

# Hitachi Universal Storage Platform® V Dynamically Provisioned 112,000 Mailbox Microsoft Exchange 2010 Resiliency Storage Solution

Tested with: ESRP — Storage Version 3.0

Test Date: October-November 2010

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# Table of Contents

<b>Overview</b> .....	<b>3</b>
<b>Disclaimer</b> .....	<b>3</b>
<b>Features</b> .....	<b>3</b>
<b>Solution Description</b> .....	<b>4</b>
<b>Targeted Customer Profile</b> .....	<b>13</b>
<b>Test Deployment</b> .....	<b>13</b>
<b>Replication Configuration</b> .....	<b>15</b>
<b>Best Practices</b> .....	<b>17</b>
Core Storage .....	17
Storage-based Replication .....	18
Backup Strategy .....	18
<b>Test Results Summary</b> .....	<b>18</b>
Reliability .....	18
Storage Performance Results .....	19
Replicated Storage Performance Results .....	25
Database Backup and Recovery Performance .....	31
<b>Conclusion</b> .....	<b>31</b>
<b>Appendix — Test Reports</b> .....	<b>32</b>
Performance Test Result Report: SUN141 .....	32
Performance Test Database Checksums Result: SUN141 .....	39
Stress Test Database Performance Result: SUN141 .....	41
Stress Test Database Checksums Result: SUN141 .....	48
Database Backup Test Result: SUN141 .....	50
Soft Recovery Test Result: SUN141 .....	53
Soft Recovery Test Performance Result: SUN141 .....	60

# Hitachi Universal Storage Platform® V Dynamically Provisioned 112,000 Mailbox Exchange 2010 Resiliency Storage Solution

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## Overview

This document provides information on a Hitachi Universal Storage Platform® V storage solution for Microsoft Exchange Server 2010, based on the Microsoft® Exchange Solution Reviewed Program (ESRP)—Storage program. For more information about the contents of this document or Hitachi Data Systems best practice recommendations for Microsoft Exchange Server 2010 storage design, see Hitachi Data Systems [Microsoft Exchange Solutions Web page](#).

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 information about the Microsoft ESRP—Storage program, see [TechNet's overview of the program](#).

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## Features

The purpose of this testing was to measure the ESRP 3.0 results on a Microsoft Exchange 2010 environment with 112,000 users and 16 servers. This testing used the Hitachi Universal Storage Platform V storage system using Hitachi Dynamic Provisioning in a two-pool RAID-10 configuration (one for databases and one for logs) in a resiliency configuration. These results help answer questions about the kind of performance capabilities to expect with a large-scale Exchange deployment on Universal Storage Platform V.

This solution includes Exchange 2010 Mailbox Resiliency by using the Database Availability Group (DAG) feature. The test configuration was capable of supporting 112,000 users with a 0.12 IOPS per user profile and user mailbox size of 1GB. A Universal Storage Platform V with 512 2TB 7.2K RPM SATA disks, 512 GB of cache and thirty-two 4Gb/sec paths was used for these tests. Testing used sixteen Sun Fire 4270 servers with 32GB of RAM, two quad-core Intel E5540 2.53GHz CPUs, thirty-two Emulex 4Gb/sec Fibre Channel adapters, and Windows Server 2008 R2 Enterprise.

Hitachi Universal Storage Platform V delivers proven enterprise class functionality — advanced virtualization of externally attached storage, logical partitioning, thin provisioning and universal replication — with the industry's most reliable, scalable and highest performing storage services platform. Universal Storage Platform V is a large-sized, high-performance, highly reliable enterprise-class storage system that can scale to 1,152 disks and over 65,000 logical units (LUs) while capable of maintaining 100 percent data availability. In addition, Universal Storage Platform V boasts an aggregate internal cache bandwidth of 106 GB/sec, 4 million aggregate IOPS and under the SPC-2 methodology, an aggregated average of 8,724.67 SPC-2 MB/sec with a single storage controller.

Universal Storage Platform V is highly suitable for a variety of applications and host platforms that support the most demanding workloads. With internal and external storage virtualization capabilities, advanced replication technologies, tiered storage features and a tightly integrated management suite, Universal Storage Platform V is fully capable of serving as the core underlying storage platform of high performance Exchange Server 2010 architectures, while maintaining the ability to support additional workloads of an organization such as SQL Server and SharePoint Server.

## Solution Description

Deploying Microsoft Exchange Server 2010 requires careful consideration of all aspects of the solution architecture. Host servers need to be configured so that they are robust enough to handle the required Exchange load. The storage solution must be designed to provide the necessary performance while also being reliable and easy to administer. Of course, an effective backup and recovery plan should be incorporated into the solution as well. The aim of this solution report is to provide a tested configuration that utilizes Universal Storage Platform V to meet the needs of a large Exchange Server deployment.

This solution uses Hitachi Dynamic Provisioning, which is enabled on Universal Storage Platform via a license key. In the most basic sense, Hitachi Dynamic Provisioning is similar to the use of a host-based logical volume manager (LVM), but with several additional features available within Universal Storage Platform V and without the need to install software on the host or incur host processing overhead. Hitachi Dynamic Provisioning is a superior solution. Hitachi Dynamic Provisioning provides for one or more pools of wide striping across many RAID groups within a Universal Storage Platform V. One or more Dynamic Provisioning virtual volumes (DP-VOLs) of a user-specified logical size (with no initial physical space allocated) are created against each pool.

Primarily, Hitachi Dynamic Provisioning is deployed to avoid the routine issue of hot spots that occur on logical units (LUs) from individual RAID groups when the host workload exceeds the IOPS or throughput capacity of that RAID group. By using many RAID groups as members of a striped dynamic provisioning pool underneath the virtual or logical volumes seen by the hosts, a host workload is distributed across many RAID groups, which provides a smoothing effect that dramatically reduces hot spots and results in fewer mailbox moves for the Exchange administrator.

Hitachi Dynamic Provisioning also carries the side benefit of thin provisioning, where physical space is only assigned from the pool to the DP-VOL as needed using 42MB chunks, up to the logical size specified for each DP-VOL. A pool can also be dynamically expanded by adding more RAID groups without disruption or requiring downtime. Upon expansion, a pool can easily be rebalanced so that the data and workload is wide striped evenly across the current and newly added RAID groups comprising the pool.

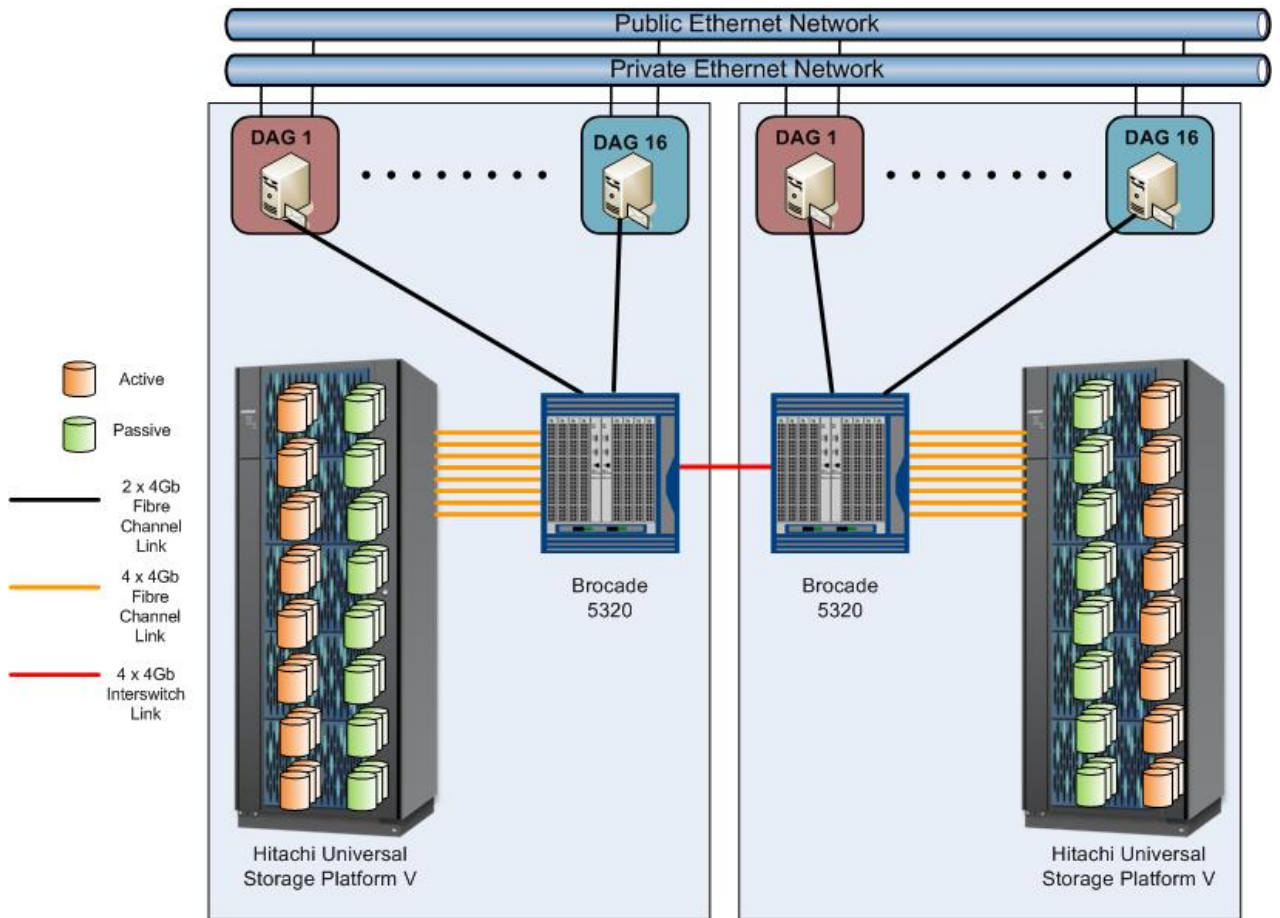
High availability is also a part of this solution with the use of the DAG feature, which is the base component of the high availability and site resilience framework built into Microsoft Exchange Server 2010. A DAG is a group of up to 16 mailbox servers that host a set of databases and logs and uses continuous replication to provide automatic database-level recovery from failures that affect individual servers or databases.

Any server in a DAG can host a copy of a mailbox database from any other server in the DAG. When a server is added to a DAG, it monitors and works with the other servers in the DAG to provide automatic recovery delivering a robust, highly-available Exchange solution without the administrative complexities of traditional failover clustering. For more information about the DAG feature in Exchange Server 2010, see <http://technet.microsoft.com/en-us/library/dd979799.aspx>

This solution includes two copies of each Exchange database using 16 DAGs, each configured with two servers that host mailboxes. To target the 112,000 user resiliency solution, a Hitachi Universal Storage Platform V configured with 512 (maximum 1152) disks and 16 host servers, each configured with 7000 mailboxes, were used to host the 12 active databases per server and the simulated database copies for the tests

Each DAG contains two copies of every database; a local, active copy on a server connected to the primary Universal Storage Platform V and the passive copy on another server connected to a second Universal Storage Platform V. This recommended configuration can support both high-availability and disaster-recovery scenarios when the active and passive database copies are allocated among both DAG members and dispersed across both Universal Storage Platform V. Each simulated DAG server node in this solution maintains a mirrored configuration and possesses adequate capacity and performance capabilities to support the second set of replicated databases.

Figure 1 illustrates the two systems that make up the simulated DAG configuration. For more information, see the Hitachi Data Systems [Storage Systems web page](#).



**Figure 1. Recommended Database Availability Group Configuration**

This solution enables organizations to consolidate Exchange Server 2010 DAG deployments on two Universal Storage Platform V storage systems. Using identical hardware and software configurations guarantees that an active database and its replicated copy do not share storage paths, disk spindles or storage controllers, making it a very reliable, high-performing, highly available Exchange Server 2010 solution that is cost effective and easy to manage. This helps ensure that performance and service levels related to storage are maintained regardless of which server is hosting the active database. If further protection is needed in a production environment, additional Exchange Server 2010 mailbox servers can be easily added to support these failover scenarios.

Figure 2 is a representation of how the LDEVs were created from parity groups and Back-end Directors.

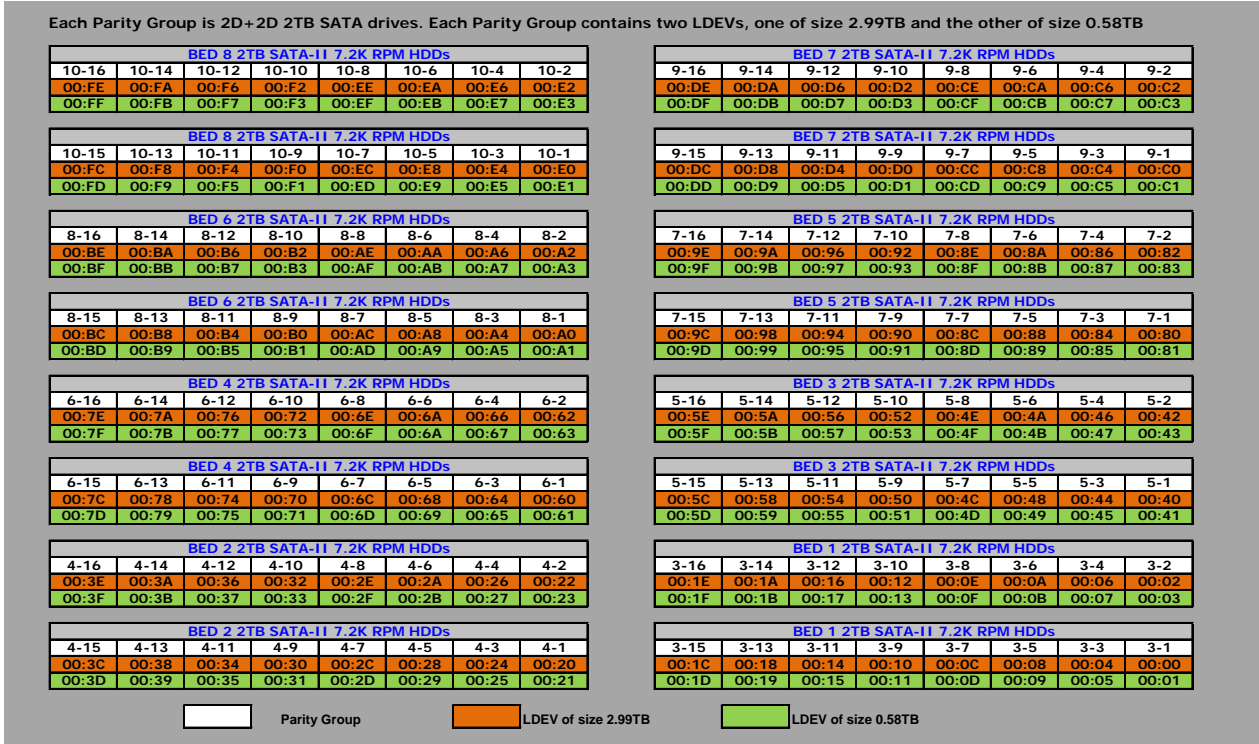
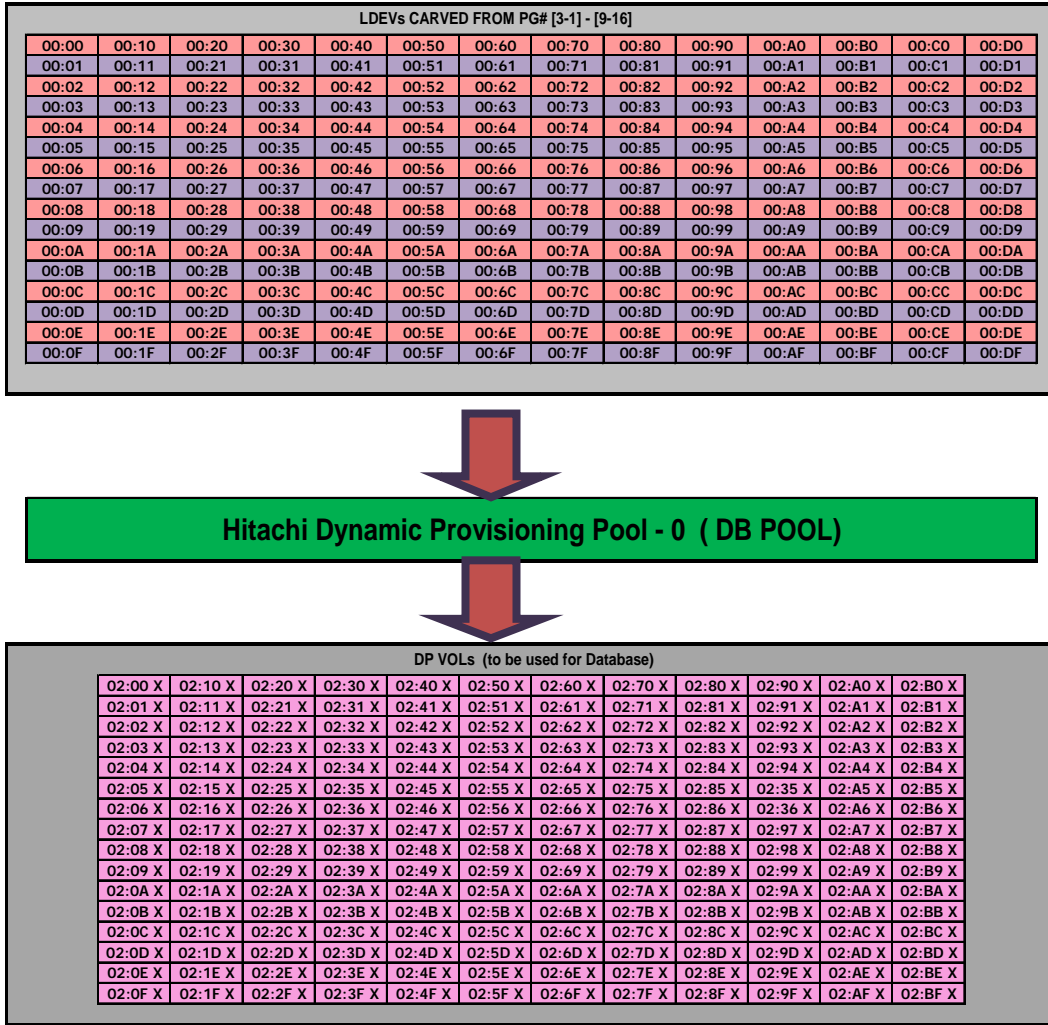


