008	141991.503	1.476
Instance2956.9	89.832	21.360	228.579	1.851	35722.743	22186.667	10.269	0.012	2.779	0.008	146382.339	1.333
Instance2956.10	77.850	18.568	218.261	1.563	35215.602	18671.856	8.034	0.003	2.344	0.002	122233.686	1.153
Instance2956.11	83.890	19.939	220.925	1.684	35560.504	19692.691	9.294	0.007	2.527	0.002	131296.124	1.246
Instance2956.12	95.811	20.746	252.201	2.169	35891.901	22115.864	11.350	0.057	3.252	0.002	148416.699	1.585
Instance2956.13	79.230	18.523	220.169	1.672	35352.973	19113.363	8.343	0.058	2.510	0.007	125263.258	2.444
Instance2956.14	83.648	18.358	223.169	1.768	35455.443	19726.831	9.604	0.014	2.652	0.002	130091.679	1.290
Instance2956.15	91.329	18.985	232.287	1.887	35752.935	20602.103	10.560	0.016	2.833	0.002	136722.043	1.388
Instance2956.16	83.289	19.320	221.661	1.633	35473.498	20205.672	10.163	0.002	2.450	0.002	136500.171	1.182

### Background database maintenance I/O performance

MSExchange Database ==> Instances	Database Maintenance I/O Reads/sec	Database Maintenance I/O Reads Average Bytes
Instance2956.1	0.000	0.000
Instance2956.2	0.000	0.000
Instance2956.3	0.000	0.000
Instance2956.4	0.000	0.000
Instance2956.5	0.000	0.000
Instance2956.6	0.000	0.000
Instance2956.7	0.000	0.000
Instance2956.8	0.000	0.000
Instance2956.9	0.000	0.000
Instance2956.10	0.000	0.000
Instance2956.11	0.000	0.000
Instance2956.12	0.000	0.000
Instance2956.13	0.000	0.000
Instance2956.14	0.000	0.000
Instance2956.15	0.000	0.000
Instance2956.16	0.000	0.000

## Total I/O performance

MSEXchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance2956.1	91.874	22.088	233.611	1.932	35729.115	21541.081	10.617	0.000	2.897	0.000	143174.450	0.000
Instance2956.2	84.140	19.376	218.655	1.581	35331.578	19309.714	8.980	0.000	2.373	0.000	128512.469	0.000
Instance2956.3	74.426	17.965	223.384	1.566	35162.140	17752.415	7.371	0.002	2.349	0.002	118292.806	1.156
Instance2956.4	86.284	18.915	219.528	1.723	35470.844	20308.069	10.059	0.007	2.586	0.008	131981.411	1.264
Instance2956.5	76.259	18.517	219.286	1.589	35205.218	18895.963	8.739	0.000	2.388	0.000	123773.549	0.000
Instance2956.6	88.266	21.684	221.294	1.749	35697.207	20984.433	10.504	0.000	2.625	0.000	140540.739	0.000
Instance2956.7	81.070	19.054	218.069	1.682	35513.890	19308.284	9.287	0.000	2.521	0.000	128655.350	0.000
Instance2956.8	94.952	22.324	240.311	2.025	35772.981	20963.965	10.570	0.023	3.040	0.008	141991.503	1.476
Instance2956.9	89.832	21.360	228.579	1.851	35722.743	22186.667	10.269	0.012	2.779	0.008	146382.339	1.333
Instance2956.10	77.850	18.568	218.261	1.563	35215.602	18671.856	8.034	0.003	2.344	0.002	122233.686	1.153
Instance2956.11	83.890	19.939	220.925	1.684	35560.504	19692.691	9.294	0.007	2.527	0.002	131296.124	1.246
Instance2956.12	95.811	20.746	252.201	2.169	35891.901	22115.864	11.350	0.057	3.252	0.002	148416.699	1.585
Instance2956.13	79.230	18.523	220.169	1.672	35352.973	19113.363	8.343	0.058	2.510	0.007	125263.258	2.444
Instance2956.14	83.648	18.358	223.169	1.768	35455.443	19726.831	9.604	0.014	2.652	0.002	130091.679	1.290
Instance2956.15	91.329	18.985	232.287	1.887	35752.935	20602.103	10.560	0.016	2.833	0.002	136722.043	1.388
Instance2956.16	83.289	19.320	221.661	1.633	35473.498	20205.672	10.163	0.002	2.450	0.002	136500.171	1.182

## Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	3.741	1.205	13.790
Available MBytes	120609.047	120543.000	124474.000
Free System Page Table Entries	33558981.439	33558636.000	33559144.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	134510213.416	111484928.000	136224768.000
Pool Paged Bytes	165693316.846	164921344.000	165834752.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

## Test Log

```

12/4/2009 8:31:35 PM -- Jetstress testing begins ...
12/4/2009 8:31:36 PM -- Prepare testing begins ...
12/4/2009 8:31:52 PM -- Attaching databases ...
12/4/2009 8:31:52 PM -- Prepare testing ends.
12/4/2009 8:31:55 PM -- Dispatching transactions begins ...
12/4/2009 8:31:55 PM -- Database cache settings: (minimum: 512.0 MB,
maximum: 4.0 GB)
12/4/2009 8:31:55 PM -- Database flush thresholds: (start: 40.9 MB, stop:
81.9 MB)
12/4/2009 8:32:13 PM -- Database read latency thresholds: (average: 20
msec/read, maximum: 100 msec/read).
12/4/2009 8:32:13 PM -- Log write latency thresholds: (average: 10
msec/write, maximum: 100 msec/write).
12/4/2009 8:32:17 PM -- Operation mix: Sessions 6, Inserts 40%, Deletes
20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
12/4/2009 8:32:17 PM -- Performance logging begins (interval: 15000 ms).
12/4/2009 8:32:17 PM -- Generating log files ...
12/4/2009 9:45:47 PM -- H:\L1 (100.6% generated), H:\L2 (102.6%
generated), H:\L3 (100.2% generated), H:\L4 (100.6% generated), H:\L5
(101.0% generated), H:\L6 (103.4% generated), H:\L7 (100.4% generated),
H:\L8 (101.2% generated), H:\L9 (102.6% generated), H:\L10 (100.6%
generated), H:\L11 (100.2% generated), H:\L12 (101.2% generated), H:\L13
(101.4% generated), H:\L14 (101.2% generated), H:\L15 (100.8% generated)
and H:\L16 (102.4% generated)
12/4/2009 9:45:47 PM -- Performance logging ends.
12/4/2009 9:45:47 PM -- JetInterop batch transaction stats: 21709,
21983, 21841, 21721, 21646, 22104, 21508, 21617, 22144, 21685, 21770,
21828, 21986, 21735, 21770 and 21947.
12/4/2009 9:45:47 PM -- Dispatching transactions ends.
12/4/2009 9:45:47 PM -- Shutting down databases ...
12/4/2009 9:45:57 PM -- Instance2956.1 (complete), Instance2956.2

```

(complete), Instance2956.3 (complete), Instance2956.4 (complete), Instance2956.5 (complete), Instance2956.6 (complete), Instance2956.7 (complete), Instance2956.8 (complete), Instance2956.9 (complete), Instance2956.10 (complete), Instance2956.11 (complete), Instance2956.12 (complete), Instance2956.13 (complete), Instance2956.14 (complete), Instance2956.15 (complete) and Instance2956.16 (complete)  
12/4/2009 9:45:57 PM -- C:\Program Files\Exchange Jetstress\Performance 2009 12 4 20 32 13.blg has 287 samples.  
12/4/2009 9:45:57 PM -- Creating test report ...  
12/4/2009 9:46:16 PM -- Instance2956.1 has 15.6 for I/O Database Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.1 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.1 has 2.8 for I/O Log Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.2 has 15.8 for I/O Database Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.2 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.2 has 2.8 for I/O Log Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.3 has 15.6 for I/O Database Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.3 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.3 has 2.8 for I/O Log Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.4 has 16.0 for I/O Database Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.4 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.4 has 2.8 for I/O Log Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.5 has 15.5 for I/O Database Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.5 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.5 has 2.8 for I/O Log Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.6 has 15.8 for I/O Database Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.6 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.6 has 2.8 for I/O Log Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.7 has 15.4 for I/O Database Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.7 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.7 has 2.8 for I/O Log Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.8 has 15.7 for I/O Database Reads

Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.8 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.8 has 2.8 for I/O Log Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.9 has 15.4 for I/O Database Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.9 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.9 has 2.8 for I/O Log Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.10 has 15.8 for I/O Database Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.10 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.10 has 2.8 for I/O Log Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.11 has 15.2 for I/O Database Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.11 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.11 has 2.8 for I/O Log Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.12 has 15.6 for I/O Database Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.12 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.12 has 2.8 for I/O Log Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.13 has 15.2 for I/O Database Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.13 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.13 has 2.8 for I/O Log Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.14 has 15.6 for I/O Database Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.14 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.14 has 2.8 for I/O Log Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.15 has 15.4 for I/O Database Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.15 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.15 has 2.8 for I/O Log Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.16 has 15.6 for I/O Database Reads Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.16 has 2.8 for I/O Log Writes Average Latency.  
12/4/2009 9:46:16 PM -- Instance2956.16 has 2.8 for I/O Log Reads Average

Latency.  
12/4/2009 9:46:16 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
12/4/2009 9:46:16 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
12/4/2009 9:46:16 PM -- C:\Program Files\Exchange Jetstress\Performance 2009 12 4 20 32 13.xml has 286 samples queried.  
12/4/2009 9:46:16 PM -- C:\Program Files\Exchange Jetstress\Performance 2009 12 4 20 32 13.html is saved.  
12/4/2009 9:48:50 PM -- Performance logging begins (interval: 4000 ms).  
12/4/2009 9:48:50 PM -- Recovering databases ...  
12/4/2009 10:21:07 PM -- Performance logging ends.  
12/4/2009 10:21:07 PM -- Instance2956.1 (1555.6731722), Instance2956.2 (1936.8304155), Instance2956.3 (1915.0838761), Instance2956.4 (1750.8616234), Instance2956.5 (1891.4809248), Instance2956.6 (1758.5524727), Instance2956.7 (1772.3585612), Instance2956.8 (1501.0260219), Instance2956.9 (1660.6930454), Instance2956.10 (1919.3271033), Instance2956.11 (1777.3973935), Instance2956.12 (1400.7797793), Instance2956.13 (1811.3432111), Instance2956.14 (1717.4462092), Instance2956.15 (1597.3098391) and Instance2956.16 (1872.1212007)  
12/4/2009 10:21:08 PM -- C:\Program Files\Exchange Jetstress\SoftRecovery 2009 12 4 21 48 46.blg has 449 samples.  
12/4/2009 10:21:08 PM -- Creating test report ...