Figure 2. Parity Group and LDEV Layout

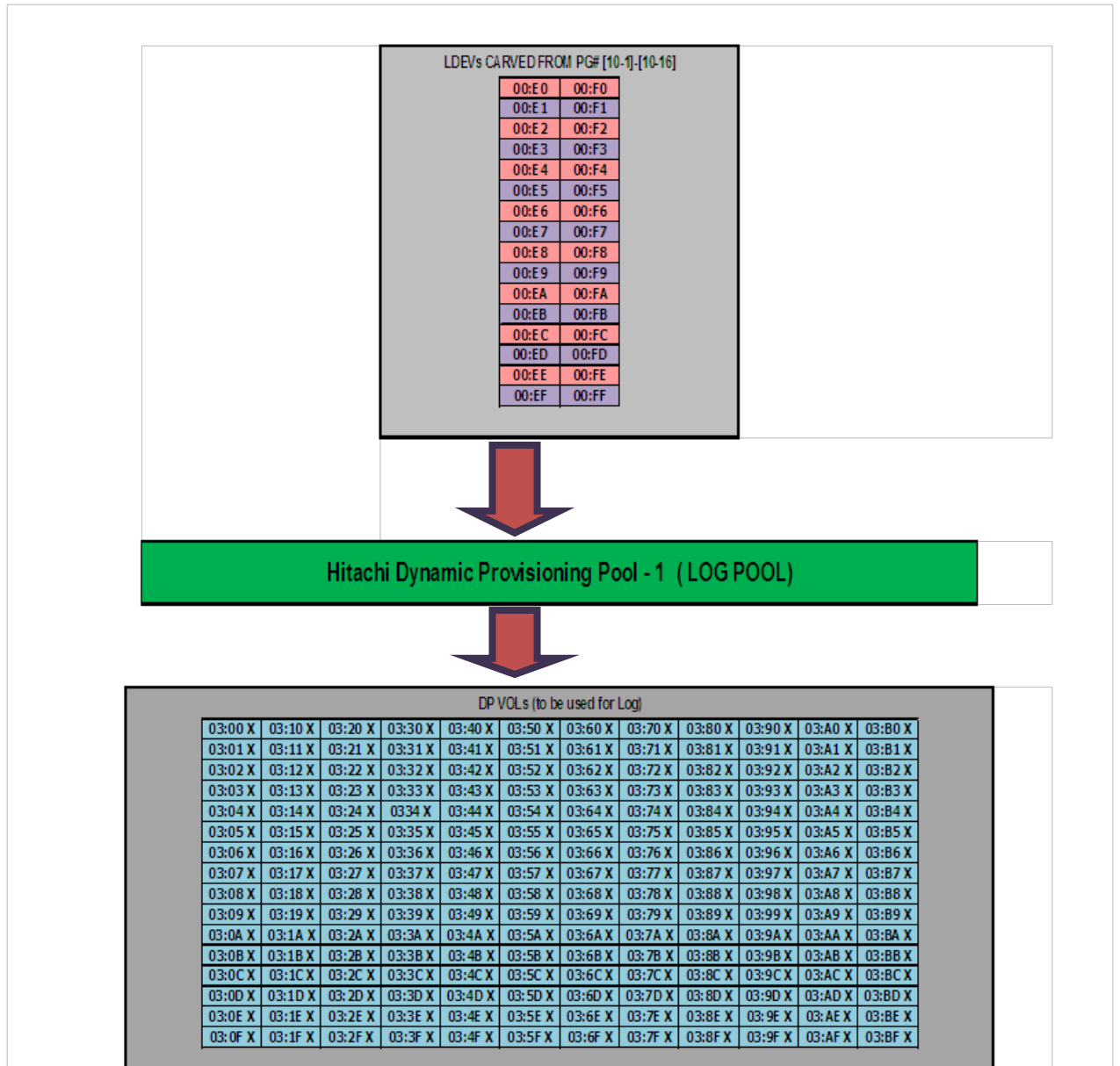
There were 128 Raid-10 2+2 SATA parity groups. Each parity group contained two LDEVs, one of size 2.99TB and the other of size 0.58TB. The LDEVs from parity groups 3-1 to 9-1 were added to HDP Pool-0 (Database Pool) and the LDEVs from Parity Group 10-1 to 10-16 were added to the HDP Pool-1 (Log Pool). There were 192 V-VOL Groups (DP-VOL containers) created from the HDP Pool-0 (Database Pool) and each group had one 2TB DP-VOL in it. Similarly, from HDP Pool-1 (Log Pool) 192 V-VOL Groups were created and each group had one 200GB DP-VOL in it. The Database DP-VOLs and Log DP-VOLs were then assigned to the hosts.

Figure 3 is a representation of how/which LDEVs were added to the HDP pools and what DP-VOLs were created from the pool.



**Figure 3. Database DP-Pool Layout**

Figure 4 is a representation of how/which LDEVs were added to the HDP pools and what DP-VOLs were created from the pool.



**Figure 4. Log DP-Pool Layout**

Table 1 outlines the primary storage port layout for the servers.

**Table 1. Universal Storage Platform V Port to Server Layout**

<i>Server</i>	<i>Primary Path</i>	<i>Secondary Path</i>
SUN141	1A	1B
SUN142	1C	1D
SUN143	1E	1F
SUN144	1G	1H
SUN145	1J	1K
SUN146	1L	1M
SUN147	1N	1P
SUN148	1Q	1R
SUN149	2A	2B
SUN150	2C	2D
SUN151	2E	2F
SUN152	2G	2H
SUN153	2J	2K
SUN154	2L	2M
SUN155	2N	2P
SUN156	2Q	2R

Table 2 outlines the port layout with the database DP-VOL assignments for the primary storage and servers. An identical configuration is deployed on the replicated storage and servers for this solution.

**Table 2. Universal Storage Platform V Port to Database DP-VOL Layout**

<i>Port</i>	<i>Database</i>	<i>DB DP-VOL</i>
1A	Database 1-12	02:00X-02:0BX
1C	Database 12-24	02:0CX-02:17X
1E	Database 25-36	02:18X-02:23X
1G	Database 37-48	02:24X-02:2FX
1J	Database 49-60	02:30X-02:3BX
1L	Database 61-72	02:3CX-02:47X
1N	Database 73-84	02:48X-02:53X
1Q	Database 85-96	02:54X-02:5FX
2A	Database 97-108	02:60X-02:6BX
2C	Database 109-120	02:6CX-02:77X
2E	Database 121-132	02:78X-02:83X
2G	Database 133-144	02:84X-02:8FX
2J	Database 145-156	02:90X-02:9BX
2L	Database 157-168	02:9CX-02:A7X
2N	Database 169-180	02:A8X-02:B3X
2Q	Database 181-192	02:B4X-02:BFX

Table 3 outlines the port layout with the log DP-VOL assignments for primary storage and servers. An identical configuration is deployed on the replicated storage and servers for this solution.

**Table 3. Universal Storage Platform V Port to Log DP-VOL Layout**

<i>Port</i>	<i>Log</i>	<i>DP-VOL</i>
1A	Log 1-12	03:00X-03:0BX
1C	Log 12-24	03:0CX-03:17X
1E	Log 25-36	03:18X-03:23X
1G	Log 37-48	03:24X-03:2FX
1J	Log 49-60	03:30X-03:3BX
1L	Log 61-72	03:3CX-03:47X
1N	Log 73-84	03:48X-03:53X
1Q	Log 85-96	03:54X-03:5FX
2A	Log 97-108	03:60X-03:6BX
2C	Log 109-120	03:6CX-03:77X
2E	Log 121-132	03:78X-03:83X
2G	Log 133-144	03:84X-03:8FX
2J	Log 145-156	03:90X-03:9BX
2L	Log 157-168	03:9CX-03:A7X
2N	Log 169-180	03:A8X-03:B3X
2Q	Log 181-192	03:B4X-03:BFX

Table 4 provides the detailed specifications for the storage configuration which uses RAID-10 (2+2) groups and 2TB 7.2K SATA II disks. Dynamic Provisioning Pool 0 is dedicated for the database and Dynamic Provisioning Pool 1 is dedicated for the logs.

**Table 4. Universal Storage Platform V Configuration Details**

<i>Host</i>	<i>Pool</i>	<i>Port</i>	<i>DP-VOLs</i>	<i>Size (GB)</i>	<i>Description</i>
Sun141	0	1A/1B	02:00X-02:0BX	2000	Databases 1-12
Sun142	0	1C/1D	02:0CX-02:17X	2000	Databases 12-24
Sun143	0	1E/1F	02:18X-02:23X	2000	Databases 25-36
Sun144	0	1G/1H	02:24X-02:2FX	2000	Databases 37-48
Sun145	0	1J/1K	02:30X-02:3BX	2000	Databases 49-60
Sun146	0	1L/1M	02:3CX-02:47X	2000	Databases 61-72
Sun147	0	1N/1P	02:48X-02:53X	2000	Databases 73-84
Sun148	0	1Q/1R	02:54X-02:5FX	2000	Databases 85-96
Sun149	0	2A/2B	02:60X-02:6BX	2000	Databases 97-108
Sun150	0	2C/2D	02:6CX-02:77X	2000	Databases 109-120
Sun151	0	2E/2F	02:78X-02:83X	2000	Databases 121-132
Sun152	0	2G/2H	02:84X-02:8FX	2000	Databases 133-144
Sun153	0	2J/2K	02:90X-02:9BX	2000	Databases 145-156
Sun154	0	2L/2M	02:9CX-02:A7X	2000	Databases 157-168

<i>Host</i>	<i>Pool</i>	<i>Port</i>	<i>DP-VOLs</i>	<i>Size (GB)</i>	<i>Description</i>
Sun155	0	2N/2P	02:A8X-02:B3X	2000	Databases 169-180
Sun156	0	2Q/2R	02:B4X-02:BFX	2000	Databases 181-192
Sun141	1	1A/1B	03:00X-03:0BX	200	Log 1-12
Sun142	1	1C/1D	03:0CX-03:17X	200	Log 12-24
Sun143	1	1E/1F	03:18X-03:23X	200	Log 25-36
Sun144	1	1G/1H	03:24X-03:2FX	200	Log 37-48
Sun145	1	1J/1K	03:30X-03:3BX	200	Log 49-60
Sun146	1	1L/1M	03:3CX-03:47X	200	Log 61-72
Sun147	1	1N/1P	03:48X-03:53X	200	Log 73-84
Sun148	1	1Q/1R	03:54X-03:5FX	200	Log 85-96
Sun149	1	2A/2B	03:60X-03:6BX	200	Log 97-108
Sun150	1	2C/2D	03:6CX-03:77X	200	Log 109-120
Sun151	1	2E/2F	03:78X-03:83X	200	Log 121-132
Sun152	1	2G/2H	03:84X-03:8FX	200	Log 133-144
Sun153	1	2J/2K	03:90X-03:9BX	200	Log 145-156
Sun154	1	2L/2M	03:9CX-03:A7X	200	Log 157-168
Sun155	1	2N/2P	03:A8X-03:B3X	200	Log 169-180
Sun156	1	2Q/2R	03:B4X-03:BFX	200	Log 181-192

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

- 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 all beyond the scope of the ESRP— Storage program. Therefore, the number of mailboxes hosted per server as part of the tested configuration might not necessarily be viable for some customer deployments.

For more information about identifying and addressing performance bottlenecks in an Exchange system, see Microsoft's [Troubleshooting Microsoft Exchange Server Performance](#).

## Targeted Customer Profile

This solution was designed for medium to large organizations that plan to consolidate their Exchange Server 2010 storage on high-performance, high-reliability storage systems. This configuration is designed to support 112,000 Exchange users with the following specifications:

- 32 Exchange Servers (16 tested, simulating 32 for the database copies)
- Two Universal Storage Platform V systems (one tested)
- 0.10 IOPS per user (0.12 tested for 20% growth)
- 1GB mailbox size
- Mailbox resiliency provides high-availability and used as primary data protection mechanism
- Universal Storage Platform V RAID protection against physical failure or loss
- 24x7 background database maintenance enabled

## Test Deployment

The following tables summarize the testing environment.

**Table 5. Simulated Exchange Configuration**

<i>Number of Exchange mailboxes simulated</i>	112,000
<i>Number of database availability groups (DAGs)</i>	16
<i>Number of servers per DAG</i>	2
<i>Number of active mailboxes per server</i>	7000
<i>Number of databases per host</i>	12
<i>Number of copies per database</i>	2
<i>Number of mailboxes per database</i>	583.3
<i>Simulated profile: I/Os per second per mailbox (IOPS, include 20% headroom)</i>	0.12
<i>Database LU size</i>	2000GB
<i>Log LU Size</i>	200GB
<i>Total database size for performance testing</i>	112,000
<i>% storage capacity used by Exchange database**</i>	27.4%

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

**Table 6. Storage Hardware**

<i>Storage connectivity (Fibre Channel, SAS, SATA, iSCSI)</i>	Fibre Channel
<i>Storage model and OS/firmware revision</i>	1 Hitachi Universal Storage Platform V Firmware: 60-07-34-00/00 WHQL listing: Hitachi Universal Storage Platform V
<i>Storage cache</i>	512GB
<i>Number of storage controllers</i>	16 Front-end and 16 Back-end boards
<i>Number of storage ports</i>	32
<i>Maximum bandwidth of storage connectivity to host</i>	128Gb/sec (32x4Gb/sec HBA)
<i>Switch type/model/firmware revision</i>	Brocade 5320, Fabric OS v6.4.0b
<i>HBA model and firmware</i>	Emulex LPe11002, FW:2.80A4
<i>Number of HBAs per host</i>	2 dual-ported HBAs per host
<i>Host server type</i>	Sun Fire 4270 2 2.54GHz quad-core Intel Xeon CPUs, 32GB memory
<i>Total number of disks tested in solution</i>	512
<i>Maximum number of spindles that can be hosted in the storage</i>	1152

**Table 7. Storage Software**

<i>HBA driver</i>	STOR Miniport 7.2.30.16
<i>HBA QueueTarget setting</i>	0
<i>HBA QueueDepth setting</i>	32
<i>Multipathing</i>	Hitachi Dynamic Link Manager v6.4.0
<i>Host OS</i>	Microsoft Windows Server 2008 R2 Enterprise
<i>ESE.dll file version</i>	14.00.0639.019
<i>Replication solution name/version</i>	N/A

**Table 8. Storage Disk Configuration (Mailbox Store Disks)**

<i>Disk type, speed and firmware revision</i>	SATA Disk 2TB 7.2K FW : A3-1D
<i>Raw capacity per disk (GB)</i>	2000
<i>Number of physical disks in test</i>	448
<i>Total raw storage capacity (GB)</i>	896,000
<i>Disk slice size (GB)</i>	N/A
<i>Number of slices per LU or number of disks per LU</i>	N/A
<i>RAID level</i>	RAID-10 (2+2)
<i>Total formatted capacity (Dynamic Provisioning Database Pool)</i>	409,248GB
<i>Storage capacity utilization</i>	45.7%
<i>Database capacity utilization</i>	42.9%

**Table 9. Storage Disk Configuration (Transaction Log Disks)**

<i>Disk type, speed and firmware revision</i>	SATA Disk 2TB 7.2K FW : A3-1D
<i>Raw capacity per disk (GB)</i>	2000
<i>Number of spindles in test</i>	64
<i>Total raw storage capacity (GB)</i>	128,000
<i>Disk slice size (GB)</i>	N/A
<i>Number of slices per LU or number of disks per LU</i>	N/A
<i>RAID level</i>	RAID-10 (2+2)
<i>Total formatted capacity (Dynamic Provisioning Log Pool)</i>	58,464GB

## Replication Configuration

**Table 10. Replication Configuration**

<i>Replication mechanism</i>	Exchange Server 2010 Database Availability Group (DAG)
<i>Number of links</i>	2
<i>Simulated link distance</i>	N/A
<i>Link type</i>	IP
<i>Link bandwidth</i>	GigE (1Gb/sec)

**Table 11. Replicated Storage Hardware**

<i>Storage connectivity (Fiber Channel, SAS, SATA, iSCSI)</i>	Fiber Channel
<i>Storage model and OS/firmware revision</i>	1 Hitachi Universal Storage Platform V Firmware: 60-07-34-00/00 WHQL listing: Hitachi Universal Storage Platform V
<i>Storage cache</i>	512GB
<i>Number of storage controllers</i>	16 Front-end and 16 Back-end boards
<i>Number of storage ports</i>	32
<i>Maximum bandwidth of storage connectivity to host</i>	128Gb/sec (32x4Gb/sec HBA)
<i>Switch type/model/firmware revision</i>	Brocade 5320, Fabric OS v6.4.0b
<i>HBA model and firmware</i>	Emulex LPe11002, FW:2.80A4
<i>Number of HBAs per host</i>	2 dual-ported HBAs per host
<i>Host server type</i>	Sun Fire 4270 2 2.54 GHz quad-core Intel Xeon CPUs, 32 GB memory
<i>Total number of disks tested in solution</i>	512
<i>Maximum number of spindles that can be hosted in the storage</i>	1152

**Table 12. Replicated Storage Software**

<i>HBA driver</i>	STOR Miniport 7.2.30.16
<i>HBA QueueTarget setting</i>	0
<i>HBA QueueDepth setting</i>	32
<i>Multipathing</i>	Hitachi Dynamic Link Manager v6.4.0
<i>Host OS</i>	Microsoft Windows Server 2008 R2 Enterprise
<i>ESE.dll file version</i>	14.00.0639.019
<i>Replication solution name/version</i>	N/A

**Table 13. Replicated Storage Disk Configuration (Mailbox Store Disks)**

<i>Disk type, speed and firmware revision</i>	SATA Disk 2TB 7.2K FW : A3-1D
<i>Raw capacity per disk (GB)</i>	2000
<i>Number of physical disks in test</i>	448
<i>total raw storage capacity (GB)</i>	896,000
<i>Disk slice size (GB)</i>	NA
<i>Number of slices per LU or number of disks per LU</i>	NA
<i>RAID level</i>	RAID-10 (2+2)
<i>Total formatted capacity</i>	409,248GB
<i>Storage capacity utilization</i>	45.7%
<i>Database capacity utilization</i>	42.9%

**Table 14. Replicated Storage Disk Configuration (Transactional Log Disks)**

<i>Disk type, speed and firmware revision</i>	SATA Disk 2TB 7.2K FW :A3-1D
<i>Raw capacity per disk (GB)</i>	2000
<i>Number of spindles in test</i>	64
<i>Total raw storage capacity (GB)</i>	128,000
<i>Disk slice size (GB)</i>	NA
<i>Number of slices per LU or number of disks per LU</i>	NA
<i>RAID level</i>	RAID-10 (2+2)
<i>Total formatted capacity</i>	58,464GB

## Best Practices

Microsoft Exchange Server 2010 is a very disk-intensive application. It presents two distinct workload patterns to the storage, with 8KB random read/write operations to the databases, and with sequential write operations from 512 bytes up to the log buffer size to the transaction logs.

For this reason, designing an optimal storage configuration can prove challenging in practice. Based on the testing run using the ESRP framework, Hitachi Data Systems recommends these best practices to improve the performance of Hitachi Universal Storage Platform V running Exchange.

For more information about Exchange 2010 best practices for storage design, see the Microsoft [TechNet](#) article "[Mailbox Server Storage Design](#)."

## Core Storage

1. When formatting a newly partitioned LU, Hitachi Data Systems recommends setting the ALU to 64K for database and to 4K for log files.
2. Disk alignment is no longer required when using Microsoft Windows Server 2008.
3. Keep the Exchange workload isolated from other applications. Mixing another I/O intensive application whose workload differs from Exchange can cause the performance for both applications to degrade.
4. Use Hitachi Dynamic Link Manager multipathing software to provide fault tolerance and high availability for host connectivity.
5. Use Hitachi Dynamic Provisioning to simplify storage management of the Exchange database and log volumes
6. Due to the difference in I/O patterns, isolate the Exchange database from the log groups. Create a dedicated dynamic provisioning pool for the databases and a separate pool for the logs.
7. Hitachi Data Systems recommends RAID-10 groups for both the database pools and for the log pool when SATA disks are used. Use of RAID-10 allows more writes at a lower response time under heavier loads. RAID-10 also supports a shorter RAID group rebuild time on failure of a disk.
8. Log LUs should be at least 10 percent of the size of the database LUs.

9. Hitachi Data Systems does not recommend LU concatenation.
10. Hitachi Data Systems recommends implementing mailbox resiliency using a database availability group (DAG) in Microsoft Exchange Server 2010.
11. Ensure that each DAG maintains at least two database copies to provide high availability.
12. Isolate active databases and their replicated copies in separate dynamic provisioning pools or ensure that they are located on a separate Universal Storage Platform V.
13. Use fewer, larger LUs for Exchange 2010 databases (up to 2TB) with background database maintenance (24x7) enabled.
14. Size storage solutions for Exchange based primarily on performance criteria. The number of disks, RAID level, and percent utilization of each disk directly affect the level of achievable performance. Factor in capacity requirements only after performance is addressed.
15. Disk size is unrelated to performance with regards to IOPS or throughput rates. Disk size is related to the usable capacity of all of the LUs from a RAID group, which is a choice users make.
16. The number of spindles, coupled with the RAID level, determines the physical IOPS capacity of the RAID group and all of its LUs. If the disk has too few spindles, the response times grow to large values very quickly.

## Storage-based Replication

N/A

## Backup Strategy

N/A

## Test Results Summary

This section provides a high-level summary of the test data from ESRP and the link to the detailed HTML reports that are generated by ESRP testing framework.

### Reliability

A number of tests in the framework check reliability spanning a 24-hour window. The goal is to verify the storage can handle high I/O load for a long period of time. Following these stress tests, both log and database files are analyzed for integrity to ensure that no database or log corruption occurs.

- No errors were reported in the event log file for the storage reliability testing
- No errors were reported for the [database](#) and [log](#) checksum process
- If done, no errors were reported during the backup to disk test [process](#)
- No errors were reported for the database checksum on the remote storage database

## Storage Performance Results

Primary storage [performance](#) testing exercises the storage with maximum sustainable Exchange type of I/O for two hours. The test shows how long it takes for the storage to respond to an I/O under load. The following data is the sum of all of the logical disk I/Os and average of all the logical disks I/O latency in the two-hour test duration.

### Individual Server Metrics

Individual server metrics show the sum of I/Os across storage groups and the average latency across all storage groups on a per-server basis.

**Table 15. Individual Server Metrics for Exchange Server (SUN141)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	941
<i>Database Disk Reads Per Second</i>	588
<i>Database Disk Writes Per Second</i>	353
<i>Average Database Disk Read Latency (ms)</i>	16.0
<i>Average Database Disk Write Latency (ms)</i>	6.7
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	298
<i>Average Log Disk Write Latency (ms)</i>	1.2

**Table 16. Individual Server Metrics for Exchange Server (SUN142)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	939
<i>Database Disk Reads Per Second</i>	588
<i>Database Disk Writes Per Second</i>	531
<i>Average Database Disk Read Latency (ms)</i>	15.9
<i>Average Database Disk Write Latency (ms)</i>	6.8
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	297
<i>Average Log Disk Write Latency (ms)</i>	1.2

**Table 17. Individual Server Metrics for Exchange Server (SUN143)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	947
<i>Database Disk Reads Per Second</i>	592
<i>Database Disk Writes Per Second</i>	355
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	6.8
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	299
<i>Average Log Disk Write Latency (ms)</i>	1.3

**Table 18. Individual Server Metrics for Exchange Server (SUN144)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	936
<i>Database Disk Reads Per Second</i>	584
<i>Database Disk Writes Per Second</i>	351
<i>Average Database Disk Read Latency (ms)</i>	16.0
<i>Average Database Disk Write Latency (ms)</i>	6.8
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	295
<i>Average Log Disk Write Latency (ms)</i>	1.2

**Table 19. Individual Server Metrics for Exchange Server (SUN145)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	941
<i>Database Disk Reads Per Second</i>	588
<i>Database Disk Writes Per Second</i>	353
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	6.8
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	297
<i>Average Log Disk Write Latency (ms)</i>	1.3

**Table 20. Individual Server Metrics for Exchange Server (SUN146)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	946
<i>Database Disk Reads Per Second</i>	592
<i>Database Disk Writes Per Second</i>	355
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	6.9
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	295
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 21. Individual Server Metrics for Exchange Server (SUN147)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	949
<i>Database Disk Reads Per Second</i>	593
<i>Database Disk Writes Per Second</i>	356
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	7.1
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	296
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 22. Individual Server Metrics for Exchange Server (SUN148)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	910
<i>Database Disk Reads Per Second</i>	569
<i>Database Disk Writes Per Second</i>	341
<i>Average Database Disk Read Latency (ms)</i>	17.0
<i>Average Database Disk Write Latency (ms)</i>	12.5
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	280
<i>Average Log Disk Write Latency (ms)</i>	2.1

**Table 23. Individual Server Metrics for Exchange Server (SUN149)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	939
<i>Database Disk Reads Per Second</i>	588
<i>Database Disk Writes Per Second</i>	352
<i>Average Database Disk Read Latency (ms)</i>	15.9
<i>Average Database Disk Write Latency (ms)</i>	6.8
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	297
<i>Average Log Disk Write Latency (ms)</i>	1.2

**Table 24. Individual Server Metrics for Exchange Server (SUN150)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	931
<i>Database Disk Reads Per Second</i>	582
<i>Database Disk Writes Per Second</i>	348
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	6.9
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	289
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 25. Individual Server Metrics for Exchange Server (SUN151)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	942
<i>Database Disk Reads Per Second</i>	589
<i>Database Disk Writes Per Second</i>	353
<i>Average Database Disk Read Latency (ms)</i>	16.2
<i>Average Database Disk Write Latency (ms)</i>	7.0
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	293
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 26. Individual Server Metrics for Exchange Server (SUN152)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	942
<i>Database Disk Reads Per Second</i>	589
<i>Database Disk Writes Per Second</i>	353
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	6.8
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	293
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 27. Individual Server Metrics for Exchange Server (SUN153)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	937
<i>Database Disk Reads Per Second</i>	586
<i>Database Disk Writes Per Second</i>	351
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	6.9
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	292
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 28. Individual Server Metrics for Exchange Server (SUN154)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	943
<i>Database Disk Reads Per Second</i>	589
<i>Database Disk Writes Per Second</i>	354
<i>Average Database Disk Read Latency (ms)</i>	16.0
<i>Average Database Disk Write Latency (ms)</i>	6.8
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	293
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 29. Individual Server Metrics for Exchange Server (SUN155)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	947
<i>Database Disk Reads Per Second</i>	592
<i>Database Disk Writes Per Second</i>	355
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	6.9
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	295
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 30. Individual Server Metrics for Exchange Server (SUN156)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	933
<i>Database Disk Reads Per Second</i>	583
<i>Database Disk Writes Per Second</i>	350
<i>Average Database Disk Read Latency (ms)</i>	15.9
<i>Average Database Disk Write Latency (ms)</i>	6.7
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	294
<i>Average Log Disk Write Latency (ms)</i>	1.2

### *Aggregate Performance Across All Servers Metrics*

The aggregate performance across all server metrics shows the sum of I/Os across all servers in the solution and the average latency across all servers in the solution.

**Table 31. Aggregate Performance for Exchange Server 2010**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	15021.3
<i>Database Disk Reads Per Second</i>	9391.7
<i>Database Disk Writes Per Second</i>	5629.5
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	7.2
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	4703.8
<i>Average Log Disk Write Latency (ms)</i>	1.4

## Replicated Storage Performance Results

These [performance](#) tests measure the performance of the secondary storage. The performance tests are identical to that of the primary storage and verify that the secondary storage is capable of being transitioned to become the primary storage. Each server is listed separately and the aggregate numbers across all servers is listed as well.

### *Individual Server Metrics*

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

**Table 32. Individual Server Metrics for Exchange Server (SUN141)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	941
<i>Database Disk Reads Per Second</i>	588
<i>Database Disk Writes Per Second</i>	353
<i>Average Database Disk Read Latency (ms)</i>	16.0
<i>Average Database Disk Write Latency (ms)</i>	6.7
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	298
<i>Average Log Disk Write Latency (ms)</i>	1.2

**Table 33. Individual Server Metrics for Exchange Server (SUN142)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	939
<i>Database Disk Reads Per Second</i>	588
<i>Database Disk Writes Per Second</i>	531
<i>Average Database Disk Read Latency (ms)</i>	15.9
<i>Average Database Disk Write Latency (ms)</i>	6.8
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	297
<i>Average Log Disk Write Latency (ms)</i>	1.2

**Table 34. Individual Server Metrics for Exchange Server (SUN143)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	947
<i>Database Disk Reads Per Second</i>	592
<i>Database Disk Writes Per Second</i>	355
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	6.8
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	299
<i>Average Log Disk Write Latency (ms)</i>	1.3

**Table 35. Individual Server Metrics for Exchange Server (SUN144)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	936
<i>Database Disk Reads Per Second</i>	584
<i>Database Disk Writes Per Second</i>	351
<i>Average Database Disk Read Latency (ms)</i>	16.0
<i>Average Database Disk Write Latency (ms)</i>	6.8
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	295
<i>Average Log Disk Write Latency (ms)</i>	1.2

**Table 36. Individual Server Metrics for Exchange Server (SUN145)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	941
<i>Database Disk Reads Per Second</i>	588
<i>Database Disk Writes Per Second</i>	353
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	6.8
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	297
<i>Average Log Disk Write Latency (ms)</i>	1.3

**Table 37. Individual Server Metrics for Exchange Server (SUN146)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	946
<i>Database Disk Reads Per Second</i>	592
<i>Database Disk Writes Per Second</i>	355
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	6.9
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	295
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 38. Individual Server Metrics for Exchange Server (SUN147)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	949
<i>Database Disk Reads Per Second</i>	593
<i>Database Disk Writes Per Second</i>	356
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	7.1
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	296
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 39. Individual Server Metrics for Exchange Server (SUN148)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	910
<i>Database Disk Reads Per Second</i>	569
<i>Database Disk Writes Per Second</i>	341
<i>Average Database Disk Read Latency (ms)</i>	17.0
<i>Average Database Disk Write Latency (ms)</i>	12.5
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	280
<i>Average Log Disk Write Latency (ms)</i>	2.1

**Table 40. Individual Server Metrics for Exchange Server (SUN149)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	939
<i>Database Disk Reads Per Second</i>	588
<i>Database Disk Writes Per Second</i>	352
<i>Average Database Disk Read Latency (ms)</i>	15.9
<i>Average Database Disk Write Latency (ms)</i>	6.8
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	297
<i>Average Log Disk Write Latency (ms)</i>	1.2

**Table 41. Individual Server Metrics for Exchange Server (SUN150)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	931
<i>Database Disk Reads Per Second</i>	582
<i>Database Disk Writes Per Second</i>	348
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	6.9
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	289
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 42. Individual Server Metrics for Exchange Server (SUN151)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	942
<i>Database Disk Reads Per Second</i>	589
<i>Database Disk Writes Per Second</i>	353
<i>Average Database Disk Read Latency (ms)</i>	16.2
<i>Average Database Disk Write Latency (ms)</i>	7.0
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	293
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 43. Individual Server Metrics for Exchange Server (SUN152)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	942
<i>Database Disk Reads Per Second</i>	589
<i>Database Disk Writes Per Second</i>	353
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	6.8
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	293
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 44. Individual Server Metrics for Exchange Server (SUN153)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	937
<i>Database Disk Reads Per Second</i>	586
<i>Database Disk Writes Per Second</i>	351
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	6.9
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	292
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 45. Individual Server Metrics for Exchange Server (SUN154)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	943
<i>Database Disk Reads Per Second</i>	589
<i>Database Disk Writes Per Second</i>	354
<i>Average Database Disk Read Latency (ms)</i>	16.0
<i>Average Database Disk Write Latency (ms)</i>	6.8
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	293
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 46. Individual Server Metrics for Exchange Server (SUN155)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	947
<i>Database Disk Reads Per Second</i>	592
<i>Database Disk Writes Per Second</i>	355
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	6.9
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	295
<i>Average Log Disk Write Latency (ms)</i>	1.6

**Table 47. Individual Server Metrics for Exchange Server (SUN156)**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	933
<i>Database Disk Reads Per Second</i>	583
<i>Database Disk Writes Per Second</i>	350
<i>Average Database Disk Read Latency (ms)</i>	15.9
<i>Average Database Disk Write Latency (ms)</i>	6.7
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	294
<i>Average Log Disk Write Latency (ms)</i>	1.2

### *Aggregate Performance Across All Servers Metrics*

This is the sum of the I/Os across servers in the solution and the average latency across all servers in the solution.

**Table 48. Aggregate Performance for Exchange Server 2010**

<i>Database I/O</i>	
<i>Database Disk Transfers Per Second</i>	15021.3
<i>Database Disk Reads Per Second</i>	9391.7
<i>Database Disk Writes Per Second</i>	5629.5
<i>Average Database Disk Read Latency (ms)</i>	16.1
<i>Average Database Disk Write Latency (ms)</i>	7.2
<i>Transaction Log I/O</i>	
<i>Log Disk Writes Per Second</i>	4703.8
<i>Average Log Disk Write Latency (ms)</i>	1.4

## Database Backup and Recovery Performance

This section has two tests: The first measures the sequential read rate of the database files and the second measures recovery/replay performance (playing transaction logs in to the database).

### *Database Read-only Performance*

The [performance](#) that this test measures is the maximum rate at which databases can be backed up via VSS. The following tables show the average rate for a single database file.

**Table 49. Database Read-only Performance**

<i>MB Read Per Second Per Database</i>	44.02
<i>MB Read Per Second Total Per Server</i>	528.22

### *Transaction Log Recovery/Replay Performance*

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

**Table 50. Transaction Log Recovery/Replay Performance**

<i>Average Time to Play One Log File (sec)</i>	2.81
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## Conclusion

This document is developed by Hitachi Data Systems and reviewed by the Microsoft Exchange product team. The test results and data presented in this document are based on the tests introduced in the ESRP test framework. Do not quote the data directly for pre-deployment verification. It is still necessary to validate the storage design for a specific customer environment.

The ESRP program is not designed to be a benchmarking program. Tests do not generate the maximum throughput for a given solution. Rather, it is focused on producing recommendations from vendors for Exchange application. Thus, do not use the data presented in this document for direct comparisons among the solutions.

## Appendix — Test Reports

This appendix contains Jetstress test results for one of the servers used in testing this storage solution. These test results are representative of the results obtained for all of the servers tested.

### Performance Test Result Report: SUN141

#### Test Summary

<i>Overall Test Result</i>	Pass
<i>Machine Name</i>	SUN141
<i>Test Description</i>	
<i>Test Start Time</i>	10/25/2010 10:16:16 PM
<i>Test End Time</i>	10/26/2010 12:21:33 AM
<i>Collection Start Time</i>	10/25/2010 10:20:28 PM
<i>Collection End Time</i>	10/26/2010 12:20:28 AM
<i>Jetstress Version</i>	14.01.0043.000
<i>Ese Version</i>	14.00.0639.019
<i>Operating System</i>	Windows Server 2008 R2 Enterprise (6.1.7600.0)
<i>Performance Log</i>	C:\USPV_2TBSATA_1GBMbox\Performance\Performance_2010_10_25_22_16_42.blg C:\USPV_2TBSATA_1GBMbox\Performance\DBCchecksum_2010_10_26_0_21_33.blg

#### Database Sizing and Throughput

<i>Achieved Transactional I/O per Second</i>	941.262
<i>Target Transactional I/O per Second</i>	840
<i>Initial Database Size (bytes)</i>	21542269091840
<i>Final Database Size (bytes)</i>	21545112829952
<i>Database Files (Count)</i>	12

#### Jetstress System Parameters

<i>Thread Count</i>	6 (per database)
<i>Minimum Database Cache</i>	384.0 MB
<i>Maximum Database Cache</i>	3072.0 MB
<i>Insert Operations</i>	40%
<i>Delete Operations</i>	20%
<i>Replace Operations</i>	5%
<i>Read Operations</i>	35%
<i>Lazy Commits</i>	70%
<i>Run Background Database Maintenance</i>	True
<i>Number of Copies per Database</i>	2

## Database Configuration

<i>Instance2224.1</i>	Log Path: C:\logluns\log1 Database: C:\dbluns\db1\Jetstress001001.edb
<i>Instance2224.2</i>	Log Path: C:\logluns\log2 Database: C:\dbluns\db2\Jetstress002001.edb
<i>Instance2224.3</i>	Log Path: C:\logluns\log3 Database: C:\dbluns\db3\Jetstress003001.edb
<i>Instance2224.4</i>	Log Path: C:\logluns\log4 Database: C:\dbluns\db4\Jetstress004001.edb
<i>Instance2224.5</i>	Log Path: C:\logluns\log5 Database: C:\dbluns\db5\Jetstress005001.edb
<i>Instance2224.6</i>	Log Path: C:\logluns\log6 Database: C:\dbluns\db6\Jetstress006001.edb
<i>Instance2224.7</i>	Log Path: C:\logluns\log7 Database: C:\dbluns\db7\Jetstress007001.edb
<i>Instance2224.8</i>	Log Path: C:\logluns\log8 Database: C:\dbluns\db8\Jetstress008001.edb
<i>Instance2224.9</i>	Log Path: C:\logluns\log9 Database: C:\dbluns\db9\Jetstress009001.edb
<i>Instance2224.10</i>	Log Path: C:\logluns\log10 Database: C:\dbluns\db10\Jetstress010001.edb
<i>Instance2224.11</i>	Log Path: C:\logluns\log11 Database: C:\dbluns\db11\Jetstress011001.edb
<i>Instance2224.12</i>	Log Path: C:\logluns\log12 Database: C:\dbluns\db12\Jetstress012001.edb

Transactional I/O Performance

<i>MSExchange Database ==&gt; Instances</i>	<i>I/O Database Reads Average Latency (msec)</i>	<i>I/O Database Writes Average Latency (msec)</i>	<i>I/O Database Reads/sec</i>	<i>I/O Database Writes/sec</i>	<i>I/O Database Reads Average Bytes</i>	<i>I/O Database Writes Average Bytes</i>	<i>I/O Log Reads Average Latency (msec)</i>	<i>I/O Log Writes Average Latency (msec)</i>	<i>I/O Log Reads/sec</i>	<i>I/O Log Writes/sec</i>	<i>I/O Log Reads Average Bytes</i>	<i>I/O Log Writes Average Bytes</i>
<b>Instance2224.1</b>	16.701	7.313	48.755	29.269	35613.658	35229.083	0.000	1.244	0.000	24.258	0.000	4656.954
<b>Instance2224.2</b>	15.931	7.234	48.994	29.448	35889.418	35377.187	0.000	1.240	0.000	24.689	0.000	4651.909
<b>Instance2224.3</b>	15.932	7.158	49.046	29.383	35684.392	35417.443	0.000	1.226	0.000	25.136	0.000	4683.824
<b>Instance2224.4</b>	15.919	7.076	49.412	29.673	35678.355	35286.883	0.000	1.230	0.000	25.000	0.000	4646.734
<b>Instance2224.5</b>	15.865	7.029	48.782	29.221	35622.245	35301.786	0.000	1.236	0.000	24.521	0.000	4646.342
<b>Instance2224.6</b>	15.926	6.970	48.837	29.339	35132.885	35323.733	0.000	1.250	0.000	24.708	0.000	4638.695
<b>Instance2224.7</b>	15.904	6.867	49.069	29.376	35600.479	35371.724	0.000	1.239	0.000	24.670	0.000	4726.802
<b>Instance2224.8</b>	15.921	6.749	49.252	29.591	35428.614	35321.240	0.000	1.224	0.000	24.885	0.000	4643.283
<b>Instance2224.9</b>	15.878	6.621	49.555	29.814	35701.597	35400.516	0.000	1.236	0.000	25.567	0.000	4675.071
<b>Instance2224.10</b>	15.935	6.319	49.235	29.469	35295.629	35352.135	0.000	1.238	0.000	24.907	0.000	4677.371
<b>Instance2224.11</b>	15.943	5.881	48.466	29.085	35579.668	35342.846	0.000	1.238	0.000	24.639	0.000	4650.863
<b>Instance2224.12</b>	15.910	5.253	48.870	29.318	35900.189	35338.067	0.000	1.229	0.000	24.803	0.000	4645.966

### Background Database Maintenance I/O Performance

<i>MSExchange Database ==&gt; Instances</i>	<i>Database Maintenance IO Reads/sec</i>	<i>Database Maintenance IO Reads Average Bytes</i>
Instance2224.1	30.132	261930.551
Instance2224.2	30.155	261912.979
Instance2224.3	30.148	261885.006
Instance2224.4	30.149	261850.427
Instance2224.5	30.157	261907.167
Instance2224.6	30.168	261954.450
Instance2224.7	30.144	261911.557
Instance2224.8	30.161	261896.791
Instance2224.9	30.177	261919.640
Instance2224.10	30.151	261882.399
Instance2224.11	30.154	261959.237
Instance2224.12	30.141	261902.288

### Log Replication I/O Performance

<i>MSExchange Database ==&gt; Instances</i>	<i>I/O Log Reads/sec</i>	<i>I/O Log Reads Average Bytes</i>
Instance2224.1	0.454	175151.130
Instance2224.2	0.465	176610.722
Instance2224.3	0.477	183434.104
Instance2224.4	0.471	176124.192
Instance2224.5	0.459	176657.376
Instance2224.6	0.463	177097.253
Instance2224.7	0.472	181962.563
Instance2224.8	0.466	177554.371
Instance2224.9	0.483	183420.822
Instance2224.10	0.471	179043.377
Instance2224.11	0.462	178542.231
Instance2224.12	0.466	179482.826

Total I/O Performance

<i>MSExchange Database ==&gt; Instances</i>	<i>I/O Database Reads Average Latency (msec)</i>	<i>I/O Database Writes Average Latency (msec)</i>	<i>I/O Database Reads/sec</i>	<i>I/O Database Writes/sec</i>	<i>I/O Database Reads Average Bytes</i>	<i>I/O Database Writes Average Bytes</i>	<i>I/O Log Reads Average Latency (msec)</i>	<i>I/O Log Writes Average Latency (msec)</i>	<i>I/O Log Reads/sec</i>	<i>I/O Log Writes/sec</i>	<i>I/O Log Reads Average Bytes</i>	<i>I/O Log Writes Average Bytes</i>
<b>Instance2224.1</b>	16.701	7.313	78.888	29.269	122058.620	35229.083	1.825	1.244	0.454	24.258	175151.130	4656.954
<b>Instance2224.2</b>	15.931	7.234	79.149	29.448	122001.613	35377.187	1.800	1.240	0.465	24.689	176610.722	4651.909
<b>Instance2224.3</b>	15.932	7.158	79.195	29.383	121795.960	35417.443	1.893	1.226	0.477	25.136	183434.104	4683.824
<b>Instance2224.4</b>	15.919	7.076	79.561	29.673	121384.615	35286.883	1.675	1.230	0.471	25.000	176124.192	4646.734
<b>Instance2224.5</b>	15.865	7.029	78.939	29.221	122070.411	35301.786	1.821	1.236	0.459	24.521	176657.376	4646.342
<b>Instance2224.6</b>	15.926	6.970	79.005	29.339	121745.169	35323.733	1.796	1.250	0.463	24.708	177097.253	4638.695
<b>Instance2224.7</b>	15.904	6.867	79.213	29.376	121722.276	35371.724	1.914	1.239	0.472	24.670	181962.563	4726.802
<b>Instance2224.8</b>	15.921	6.749	79.413	29.591	121440.265	35321.240	1.748	1.224	0.466	24.885	177554.371	4643.283
<b>Instance2224.9</b>	15.878	6.621	79.731	29.814	121320.550	35400.516	1.737	1.236	0.483	25.567	183420.822	4675.071
<b>Instance2224.10</b>	15.935	6.319	79.386	29.469	121353.287	35352.135	1.751	1.238	0.471	24.907	179043.377	4677.371
<b>Instance2224.11</b>	15.943	5.881	78.620	29.085	122404.632	35342.846	1.741	1.238	0.462	24.639	178542.231	4650.863
<b>Instance2224.12</b>	15.910	5.253	79.011	29.318	122115.215	35338.067	1.804	1.229	0.466	24.803	179482.826	4645.966

## Host System Performance

<i>Counter</i>	<i>Average</i>	<i>Minimum</i>	<i>Maximum</i>
<b>% Processor Time</b>	0.824	0.000	3.300
<b>Available MBytes</b>	27569.779	27559.000	27745.000
<b>Free System Page Table Entries</b>	33555130.973	33555123.000	33555131.000
<b>Transition Pages RePurposed/sec</b>	0.000	0.000	0.000
<b>Pool Nonpaged Bytes</b>	67898878.931	67174400.000	68116480.000
<b>Pool Paged Bytes</b>	100061141.244	99975168.000	100139008.000
<b>Database Page Fault Stalls/sec</b>	0.000	0.000	0.000

Test Log 10/25/2010 10:16:16 PM -- Jetstress testing begins ...  
 10/25/2010 10:16:16 PM -- Prepare testing begins ...  
 10/25/2010 10:16:28 PM -- Attaching databases ...  
 10/25/2010 10:16:28 PM -- Prepare testing ends.  
 10/25/2010 10:16:28 PM -- Dispatching transactions begins ...  
 10/25/2010 10:16:28 PM -- Database cache settings: (minimum: 384.0 MB, maximum: 3.0 GB)  
 10/25/2010 10:16:28 PM -- Database flush thresholds: (start: 30.7 MB, stop: 61.4 MB)  
 10/25/2010 10:16:42 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).  
 10/25/2010 10:16:42 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).  
 10/25/2010 10:16:54 PM -- Operation mix: Sessions 6, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.  
 10/25/2010 10:16:54 PM -- Performance logging begins (interval: 15000 ms).  
 10/25/2010 10:16:54 PM -- Attaining prerequisites:  
 10/25/2010 10:20:28 PM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last: 2906014000.0 (lower bound: 2899103000.0, upper bound: none)  
 10/26/2010 12:20:29 AM -- Performance logging ends.  
 10/26/2010 12:21:27 AM -- JetInterop batch transaction stats: 16795, 16889, 17050, 16961, 16839, 16846, 17177, 16992, 17246, 17178, 16891 and 16855.  
 10/26/2010 12:21:27 AM -- Dispatching transactions ends.  
 10/26/2010 12:21:27 AM -- Shutting down databases ...  
 10/26/2010 12:21:33 AM -- Instance2224.1 (complete), Instance2224.2 (complete), Instance2224.3 (complete), Instance2224.4 (complete), Instance2224.5 (complete), Instance2224.6 (complete), Instance2224.7 (complete), Instance2224.8 (complete), Instance2224.9 (complete), Instance2224.10 (complete), Instance2224.11 (complete) and Instance2224.12 (complete)  
 10/26/2010 12:21:34 AM -- Performance logging begins (interval: 30000 ms).  
 10/26/2010 12:21:34 AM -- Verifying database checksums ...  
 10/26/2010 2:41:27 PM -- C:\dbluns\db1 (100% processed), C:\dbluns\db2 (100% processed), C:\dbluns\db3 (100% processed), C:\dbluns\db4 (100% processed), C:\dbluns\db5 (100% processed), C:\dbluns\db6 (100% processed), C:\dbluns\db7 (100% processed), C:\dbluns\db8 (100% processed), C:\dbluns\db9 (100% processed), C:\dbluns\db10 (100% processed), C:\dbluns\db11 (100% processed) and C:\dbluns\db12 (100% processed)  
 10/26/2010 2:41:27 PM -- Performance logging ends.  
 10/26/2010 2:41:27 PM --  
 C:\USPV\_2TBSATA\_1GBMbox\Performance\DBChecksum\_2010\_10\_26\_0\_21\_33.blg has 1718 samples.  
 10/26/2010 2:41:44 PM --  
 C:\USPV\_2TBSATA\_1GBMbox\Performance\DBChecksum\_2010\_10\_26\_0\_21\_33.html is saved.  
 10/26/2010 2:41:44 PM -- Verifying log checksums ...  
 10/26/2010 2:41:45 PM -- C:\logluns\log1 (12 log(s) processed), C:\logluns\log2 (12 log(s) processed),

C:\logluns\log3 (11 log(s) processed), C:\logluns\log4 (12 log(s) processed), C:\logluns\log5 (11 log(s) processed), C:\logluns\log6 (12 log(s) processed), C:\logluns\log7 (13 log(s) processed), C:\logluns\log8 (12 log(s) processed), C:\logluns\log9 (12 log(s) processed), C:\logluns\log10 (12 log(s) processed), C:\logluns\log11 (12 log(s) processed) and C:\logluns\log12 (11 log(s) processed)

10/26/2010 2:41:45 PM --

C:\USPV\_2TBSATA\_1GBMbox\Performance\Performance\_2010\_10\_25\_22\_16\_42.blg has 493 samples.

10/26/2010 2:41:45 PM -- Creating test report ...

10/26/2010 2:41:52 PM -- Instance2224.1 has 16.7 for I/O Database Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.1 has 1.2 for I/O Log Writes Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.1 has 1.2 for I/O Log Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.2 has 15.9 for I/O Database Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.2 has 1.2 for I/O Log Writes Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.2 has 1.2 for I/O Log Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.3 has 15.9 for I/O Database Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.3 has 1.2 for I/O Log Writes Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.3 has 1.2 for I/O Log Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.4 has 15.9 for I/O Database Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.4 has 1.2 for I/O Log Writes Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.4 has 1.2 for I/O Log Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.5 has 15.9 for I/O Database Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.5 has 1.2 for I/O Log Writes Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.5 has 1.2 for I/O Log Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.6 has 15.9 for I/O Database Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.6 has 1.3 for I/O Log Writes Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.6 has 1.3 for I/O Log Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.7 has 15.9 for I/O Database Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.7 has 1.2 for I/O Log Writes Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.7 has 1.2 for I/O Log Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.8 has 15.9 for I/O Database Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.8 has 1.2 for I/O Log Writes Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.8 has 1.2 for I/O Log Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.9 has 15.9 for I/O Database Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.9 has 1.2 for I/O Log Writes Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.9 has 1.2 for I/O Log Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.10 has 15.9 for I/O Database Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.10 has 1.2 for I/O Log Writes Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.10 has 1.2 for I/O Log Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.11 has 15.9 for I/O Database Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.11 has 1.2 for I/O Log Writes Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.11 has 1.2 for I/O Log Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.12 has 15.9 for I/O Database Reads Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.12 has 1.2 for I/O Log Writes Average Latency.

10/26/2010 2:41:52 PM -- Instance2224.12 has 1.2 for I/O Log Reads Average Latency.

10/26/2010 2:41:52 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.

10/26/2010 2:41:52 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.

10/26/2010 2:41:52 PM --

C:\USPV\_2TBSATA\_1GBMbox\Performance\Performance\_2010\_10\_25\_22\_16\_42.xml has 478 samples queried.

## Performance Test Database Checksums Result: SUN141

### Checksum Statistics - All

<i>Database</i>	<i>Seen pages</i>	<i>Bad pages</i>	<i>Correctable pages</i>	<i>Wrong page-number pages</i>	<i>File length / seconds taken</i>
C:\dbluns\db1\Jetstress001001.edb	54792034	0	0	0	1712251 MBytes / 51592 sec
C:\dbluns\db2\Jetstress002001.edb	54792290	0	0	0	1712259 MBytes / 50842 sec
C:\dbluns\db3\Jetstress003001.edb	54792546	0	0	0	1712267 MBytes / 50765 sec
C:\dbluns\db4\Jetstress004001.edb	54792034	0	0	0	1712251 MBytes / 50604 sec
C:\dbluns\db5\Jetstress005001.edb	54792034	0	0	0	1712251 MBytes / 50573 sec
C:\dbluns\db6\Jetstress006001.edb	54791778	0	0	0	1712243 MBytes / 50852 sec
C:\dbluns\db7\Jetstress007001.edb	54792290	0	0	0	1712259 MBytes / 50791 sec
C:\dbluns\db8\Jetstress008001.edb	54792034	0	0	0	1712251 MBytes / 50881 sec
C:\dbluns\db9\Jetstress009001.edb	54792034	0	0	0	1712251 MBytes / 50847 sec
C:\dbluns\db10\Jetstress010001.edb	54791778	0	0	0	1712243 MBytes / 50825 sec
C:\dbluns\db11\Jetstress011001.edb	54791522	0	0	0	1712235 MBytes / 50544 sec
C:\dbluns\db12\Jetstress012001.edb	54792290	0	0	0	1712259 MBytes / 50303 sec
<b>(Sum)</b>	657504664	0	0	0	20547020 MBytes / 51592 sec

### Disk Subsystem Performance (of checksum)

<i>LogicalDisk</i>	<i>Avg. Disk sec/Read</i>	<i>Avg. Disk sec/Write</i>	<i>Disk Reads/sec</i>	<i>Disk Writes/sec</i>	<i>Avg. Disk Bytes/Read</i>
C:\dbluns\db1	0.069	0.000	529.570	0.000	65536.000
C:\dbluns\db2	0.063	0.000	538.832	0.000	65536.000
C:\dbluns\db3	0.063	0.000	539.554	0.000	65536.000
C:\dbluns\db4	0.062	0.000	541.014	0.000	65536.000
C:\dbluns\db5	0.063	0.000	541.876	0.000	65536.000
C:\dbluns\db6	0.064	0.000	538.547	0.000	65536.000
C:\dbluns\db7	0.064	0.000	539.343	0.000	65536.000
C:\dbluns\db8	0.062	0.000	538.338	0.000	65536.000

<i>LogicalDisk</i>	<i>Avg. Disk sec/Read</i>	<i>Avg. Disk sec/Write</i>	<i>Disk Reads/sec</i>	<i>Disk Writes/sec</i>	<i>Avg. Disk Bytes/Read</i>
C:\dbluns\db9	0.064	0.000	538.738	0.000	65536.000
C:\dbluns\db10	0.063	0.000	538.916	0.000	65536.000
C:\dbluns\db11	0.062	0.000	542.059	0.000	65536.000
C:\dbluns\db12	0.061	0.000	544.419	0.000	65536.000

#### Memory System Performance (of checksum)

<i>Counter</i>	<i>Average</i>	<i>Minimum</i>	<i>Maximum</i>
<b>% Processor Time</b>	1.999	0.000	3.992
<b>Available MBytes</b>	30856.536	30842.000	30880.000
<b>Free System Page Table Entries</b>	33555131.059	33555127.000	33555133.000
<b>Transition Pages RePurposed/sec</b>	0.000	0.000	0.000
<b>Pool Nonpaged Bytes</b>	72331898.189	72060928.000	73236480.000
<b>Pool Paged Bytes</b>	101550387.558	100069376.000	106049536.000

Test Log10/25/2010 10:16:16 PM -- Jetstress testing begins ...  
10/25/2010 10:16:16 PM -- Prepare testing begins ...  
10/25/2010 10:16:28 PM -- Attaching databases ...  
10/25/2010 10:16:28 PM -- Prepare testing ends.  
10/25/2010 10:16:28 PM -- Dispatching transactions begins ...  
10/25/2010 10:16:28 PM -- Database cache settings: (minimum: 384.0 MB, maximum: 3.0 GB)  
10/25/2010 10:16:28 PM -- Database flush thresholds: (start: 30.7 MB, stop: 61.4 MB)  
10/25/2010 10:16:42 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).  
10/25/2010 10:16:42 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).  
10/25/2010 10:16:54 PM -- Operation mix: Sessions 6, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.  
10/25/2010 10:16:54 PM -- Performance logging begins (interval: 15000 ms).  
10/25/2010 10:16:54 PM -- Attaining prerequisites:  
10/25/2010 10:20:28 PM -- \MSEExchange Database(JetstressWin)\Database Cache Size, Last: 2906014000.0 (lower bound: 2899103000.0, upper bound: none)  
10/26/2010 12:20:29 AM -- Performance logging ends.  
10/26/2010 12:21:27 AM -- JetInterop batch transaction stats: 16795, 16889, 17050, 16961, 16839, 16846, 17177, 16992, 17246, 17178, 16891 and 16855.  
10/26/2010 12:21:27 AM -- Dispatching transactions ends.  
10/26/2010 12:21:27 AM -- Shutting down databases ...  
10/26/2010 12:21:33 AM -- Instance2224.1 (complete), Instance2224.2 (complete), Instance2224.3 (complete), Instance2224.4 (complete), Instance2224.5 (complete), Instance2224.6 (complete), Instance2224.7 (complete), Instance2224.8 (complete), Instance2224.9 (complete), Instance2224.10 (complete), Instance2224.11 (complete) and Instance2224.12 (complete)  
10/26/2010 12:21:34 AM -- Performance logging begins (interval: 30000 ms).  
10/26/2010 12:21:34 AM -- Verifying database checksums ...  
10/26/2010 2:41:27 PM -- C:\dbluns\db1 (100% processed), C:\dbluns\db2 (100% processed), C:\dbluns\db3 (100% processed), C:\dbluns\db4 (100% processed), C:\dbluns\db5 (100% processed), C:\dbluns\db6 (100% processed), C:\dbluns\db7 (100% processed), C:\dbluns\db8 (100% processed), C:\dbluns\db9 (100% processed), C:\dbluns\db10 (100% processed), C:\dbluns\db11 (100% processed) and C:\dbluns\db12 (100% processed)  
10/26/2010 2:41:27 PM -- Performance logging ends.  
10/26/2010 2:41:27 PM --

C:\USPV\_2TBSATA\_1GBMbox\Performance\DBCchecksum\_2010\_10\_26\_0\_21\_33.blg has 1718 samples.

## Stress Test Database Performance Result: SUN141

### Test Summary

<i>Overall Test Result</i>	Pass
<i>Machine Name</i>	SUN141
<i>Test Description</i>	
<i>Test Start Time</i>	10/28/2010 10:39:37 PM
<i>Test End Time</i>	10/30/2010 2:01:57 AM
<i>Collection Start Time</i>	10/28/2010 10:45:01 PM
<i>Collection End Time</i>	10/29/2010 10:44:58 PM
<i>Jetstress Version</i>	14.01.0043.000
<i>Ese Version</i>	14.00.0639.019
<i>Operating System</i>	Windows Server 2008 R2 Enterprise (6.1.7600.0)
<i>Performance Log</i>	C:\USPV_2TBSATA_1GBMbox\Stress\Stress_2010_10_28_22_40_3.blg C:\USPV_2TBSATA_1GBMbox\Stress\DBCchecksum_2010_10_30_2_1_57.blg

### Database Sizing and Throughput

<i>Achieved Transactional I/O per Second</i>	910.421
<i>Target Transactional I/O per Second</i>	840
<i>Initial Database Size (bytes)</i>	21578432380928
<i>Final Database Size (bytes)</i>	21614369177600
<i>Database Files (Count)</i>	12

### Jetstress System Parameters

<i>Thread Count</i>	6 (per database)
<i>Minimum Database Cache</i>	384.0 MB
<i>Maximum Database Cache</i>	3072.0 MB
<i>Insert Operations</i>	40%
<i>Delete Operations</i>	20%
<i>Replace Operations</i>	5%
<i>Read Operations</i>	35%
<i>Lazy Commits</i>	70%
<i>Run Background Database Maintenance</i>	True
<i>Number of Copies per Database</i>	2

## Database Configuration

<i>Instance2484.1</i>	Log Path: C:\logluns\log1 Database: C:\dbluns\db1\Jetstress001001.edb
<i>Instance2484.2</i>	Log Path: C:\logluns\log2 Database: C:\dbluns\db2\Jetstress002001.edb
<i>Instance2484.3</i>	Log Path: C:\logluns\log3 Database: C:\dbluns\db3\Jetstress003001.edb
<i>Instance2484.4</i>	Log Path: C:\logluns\log4 Database: C:\dbluns\db4\Jetstress004001.edb
<i>Instance2484.5</i>	Log Path: C:\logluns\log5 Database: C:\dbluns\db5\Jetstress005001.edb
<i>Instance2484.6</i>	Log Path: C:\logluns\log6 Database: C:\dbluns\db6\Jetstress006001.edb
<i>Instance2484.7</i>	Log Path: C:\logluns\log7 Database: C:\dbluns\db7\Jetstress007001.edb
<i>Instance2484.8</i>	Log Path: C:\logluns\log8 Database: C:\dbluns\db8\Jetstress008001.edb
<i>Instance2484.9</i>	Log Path: C:\logluns\log9 Database: C:\dbluns\db9\Jetstress009001.edb
<i>Instance2484.10</i>	Log Path: C:\logluns\log10 Database: C:\dbluns\db10\Jetstress010001.edb
<i>Instance2484.11</i>	Log Path: C:\logluns\log11 Database: C:\dbluns\db11\Jetstress011001.edb
<i>Instance2484.12</i>	Log Path: C:\logluns\log12 Database: C:\dbluns\db12\Jetstress012001.edb

Transactional I/O Performance

<i>MSExchange Database ==&gt; Instances</i>	<i>I/O Database Reads Average Latency (msec)</i>	<i>I/O Database Writes Average Latency (msec)</i>	<i>I/O Database Reads/sec</i>	<i>I/O Database Writes/sec</i>	<i>I/O Database Reads Average Bytes</i>	<i>I/O Database Writes Average Bytes</i>	<i>I/O Log Reads Average Latency (msec)</i>	<i>I/O Log Writes Average Latency (msec)</i>	<i>I/O Log Reads/sec</i>	<i>I/O Log Writes/sec</i>	<i>I/O Log Reads Average Bytes</i>	<i>I/O Log Writes Average Bytes</i>
<b>Instance2484.1</b>	17.002	7.630	47.365	28.573	35754.929	35164.938	0.000	1.638	0.000	23.504	0.000	4722.414
<b>Instance2484.2</b>	16.503	7.560	47.277	28.515	35810.226	35143.200	0.000	1.626	0.000	23.402	0.000	4704.156
<b>Instance2484.3</b>	16.483	7.475	47.608	28.722	35744.255	35146.971	0.000	1.632	0.000	23.655	0.000	4703.765
<b>Instance2484.4</b>	16.462	7.385	47.407	28.598	35788.171	35143.722	0.000	1.632	0.000	23.451	0.000	4701.114
<b>Instance2484.5</b>	16.472	7.303	47.469	28.637	35869.842	35163.925	0.000	1.632	0.000	23.530	0.000	4701.762
<b>Instance2484.6</b>	16.452	7.238	47.014	28.332	35858.907	35122.282	0.000	1.627	0.000	23.320	0.000	4697.283
<b>Instance2484.7</b>	16.446	7.150	47.209	28.472	35852.320	35156.061	0.000	1.632	0.000	23.458	0.000	4716.481
<b>Instance2484.8</b>	16.471	7.060	47.498	28.671	35895.145	35132.889	0.000	1.627	0.000	23.577	0.000	4703.903
<b>Instance2484.9</b>	16.442	6.919	47.059	28.370	35900.924	35160.257	0.000	1.635	0.000	23.407	0.000	4693.825
<b>Instance2484.10</b>	16.425	6.632	47.307	28.535	35933.700	35152.284	0.000	1.628	0.000	23.435	0.000	4715.009
<b>Instance2484.11</b>	16.409	6.147	47.406	28.588	35955.429	35158.278	0.000	1.631	0.000	23.510	0.000	4711.367
<b>Instance2484.12</b>	16.424	5.421	47.281	28.507	35864.852	35156.250	0.000	1.632	0.000	23.453	0.000	4706.288

### Background Database Maintenance I/O Performance

<i>MSExchange Database ==&gt; Instances</i>	<i>Database Maintenance IO Reads/sec</i>	<i>Database Maintenance IO Reads Average Bytes</i>
Instance2484.1	30.246	261921.110
Instance2484.2	30.239	261927.162
Instance2484.3	30.254	261930.918
Instance2484.4	30.254	261923.961
Instance2484.5	30.240	261911.346
Instance2484.6	30.246	261924.595
Instance2484.7	30.256	261930.047
Instance2484.8	30.260	261923.155
Instance2484.9	30.260	261926.876
Instance2484.10	30.272	261911.259
Instance2484.11	30.284	261920.709
Instance2484.12	30.289	261914.316

### Log Replication I/O Performance

<i>MSExchange Database ==&gt; Instances</i>	<i>I/O Log Reads/sec</i>	<i>I/O Log Reads Average Bytes</i>
Instance2484.1	0.450	172736.028
Instance2484.2	0.446	171434.628
Instance2484.3	0.451	173828.651
Instance2484.4	0.447	171639.388
Instance2484.5	0.448	171078.663
Instance2484.6	0.444	170241.374
Instance2484.7	0.448	171232.575
Instance2484.8	0.450	172254.358
Instance2484.9	0.445	171112.437
Instance2484.10	0.447	171716.154
Instance2484.11	0.449	172279.281
Instance2484.12	0.447	171817.444

Total I/O Performance

<i>MSExchange Database ==&gt; Instances</i>	<i>I/O Database Reads Average Latency (msec)</i>	<i>I/O Database Writes Average Latency (msec)</i>	<i>I/O Database Reads/sec</i>	<i>I/O Database Writes/sec</i>	<i>I/O Database Reads Average Bytes</i>	<i>I/O Database Writes Average Bytes</i>	<i>I/O Log Reads Average Latency (msec)</i>	<i>I/O Log Writes Average Latency (msec)</i>	<i>I/O Log Reads/sec</i>	<i>I/O Log Writes/sec</i>	<i>I/O Log Reads Average Bytes</i>	<i>I/O Log Writes Average Bytes</i>
Instance2484.1	17.002	7.630	77.611	28.573	123895.386	35164.938	2.236	1.638	0.450	23.504	172736.028	4722.414
Instance2484.2	16.503	7.560	77.516	28.515	124018.242	35143.200	2.263	1.626	0.446	23.402	171434.628	4704.156
Instance2484.3	16.483	7.475	77.862	28.722	123629.909	35146.971	2.297	1.632	0.451	23.655	173828.651	4703.765
Instance2484.4	16.462	7.385	77.660	28.598	123882.519	35143.722	2.212	1.632	0.447	23.451	171639.388	4701.114
Instance2484.5	16.472	7.303	77.709	28.637	123831.243	35163.925	2.183	1.632	0.448	23.530	171078.663	4701.762
Instance2484.6	16.452	7.238	77.260	28.332	124359.263	35122.282	2.567	1.627	0.444	23.320	170241.374	4697.283
Instance2484.7	16.446	7.150	77.465	28.472	124153.718	35156.061	2.225	1.632	0.448	23.458	171232.575	4716.481
Instance2484.8	16.471	7.060	77.758	28.671	123855.162	35132.889	2.222	1.627	0.450	23.577	172254.358	4703.903
Instance2484.9	16.442	6.919	77.319	28.370	124359.968	35160.257	2.173	1.635	0.445	23.407	171112.437	4693.825
Instance2484.10	16.425	6.632	77.579	28.535	124112.222	35152.284	2.318	1.628	0.447	23.435	171716.154	4715.009
Instance2484.11	16.409	6.147	77.689	28.588	124037.873	35158.278	2.246	1.631	0.449	23.510	172279.281	4711.367
Instance2484.12	16.424	5.421	77.570	28.507	124131.959	35156.250	2.288	1.632	0.447	23.453	171817.444	4706.288

## Host System Performance

<i>Counter</i>	<i>Average</i>	<i>Minimum</i>	<i>Maximum</i>
<b>% Processor Time</b>	0.932	0.000	4.110
<b>Available MBytes</b>	27550.807	27432.000	27865.000
<b>Free System Page Table Entries</b>	33555131.003	33555122.000	33555133.000
<b>Transition Pages RePurposed/sec</b>	0.000	0.000	0.000
<b>Pool Nonpaged Bytes</b>	69739536.039	68132864.000	70385664.000
<b>Pool Paged Bytes</b>	101591954.578	98590720.000	128299008.000
<b>Database Page Fault Stalls/sec</b>	0.000	0.000	0.000

Test Log10/28/2010 10:39:36 PM -- Jetstress testing begins ...  
10/28/2010 10:39:37 PM -- Prepare testing begins ...  
10/28/2010 10:39:49 PM -- Attaching databases ...  
10/28/2010 10:39:49 PM -- Prepare testing ends.  
10/28/2010 10:39:49 PM -- Dispatching transactions begins ...  
10/28/2010 10:39:49 PM -- Database cache settings: (minimum: 384.0 MB, maximum: 3.0 GB)  
10/28/2010 10:39:49 PM -- Database flush thresholds: (start: 30.7 MB, stop: 61.4 MB)  
10/28/2010 10:40:03 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 200 msec/read).  
10/28/2010 10:40:03 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 200 msec/write).  
10/28/2010 10:40:16 PM -- Operation mix: Sessions 6, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.  
10/28/2010 10:40:16 PM -- Performance logging begins (interval: 15000 ms).  
10/28/2010 10:40:16 PM -- Attaining prerequisites:  
10/28/2010 10:45:01 PM -- \MSEExchange Database(JetstressWin)\Database Cache Size, Last: 2907210000.0 (lower bound: 2899103000.0, upper bound: none)  
10/29/2010 10:45:02 PM -- Performance logging ends.  
10/30/2010 2:01:49 AM -- JetInterop batch transaction stats: 213407, 212600, 213686, 212740, 213063, 211743, 212763, 213607, 212088, 213444, 213174 and 213528.  
10/30/2010 2:01:51 AM -- Dispatching transactions ends.  
10/30/2010 2:01:51 AM -- Shutting down databases ...  
10/30/2010 2:01:57 AM -- Instance2484.1 (complete), Instance2484.2 (complete), Instance2484.3 (complete), Instance2484.4 (complete), Instance2484.5 (complete), Instance2484.6 (complete), Instance2484.7 (complete), Instance2484.8 (complete), Instance2484.9 (complete), Instance2484.10 (complete), Instance2484.11 (complete) and Instance2484.12 (complete)  
10/30/2010 2:01:58 AM -- Performance logging begins (interval: 30000 ms).  
10/30/2010 2:01:58 AM -- Verifying database checksums ...  
10/30/2010 4:35:24 PM -- C:\dbluns\db1 (100% processed), C:\dbluns\db2 (100% processed), C:\dbluns\db3 (100% processed), C:\dbluns\db4 (100% processed), C:\dbluns\db5 (100% processed), C:\dbluns\db6 (100% processed), C:\dbluns\db7 (100% processed), C:\dbluns\db8 (100% processed), C:\dbluns\db9 (100% processed), C:\dbluns\db10 (100% processed), C:\dbluns\db11 (100% processed) and C:\dbluns\db12 (100% processed)  
10/30/2010 4:35:24 PM -- Performance logging ends.  
10/30/2010 4:35:24 PM --  
C:\USPV\_2TBSATA\_1GBMbox\Stress\DBChecksum\_2010\_10\_30\_2\_1\_57.blg has 1746 samples.  
10/30/2010 4:35:41 PM --  
C:\USPV\_2TBSATA\_1GBMbox\Stress\DBChecksum\_2010\_10\_30\_2\_1\_57.html is saved.  
10/30/2010 4:35:41 PM -- Verifying log checksums ...  
10/30/2010 4:35:42 PM -- C:\logluns\log1 (12 log(s) processed), C:\logluns\log2 (11 log(s) processed), C:\logluns\log3 (11 log(s) processed), C:\logluns\log4 (12 log(s) processed), C:\logluns\log5 (12 log(s) processed), C:\logluns\log6 (11 log(s) processed), C:\logluns\log7 (12 log(s) processed), C:\logluns\log8 (12 log(s) processed), C:\logluns\log9 (11 log(s) processed),

C:\logluns\log10 (12 log(s) processed), C:\logluns\log11 (11 log(s) processed) and C:\logluns\log12 (12 log(s) processed)  
10/30/2010 4:35:42 PM -- C:\USPV\_2TBSATA\_1GBMbox\Stress\Stress\_2010\_10\_28\_22\_40\_3.blg has 5764 samples.  
10/30/2010 4:35:42 PM -- Creating test report ...  
10/30/2010 4:36:41 PM -- Instance2484.1 has 17.0 for I/O Database Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.1 has 1.6 for I/O Log Writes Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.1 has 1.6 for I/O Log Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.2 has 16.5 for I/O Database Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.2 has 1.6 for I/O Log Writes Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.2 has 1.6 for I/O Log Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.3 has 16.5 for I/O Database Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.3 has 1.6 for I/O Log Writes Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.3 has 1.6 for I/O Log Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.4 has 16.5 for I/O Database Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.4 has 1.6 for I/O Log Writes Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.4 has 1.6 for I/O Log Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.5 has 16.5 for I/O Database Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.5 has 1.6 for I/O Log Writes Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.5 has 1.6 for I/O Log Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.6 has 16.5 for I/O Database Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.6 has 1.6 for I/O Log Writes Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.6 has 1.6 for I/O Log Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.7 has 16.4 for I/O Database Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.7 has 1.6 for I/O Log Writes Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.7 has 1.6 for I/O Log Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.8 has 16.5 for I/O Database Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.8 has 1.6 for I/O Log Writes Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.8 has 1.6 for I/O Log Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.9 has 16.4 for I/O Database Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.9 has 1.6 for I/O Log Writes Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.9 has 1.6 for I/O Log Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.10 has 16.4 for I/O Database Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.10 has 1.6 for I/O Log Writes Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.10 has 1.6 for I/O Log Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.11 has 16.4 for I/O Database Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.11 has 1.6 for I/O Log Writes Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.11 has 1.6 for I/O Log Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.12 has 16.4 for I/O Database Reads Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.12 has 1.6 for I/O Log Writes Average Latency.  
10/30/2010 4:36:41 PM -- Instance2484.12 has 1.6 for I/O Log Reads Average Latency.  
10/30/2010 4:36:41 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
10/30/2010 4:36:41 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
10/30/2010 4:36:41 PM -- C:\USPV\_2TBSATA\_1GBMbox\Stress\Stress\_2010\_10\_28\_22\_40\_3.xml has 5745 samples queried.

## Stress Test Database Checksums Result: SUN141

### Checksum Statistics - All

<i>Database</i>	<i>Seen pages</i>	<i>Bad pages</i>	<i>Correctable pages</i>	<i>Wrong page-number pages</i>	<i>File length / seconds taken</i>
C:\dbluns\db1\Jetstress001001.edb	54968674	0	0	0	1717771 MBytes / 52406 sec
C:\dbluns\db2\Jetstress002001.edb	54968162	0	0	0	1717755 MBytes / 51681 sec
C:\dbluns\db3\Jetstress003001.edb	54969698	0	0	0	1717803 MBytes / 51670 sec
C:\dbluns\db4\Jetstress004001.edb	54968162	0	0	0	1717755 MBytes / 51216 sec
C:\dbluns\db5\Jetstress005001.edb	54967906	0	0	0	1717747 MBytes / 51522 sec
C:\dbluns\db6\Jetstress006001.edb	54967138	0	0	0	1717723 MBytes / 51625 sec
C:\dbluns\db7\Jetstress007001.edb	54968162	0	0	0	1717755 MBytes / 51471 sec
C:\dbluns\db8\Jetstress008001.edb	54968418	0	0	0	1717763 MBytes / 51297 sec
C:\dbluns\db9\Jetstress009001.edb	54967394	0	0	0	1717731 MBytes / 51601 sec
C:\dbluns\db10\Jetstress010001.edb	54968162	0	0	0	1717755 MBytes / 51457 sec
C:\dbluns\db11\Jetstress011001.edb	54967650	0	0	0	1717739 MBytes / 51576 sec
C:\dbluns\db12\Jetstress012001.edb	54968674	0	0	0	1717771 MBytes / 51573 sec
<b>(Sum)</b>	659618200	0	0	0	20613068 MBytes / 52406 sec

### Disk Subsystem Performance (of checksum)

<i>LogicalDisk</i>	<i>Avg. Disk sec/Read</i>	<i>Avg. Disk sec/Write</i>	<i>Disk Reads/sec</i>	<i>Disk Writes/sec</i>	<i>Avg. Disk Bytes/Read</i>
C:\dbluns\db1	0.070	0.000	524.450	0.000	65536.000
C:\dbluns\db2	0.066	0.000	531.168	0.000	65536.000
C:\dbluns\db3	0.066	0.000	531.716	0.000	65536.000
C:\dbluns\db4	0.066	0.000	536.697	0.000	65536.000
C:\dbluns\db5	0.065	0.000	533.283	0.000	65536.000
C:\dbluns\db6	0.066	0.000	532.407	0.000	65536.000
C:\dbluns\db7	0.065	0.000	533.723	0.000	65536.000
C:\dbluns\db8	0.065	0.000	535.839	0.000	65536.000
C:\dbluns\db9	0.067	0.000	532.477	0.000	65536.000

<i>LogicalDisk</i>	<i>Avg. Disk sec/Read</i>	<i>Avg. Disk sec/Write</i>	<i>Disk Reads/sec</i>	<i>Disk Writes/sec</i>	<i>Avg. Disk Bytes/Read</i>
<b>C:\dbluns\db10</b>	0.065	0.000	534.057	0.000	65536.000
<b>C:\dbluns\db11</b>	0.065	0.000	532.727	0.000	65536.000
<b>C:\dbluns\db12</b>	0.065	0.000	532.810	0.000	65536.000

#### Memory System Performance (of checksum)

<i>Counter</i>	<i>Average</i>	<i>Minimum</i>	<i>Maximum</i>
<b>% Processor Time</b>	2.128	0.000	4.979
<b>Available MBytes</b>	30832.966	30819.000	30859.000
<b>Free System Page Table Entries</b>	33555131.064	33555131.000	33555133.000
<b>Transition Pages RePurposed/sec</b>	0.000	0.000	0.000
<b>Pool Nonpaged Bytes</b>	73381817.622	73150464.000	74395648.000
<b>Pool Paged Bytes</b>	104075195.968	102481920.000	106954752.000

Test Log10/28/2010 10:39:36 PM -- Jetstress testing begins ...  
10/28/2010 10:39:37 PM -- Prepare testing begins ...  
10/28/2010 10:39:49 PM -- Attaching databases ...  
10/28/2010 10:39:49 PM -- Prepare testing ends.  
10/28/2010 10:39:49 PM -- Dispatching transactions begins ...  
10/28/2010 10:39:49 PM -- Database cache settings: (minimum: 384.0 MB, maximum: 3.0 GB)  
10/28/2010 10:39:49 PM -- Database flush thresholds: (start: 30.7 MB, stop: 61.4 MB)  
10/28/2010 10:40:03 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 200 msec/read).  
10/28/2010 10:40:03 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 200 msec/write).  
10/28/2010 10:40:16 PM -- Operation mix: Sessions 6, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.  
10/28/2010 10:40:16 PM -- Performance logging begins (interval: 15000 ms).  
10/28/2010 10:40:16 PM -- Attaining prerequisites:  
10/28/2010 10:45:01 PM -- \MSEExchange Database(JetstressWin)\Database Cache Size, Last: 2907210000.0 (lower bound: 2899103000.0, upper bound: none)  
10/29/2010 10:45:02 PM -- Performance logging ends.  
10/30/2010 2:01:49 AM -- JetInterop batch transaction stats: 213407, 212600, 213686, 212740, 213063, 211743, 212763, 213607, 212088, 213444, 213174 and 213528.  
10/30/2010 2:01:51 AM -- Dispatching transactions ends.  
10/30/2010 2:01:51 AM -- Shutting down databases ...  
10/30/2010 2:01:57 AM -- Instance2484.1 (complete), Instance2484.2 (complete), Instance2484.3 (complete), Instance2484.4 (complete), Instance2484.5 (complete), Instance2484.6 (complete), Instance2484.7 (complete), Instance2484.8 (complete), Instance2484.9 (complete), Instance2484.10 (complete), Instance2484.11 (complete) and Instance2484.12 (complete)  
10/30/2010 2:01:58 AM -- Performance logging begins (interval: 30000 ms).  
10/30/2010 2:01:58 AM -- Verifying database checksums ...  
10/30/2010 4:35:24 PM -- C:\dbluns\db1 (100% processed), C:\dbluns\db2 (100% processed), C:\dbluns\db3 (100% processed), C:\dbluns\db4 (100% processed), C:\dbluns\db5 (100% processed), C:\dbluns\db6 (100% processed), C:\dbluns\db7 (100% processed), C:\dbluns\db8 (100% processed), C:\dbluns\db9 (100% processed), C:\dbluns\db10 (100% processed), C:\dbluns\db11 (100% processed) and C:\dbluns\db12 (100% processed)  
10/30/2010 4:35:24 PM -- Performance logging ends.  
10/30/2010 4:35:24 PM --  
C:\USPV\_2TBSATA\_1GBMbox\Stress\DBChecksum\_2010\_10\_30\_2\_1\_57.blg has 1746 samples.

## Database Backup Test Result: SUN141

### Database Backup Statistics - All

<i>Database Instance</i>	<i>Database Size (MBytes)</i>	<i>Elapsed Backup Time</i>	<i>MBytes Transferred/sec</i>
<b>Instance2512.1</b>	1717763.09	11:09:42	42.75
<b>Instance2512.2</b>	1717747.09	10:50:48	43.99
<b>Instance2512.3</b>	1717795.09	10:49:15	44.10
<b>Instance2512.4</b>	1717747.09	10:47:11	44.24
<b>Instance2512.5</b>	1717739.09	10:49:53	44.05
<b>Instance2512.6</b>	1717715.09	10:51:36	43.94
<b>Instance2512.7</b>	1717747.09	10:50:10	44.03
<b>Instance2512.8</b>	1717755.09	10:51:19	43.96
<b>Instance2512.9</b>	1717723.09	10:46:52	44.26
<b>Instance2512.10</b>	1717747.09	10:49:46	44.06
<b>Instance2512.11</b>	1717731.09	10:45:25	44.36
<b>Instance2512.12</b>	1717763.09	10:47:32	44.21

### Jetstress System Parameters

<i>Thread Count</i>	6 (per database)
<i>Minimum Database Cache</i>	384.0 MB
<i>Maximum Database Cache</i>	3072.0 MB
<i>Insert Operations</i>	40%
<i>Delete Operations</i>	20%
<i>Replace Operations</i>	5%
<i>Read Operations</i>	35%
<i>Lazy Commits</i>	70%

## Database Configuration

<i>Instance2512.1</i>	Log Path: C:\logluns\log1 Database: C:\dbluns\db1\Jetstress001001.edb
<i>Instance2512.2</i>	Log Path: C:\logluns\log2 Database: C:\dbluns\db2\Jetstress002001.edb
<i>Instance2512.3</i>	Log Path: C:\logluns\log3 Database: C:\dbluns\db3\Jetstress003001.edb
<i>Instance2512.4</i>	Log Path: C:\logluns\log4 Database: C:\dbluns\db4\Jetstress004001.edb
<i>Instance2512.5</i>	Log Path: C:\logluns\log5 Database: C:\dbluns\db5\Jetstress005001.edb
<i>Instance2512.6</i>	Log Path: C:\logluns\log6 Database: C:\dbluns\db6\Jetstress006001.edb
<i>Instance2512.7</i>	Log Path: C:\logluns\log7 Database: C:\dbluns\db7\Jetstress007001.edb
<i>Instance2512.8</i>	Log Path: C:\logluns\log8 Database: C:\dbluns\db8\Jetstress008001.edb
<i>Instance2512.9</i>	Log Path: C:\logluns\log9 Database: C:\dbluns\db9\Jetstress009001.edb
<i>Instance2512.10</i>	Log Path: C:\logluns\log10 Database: C:\dbluns\db10\Jetstress010001.edb
<i>Instance2512.11</i>	Log Path: C:\logluns\log11 Database: C:\dbluns\db11\Jetstress011001.edb
<i>Instance2512.12</i>	Log Path: C:\logluns\log12 Database: C:\dbluns\db12\Jetstress012001.edb

Transactional I/O Performance

<i>MSExchange Database ==&gt; Instances</i>	<i>I/O Database Reads Average Latency (msec)</i>	<i>I/O Database Writes Average Latency (msec)</i>	<i>I/O Database Reads/sec</i>	<i>I/O Database Writes/sec</i>	<i>I/O Database Reads Average Bytes</i>	<i>I/O Database Writes Average Bytes</i>	<i>I/O Log Reads Average Latency (msec)</i>	<i>I/O Log Writes Average Latency (msec)</i>	<i>I/O Log Reads/sec</i>	<i>I/O Log Writes/sec</i>	<i>I/O Log Reads Average Bytes</i>	<i>I/O Log Writes Average Bytes</i>
Instance2512.1	12.671	0.000	170.915	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2512.2	9.249	0.000	175.857	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2512.3	9.212	0.000	176.351	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2512.4	9.182	0.000	176.928	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2512.5	9.192	0.000	176.162	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2512.6	9.290	0.000	175.634	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2512.7	9.226	0.000	176.110	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2512.8	9.249	0.000	175.769	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2512.9	9.189	0.000	177.010	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2512.10	9.196	0.000	176.210	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2512.11	9.215	0.000	177.392	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2512.12	9.236	0.000	176.793	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

## Host System Performance

<i>Counter</i>	<i>Average</i>	<i>Minimum</i>	<i>Maximum</i>
<b>% Processor Time</b>	1.361	0.000	4.529
<b>Available MBytes</b>	30888.702	30877.000	30894.000
<b>Free System Page Table Entries</b>	33555643.000	33555643.000	33555643.000
<b>Transition Pages RePurposed/sec</b>	0.000	0.000	0.000
<b>Pool Nonpaged Bytes</b>	65968128.000	65912832.000	66301952.000
<b>Pool Paged Bytes</b>	99448235.049	99196928.000	100802560.000
<b>Database Page Fault Stalls/sec</b>	0.000	0.000	0.000

Test Log10/31/2010 10:28:20 AM -- Jetstress testing begins ...  
 10/31/2010 10:28:20 AM -- Prepare testing begins ...  
 10/31/2010 10:28:33 AM -- Attaching databases ...  
 10/31/2010 10:28:33 AM -- Prepare testing ends.  
 10/31/2010 10:28:52 AM -- Performance logging begins (interval: 30000 ms).  
 10/31/2010 10:28:52 AM -- Backing up databases ...  
 10/31/2010 9:38:35 PM -- Performance logging ends.  
 10/31/2010 9:38:35 PM -- Instance2512.1 (100% processed), Instance2512.2 (100% processed),  
 Instance2512.3 (100% processed), Instance2512.4 (100% processed), Instance2512.5 (100%  
 processed), Instance2512.6 (100% processed), Instance2512.7 (100% processed), Instance2512.8  
 (100% processed), Instance2512.9 (100% processed), Instance2512.10 (100% processed),  
 Instance2512.11 (100% processed) and Instance2512.12 (100% processed)  
 10/31/2010 9:38:35 PM --  
 C:\USPV\_2TBSATA\_1GBMbox\Backuptest\DatabaseBackup\_2010\_10\_31\_10\_28\_33.blg has 1338  
 samples.  
 10/31/2010 9:38:35 PM -- Creating test report ...

## Soft Recovery Test Result: SUN141

### Soft-Recovery Statistics - All

<i>Database Instance</i>	<i>Log files replayed</i>	<i>Elapsed seconds</i>
<b>Instance2512.1</b>	507	1417.0128889
<b>Instance2512.2</b>	507	1431.864115
<b>Instance2512.3</b>	509	1453.8757536
<b>Instance2512.4</b>	505	1416.2172875
<b>Instance2512.5</b>	517	1448.8369448
<b>Instance2512.6</b>	511	1455.4669564
<b>Instance2512.7</b>	500	1428.6817094
<b>Instance2512.8</b>	511	1450.9585485
<b>Instance2512.9</b>	501	1434.7813201
<b>Instance2512.10</b>	509	1437.1681243
<b>Instance2512.11</b>	500	1435.842122
<b>Instance2512.12</b>	502	1449.8977467

## Database Configuration

<i>Instance2512.1</i>	Log Path: C:\logluns\log1 Database: C:\dbluns\db1\Jetstress001001.edb
<i>Instance2512.2</i>	Log Path: C:\logluns\log2 Database: C:\dbluns\db2\Jetstress002001.edb
<i>Instance2512.3</i>	Log Path: C:\logluns\log3 Database: C:\dbluns\db3\Jetstress003001.edb
<i>Instance2512.4</i>	Log Path: C:\logluns\log4 Database: C:\dbluns\db4\Jetstress004001.edb
<i>Instance2512.5</i>	Log Path: C:\logluns\log5 Database: C:\dbluns\db5\Jetstress005001.edb
<i>Instance2512.6</i>	Log Path: C:\logluns\log6 Database: C:\dbluns\db6\Jetstress006001.edb
<i>Instance2512.7</i>	Log Path: C:\logluns\log7 Database: C:\dbluns\db7\Jetstress007001.edb
<i>Instance2512.8</i>	Log Path: C:\logluns\log8 Database: C:\dbluns\db8\Jetstress008001.edb
<i>Instance2512.9</i>	Log Path: C:\logluns\log9 Database: C:\dbluns\db9\Jetstress009001.edb
<i>Instance2512.10</i>	Log Path: C:\logluns\log10 Database: C:\dbluns\db10\Jetstress010001.edb
<i>Instance2512.11</i>	Log Path: C:\logluns\log11 Database: C:\dbluns\db11\Jetstress011001.edb
<i>Instance2512.12</i>	Log Path: C:\logluns\log12 Database: C:\dbluns\db12\Jetstress012001.edb

Transactional I/O Performance

<i>MSExchange Database ==&gt; Instances</i>	<i>I/O Database Reads Average Latency (msec)</i>	<i>I/O Database Writes Average Latency (msec)</i>	<i>I/O Database Reads/sec</i>	<i>I/O Database Writes/sec</i>	<i>I/O Database Reads Average Bytes</i>	<i>I/O Database Writes Average Bytes</i>	<i>I/O Log Reads Average Latency (msec)</i>	<i>I/O Log Writes Average Latency (msec)</i>	<i>I/O Log Reads/sec</i>	<i>I/O Log Writes/sec</i>	<i>I/O Log Reads Average Bytes</i>	<i>I/O Log Writes Average Bytes</i>
<b>Instance2512.1</b>	68.629	29.756	509.787	2.149	35585.432	32487.932	3.643	0.020	3.230	0.005	229833.761	1.459
<b>Instance2512.2</b>	66.474	29.170	503.765	2.122	35830.106	32397.740	3.629	0.000	3.184	0.000	228617.840	0.000
<b>Instance2512.3</b>	62.827	26.414	490.986	2.095	36505.927	31675.733	3.786	0.000	3.143	0.000	223489.444	0.000
<b>Instance2512.4</b>	67.332	30.902	496.764	2.142	35825.782	32487.131	3.689	0.000	3.214	0.000	229241.260	0.000
<b>Instance2512.5</b>	66.022	25.844	499.367	2.132	36615.827	32127.285	3.525	0.000	3.198	0.000	227697.836	0.000
<b>Instance2512.6</b>	62.827	29.708	501.034	2.088	37239.345	31948.800	3.450	0.000	3.137	0.000	225471.697	0.000
<b>Instance2512.7</b>	63.666	27.731	496.225	2.104	36174.312	31934.915	3.339	0.002	3.158	0.008	224729.569	1.446
<b>Instance2512.8</b>	65.016	28.163	500.818	2.105	36705.322	32037.794	3.549	0.000	3.158	0.000	225412.648	0.000
<b>Instance2512.9</b>	63.909	28.016	493.961	2.095	36540.332	31844.958	3.618	0.000	3.143	0.000	225335.767	0.000
<b>Instance2512.10</b>	66.997	27.922	503.336	2.127	35955.877	32399.820	3.413	0.000	3.191	0.002	227965.456	1.438
<b>Instance2512.11</b>	65.456	28.537	499.536	2.083	36535.981	31937.262	3.727	0.000	3.124	0.000	225305.274	0.000
<b>Instance2512.12</b>	67.579	29.059	490.964	2.080	35971.041	31946.518	3.753	0.001	3.121	0.002	226295.659	1.426

### Background Database Maintenance I/O Performance

<i>MSExchange Database ==&gt; Instances</i>	<i>Database Maintenance IO Reads/sec</i>	<i>Database Maintenance IO Reads Average Bytes</i>
Instance2512.1	27.333	261968.396
Instance2512.2	27.278	261921.529
Instance2512.3	27.516	261982.075
Instance2512.4	27.039	262027.141
Instance2512.5	27.239	261913.653
Instance2512.6	27.601	261999.666
Instance2512.7	27.474	261970.928
Instance2512.8	27.552	261965.415
Instance2512.9	27.394	261942.366
Instance2512.10	27.190	261953.142
Instance2512.11	27.483	261955.353
Instance2512.12	27.442	261948.599

Total I/O Performance

<i>MSExchange Database ==&gt; Instances</i>	<i>I/O Database Reads Average Latency (msec)</i>	<i>I/O Database Writes Average Latency (msec)</i>	<i>I/O Database Reads/sec</i>	<i>I/O Database Writes/sec</i>	<i>I/O Database Reads Average Bytes</i>	<i>I/O Database Writes Average Bytes</i>	<i>I/O Log Reads Average Latency (msec)</i>	<i>I/O Log Writes Average Latency (msec)</i>	<i>I/O Log Reads/sec</i>	<i>I/O Log Writes/sec</i>	<i>I/O Log Reads Average Bytes</i>	<i>I/O Log Writes Average Bytes</i>
Instance2512.1	68.629	29.756	537.120	2.149	47105.602	32487.932	3.643	0.020	3.230	0.005	229833.761	1.459
Instance2512.2	66.474	29.170	531.044	2.122	47443.758	32397.740	3.629	0.000	3.184	0.000	228617.840	0.000
Instance2512.3	62.827	26.414	518.502	2.095	48471.457	31675.733	3.786	0.000	3.143	0.000	223489.444	0.000
Instance2512.4	67.332	30.902	523.803	2.142	47502.435	32487.131	3.689	0.000	3.214	0.000	229241.260	0.000
Instance2512.5	66.022	25.844	526.605	2.132	48269.295	32127.285	3.525	0.000	3.198	0.000	227697.836	0.000
Instance2512.6	62.827	29.708	528.634	2.088	48974.406	31948.800	3.450	0.000	3.137	0.000	225471.697	0.000
Instance2512.7	63.666	27.731	523.699	2.104	48019.940	31934.915	3.339	0.002	3.158	0.008	224729.569	1.446
Instance2512.8	65.016	28.163	528.369	2.105	48451.432	32037.794	3.549	0.000	3.158	0.000	225412.648	0.000
Instance2512.9	63.909	28.016	521.354	2.095	48383.765	31844.958	3.618	0.000	3.143	0.000	225335.767	0.000
Instance2512.10	66.997	27.922	530.526	2.127	47538.400	32399.820	3.413	0.000	3.191	0.002	227965.456	1.438
Instance2512.11	65.456	28.537	527.019	2.083	48291.034	31937.262	3.727	0.000	3.124	0.000	225305.274	0.000
Instance2512.12	67.579	29.059	518.407	2.080	47933.349	31946.518	3.753	0.001	3.121	0.002	226295.659	1.426

## Host System Performance

<i>Counter</i>	<i>Average</i>	<i>Minimum</i>	<i>Maximum</i>
<b>% Processor Time</b>	2.890	0.000	12.112
<b>Available MBytes</b>	27632.961	27567.000	30428.000
<b>Free System Page Table Entries</b>	33555644.978	33555639.000	33555645.000
<b>Transition Pages RePurposed/sec</b>	0.000	0.000	0.000
<b>Pool Nonpaged Bytes</b>	86771490.748	73232384.000	88772608.000
<b>Pool Paged Bytes</b>	106352912.310	106295296.000	106434560.000
<b>Database Page Fault Stalls/sec</b>	0.001	0.000	0.497

Test Log 11/1/2010 1:41:49 AM -- Jetstress testing begins ...  
 11/1/2010 1:41:49 AM -- Prepare testing begins ...  
 11/1/2010 1:42:02 AM -- Attaching databases ...  
 11/1/2010 1:42:02 AM -- Prepare testing ends.  
 11/1/2010 1:42:02 AM -- Dispatching transactions begins ...  
 11/1/2010 1:42:02 AM -- Database cache settings: (minimum: 384.0 MB, maximum: 3.0 GB)  
 11/1/2010 1:42:02 AM -- Database flush thresholds: (start: 30.7 MB, stop: 61.4 MB)  
 11/1/2010 1:42:16 AM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).  
 11/1/2010 1:42:16 AM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).  
 11/1/2010 1:42:23 AM -- Operation mix: Sessions 6, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.  
 11/1/2010 1:42:23 AM -- Performance logging begins (interval: 15000 ms).  
 11/1/2010 1:42:23 AM -- Generating log files ...  
 11/1/2010 4:07:43 AM -- C:\logluns\log1 (101.6% generated), C:\logluns\log2 (101.6% generated), C:\logluns\log3 (102.0% generated), C:\logluns\log4 (101.2% generated), C:\logluns\log5 (103.6% generated), C:\logluns\log6 (102.4% generated), C:\logluns\log7 (100.2% generated), C:\logluns\log8 (102.4% generated), C:\logluns\log9 (100.4% generated), C:\logluns\log10 (102.0% generated), C:\logluns\log11 (100.2% generated) and C:\logluns\log12 (100.6% generated)  
 11/1/2010 4:07:43 AM -- Performance logging ends.  
 11/1/2010 4:07:43 AM -- JetInterop batch transaction stats: 22189, 22326, 21960, 21913, 22396, 22149, 22028, 22234, 21831, 22148, 21823 and 21862.  
 11/1/2010 4:07:44 AM -- Dispatching transactions ends.  
 11/1/2010 4:07:44 AM -- Shutting down databases ...  
 11/1/2010 4:07:48 AM -- Instance2512.1 (complete), Instance2512.2 (complete), Instance2512.3 (complete), Instance2512.4 (complete), Instance2512.5 (complete), Instance2512.6 (complete), Instance2512.7 (complete), Instance2512.8 (complete), Instance2512.9 (complete), Instance2512.10 (complete), Instance2512.11 (complete) and Instance2512.12 (complete)  
 11/1/2010 4:07:48 AM --  
 C:\USPV\_2TBSATA\_1GBMbox\SoftRecovery\Performance\_2010\_11\_1\_1\_42\_16.blg has 580 samples.  
 11/1/2010 4:07:48 AM -- Creating test report ...  
 11/1/2010 4:07:52 AM -- Instance2512.1 has 21.1 for I/O Database Reads Average Latency.  
 11/1/2010 4:07:52 AM -- Instance2512.1 has 1.4 for I/O Log Writes Average Latency.  
 11/1/2010 4:07:52 AM -- Instance2512.1 has 1.4 for I/O Log Reads Average Latency.  
 11/1/2010 4:07:52 AM -- Instance2512.2 has 20.3 for I/O Database Reads Average Latency.  
 11/1/2010 4:07:52 AM -- Instance2512.2 has 1.4 for I/O Log Writes Average Latency.  
 11/1/2010 4:07:52 AM -- Instance2512.2 has 1.4 for I/O Log Reads Average Latency.  
 11/1/2010 4:07:52 AM -- Instance2512.3 has 20.3 for I/O Database Reads Average Latency.  
 11/1/2010 4:07:52 AM -- Instance2512.3 has 1.4 for I/O Log Writes Average Latency.  
 11/1/2010 4:07:52 AM -- Instance2512.3 has 1.4 for I/O Log Reads Average Latency.

11/1/2010 4:07:52 AM -- Instance2512.4 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.4 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.4 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.5 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.5 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.5 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.6 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.6 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.6 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.7 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.7 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.7 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.8 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.8 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.8 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.9 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.9 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.9 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.10 has 20.2 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.10 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.10 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.11 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.11 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.11 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.12 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.12 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.12 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
11/1/2010 4:07:52 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
11/1/2010 4:07:52 AM --  
C:\USPV\_2TBSATA\_1GBMbox\SoftRecovery\Performance\_2010\_11\_1\_1\_42\_16.xml has 579 samples queried.  
11/1/2010 4:07:53 AM --  
C:\USPV\_2TBSATA\_1GBMbox\SoftRecovery\Performance\_2010\_11\_1\_1\_42\_16.html is saved.  
11/1/2010 4:14:46 AM -- Performance logging begins (interval: 4000 ms).  
11/1/2010 4:14:46 AM -- Recovering databases ...  
11/1/2010 4:39:02 AM -- Performance logging ends.  
11/1/2010 4:39:02 AM -- Instance2512.1 (1417.0128889), Instance2512.2 (1431.864115), Instance2512.3 (1453.8757536), Instance2512.4 (1416.2172875), Instance2512.5 (1448.8369448), Instance2512.6 (1455.4669564), Instance2512.7 (1428.6817094), Instance2512.8 (1450.9585485), Instance2512.9 (1434.7813201), Instance2512.10 (1437.1681243), Instance2512.11 (1435.842122) and Instance2512.12 (1449.8977467)  
11/1/2010 4:39:02 AM --  
C:\USPV\_2TBSATA\_1GBMbox\SoftRecovery\SoftRecovery\_2010\_11\_1\_4\_14\_40.blg has 361 samples.  
11/1/2010 4:39:02 AM -- Creating test report ...

## Soft Recovery Test Performance Result: SUN141

### Test Summary

<i>Overall Test Result</i>	<b>Fail</b>
<i>Machine Name</i>	SUN141
<i>Test Description</i>	
<i>Test Start Time</i>	11/1/2010 1:41:49 AM
<i>Test End Time</i>	11/1/2010 4:07:48 AM
<i>Collection Start Time</i>	11/1/2010 1:42:38 AM
<i>Collection End Time</i>	11/1/2010 4:07:36 AM
<i>Jetstress Version</i>	14.01.0043.000
<i>Ese Version</i>	14.00.0639.019
<i>Operating System</i>	Windows Server 2008 R2 Enterprise (6.1.7600.0)
<i>Performance Log</i>	C:\USPV_2TBSATA_1GBMbox\SoftRecovery\Performance_2010_11_1_1_42_16.blg

### Test Issues

<b>Fail</b>	Process has average database read latencies higher than 20.000 msec.
-------------	--

### Database Sizing and Throughput

<i>Achieved Transactional I/O per Second</i>	1061.286
<i>Capacity Percentage</i>	100%
<i>Throughput Percentage</i>	100%
<i>Initial Database Size (bytes)</i>	21614369177600
<i>Final Database Size (bytes)</i>	21618102108160
<i>Database Files (Count)</i>	12

### Jetstress System Parameters

<i>Thread Count</i>	6 (per database)
<i>Minimum Database Cache</i>	384.0 MB
<i>Maximum Database Cache</i>	3072.0 MB
<i>Insert Operations</i>	40%
<i>Delete Operations</i>	20%
<i>Replace Operations</i>	5%
<i>Read Operations</i>	35%
<i>Lazy Commits</i>	70%

## Database Configuration

<i>Instance2512.1</i>	Log Path: C:\logluns\log1 Database: C:\dbluns\db1\Jetstress001001.edb
<i>Instance2512.2</i>	Log Path: C:\logluns\log2 Database: C:\dbluns\db2\Jetstress002001.edb
<i>Instance2512.3</i>	Log Path: C:\logluns\log3 Database: C:\dbluns\db3\Jetstress003001.edb
<i>Instance2512.4</i>	Log Path: C:\logluns\log4 Database: C:\dbluns\db4\Jetstress004001.edb
<i>Instance2512.5</i>	Log Path: C:\logluns\log5 Database: C:\dbluns\db5\Jetstress005001.edb
<i>Instance2512.6</i>	Log Path: C:\logluns\log6 Database: C:\dbluns\db6\Jetstress006001.edb
<i>Instance2512.7</i>	Log Path: C:\logluns\log7 Database: C:\dbluns\db7\Jetstress007001.edb
<i>Instance2512.8</i>	Log Path: C:\logluns\log8 Database: C:\dbluns\db8\Jetstress008001.edb
<i>Instance2512.9</i>	Log Path: C:\logluns\log9 Database: C:\dbluns\db9\Jetstress009001.edb
<i>Instance2512.10</i>	Log Path: C:\logluns\log10 Database: C:\dbluns\db10\Jetstress010001.edb
<i>Instance2512.11</i>	Log Path: C:\logluns\log11 Database: C:\dbluns\db11\Jetstress011001.edb
<i>Instance2512.12</i>	Log Path: C:\logluns\log12 Database: C:\dbluns\db12\Jetstress012001.edb

Transactional I/O Performance

<i>MSExchange Database ==&gt; Instances</i>	<i>I/O Database Reads Average Latency (msec)</i>	<i>I/O Database Writes Average Latency (msec)</i>	<i>I/O Database Reads/sec</i>	<i>I/O Database Writes/sec</i>	<i>I/O Database Reads Average Bytes</i>	<i>I/O Database Writes Average Bytes</i>	<i>I/O Log Reads Average Latency (msec)</i>	<i>I/O Log Writes Average Latency (msec)</i>	<i>I/O Log Reads/sec</i>	<i>I/O Log Writes/sec</i>	<i>I/O Log Reads Average Bytes</i>	<i>I/O Log Writes Average Bytes</i>
Instance2512.1	21.117	17.083	56.010	33.471	32768.000	35097.993	0.000	1.419	0.000	27.728	0.000	4652.386
Instance2512.2	20.270	16.792	55.845	33.359	32768.000	35123.350	0.000	1.414	0.000	27.578	0.000	4665.139
Instance2512.3	20.349	16.616	54.984	32.802	32768.000	35150.633	0.000	1.419	0.000	27.197	0.000	4749.075
Instance2512.4	20.323	16.247	54.913	32.724	32768.000	35111.844	0.000	1.423	0.000	27.178	0.000	4705.907
Instance2512.5	20.256	15.967	55.771	33.323	32768.000	35216.404	0.000	1.414	0.000	27.753	0.000	4718.925
Instance2512.6	20.283	15.620	55.812	33.311	32768.000	35112.044	0.000	1.421	0.000	27.328	0.000	4740.165
Instance2512.7	20.325	15.336	54.900	32.752	32768.000	35145.333	0.000	1.414	0.000	27.171	0.000	4683.585
Instance2512.8	20.280	14.811	56.007	33.434	32768.000	35072.648	0.000	1.407	0.000	27.724	0.000	4689.981
Instance2512.9	20.303	13.760	54.514	32.468	32768.000	35088.883	0.000	1.411	0.000	27.022	0.000	4707.580
Instance2512.10	20.209	11.726	56.036	33.455	32768.000	35078.638	0.000	1.412	0.000	27.508	0.000	4691.598
Instance2512.11	20.314	8.823	54.780	32.641	32768.000	35082.540	0.000	1.414	0.000	27.107	0.000	4692.558
Instance2512.12	20.280	5.695	55.112	32.861	32768.000	35095.570	0.000	1.419	0.000	27.251	0.000	4693.047

## Host System Performance

<i>Counter</i>	<i>Average</i>	<i>Minimum</i>	<i>Maximum</i>
<b>% Processor Time</b>	1.247	0.000	2.738
<b>Available MBytes</b>	27624.521	27572.000	30380.000
<b>Free System Page Table Entries</b>	33555643.640	33555642.000	33555645.000
<b>Transition Pages RePurposed/sec</b>	0.000	0.000	0.000
<b>Pool Nonpaged Bytes</b>	70225213.793	66547712.000	70717440.000
<b>Pool Paged Bytes</b>	105900413.352	105865216.000	106012672.000
<b>Database Page Fault Stalls/sec</b>	0.000	0.000	0.000

Test Log 11/1/2010 1:41:49 AM -- Jetstress testing begins ...  
 11/1/2010 1:41:49 AM -- Prepare testing begins ...  
 11/1/2010 1:42:02 AM -- Attaching databases ...  
 11/1/2010 1:42:02 AM -- Prepare testing ends.  
 11/1/2010 1:42:02 AM -- Dispatching transactions begins ...  
 11/1/2010 1:42:02 AM -- Database cache settings: (minimum: 384.0 MB, maximum: 3.0 GB)  
 11/1/2010 1:42:02 AM -- Database flush thresholds: (start: 30.7 MB, stop: 61.4 MB)  
 11/1/2010 1:42:16 AM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).  
 11/1/2010 1:42:16 AM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).  
 11/1/2010 1:42:23 AM -- Operation mix: Sessions 6, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.  
 11/1/2010 1:42:23 AM -- Performance logging begins (interval: 15000 ms).  
 11/1/2010 1:42:23 AM -- Generating log files ...  
 11/1/2010 4:07:43 AM -- C:\logluns\log1 (101.6% generated), C:\logluns\log2 (101.6% generated), C:\logluns\log3 (102.0% generated), C:\logluns\log4 (101.2% generated), C:\logluns\log5 (103.6% generated), C:\logluns\log6 (102.4% generated), C:\logluns\log7 (100.2% generated), C:\logluns\log8 (102.4% generated), C:\logluns\log9 (100.4% generated), C:\logluns\log10 (102.0% generated), C:\logluns\log11 (100.2% generated) and C:\logluns\log12 (100.6% generated)  
 11/1/2010 4:07:43 AM -- Performance logging ends.  
 11/1/2010 4:07:43 AM -- JetInterop batch transaction stats: 22189, 22326, 21960, 21913, 22396, 22149, 22028, 22234, 21831, 22148, 21823 and 21862.  
 11/1/2010 4:07:44 AM -- Dispatching transactions ends.  
 11/1/2010 4:07:44 AM -- Shutting down databases ...  
 11/1/2010 4:07:48 AM -- Instance2512.1 (complete), Instance2512.2 (complete), Instance2512.3 (complete), Instance2512.4 (complete), Instance2512.5 (complete), Instance2512.6 (complete), Instance2512.7 (complete), Instance2512.8 (complete), Instance2512.9 (complete), Instance2512.10 (complete), Instance2512.11 (complete) and Instance2512.12 (complete)  
 11/1/2010 4:07:48 AM --  
 C:\USPV\_2TBSATA\_1GBMbox\SoftRecovery\Performance\_2010\_11\_1\_1\_42\_16.blg has 580 samples.  
 11/1/2010 4:07:48 AM -- Creating test report ...  
 11/1/2010 4:07:52 AM -- Instance2512.1 has 21.1 for I/O Database Reads Average Latency.  
 11/1/2010 4:07:52 AM -- Instance2512.1 has 1.4 for I/O Log Writes Average Latency.  
 11/1/2010 4:07:52 AM -- Instance2512.1 has 1.4 for I/O Log Reads Average Latency.  
 11/1/2010 4:07:52 AM -- Instance2512.2 has 20.3 for I/O Database Reads Average Latency.  
 11/1/2010 4:07:52 AM -- Instance2512.2 has 1.4 for I/O Log Writes Average Latency.  
 11/1/2010 4:07:52 AM -- Instance2512.2 has 1.4 for I/O Log Reads Average Latency.  
 11/1/2010 4:07:52 AM -- Instance2512.3 has 20.3 for I/O Database Reads Average Latency.  
 11/1/2010 4:07:52 AM -- Instance2512.3 has 1.4 for I/O Log Writes Average Latency.

11/1/2010 4:07:52 AM -- Instance2512.3 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.4 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.4 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.4 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.5 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.5 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.5 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.6 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.6 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.6 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.7 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.7 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.7 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.8 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.8 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.8 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.9 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.9 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.9 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.10 has 20.2 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.10 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.10 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.11 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.11 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.11 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.12 has 20.3 for I/O Database Reads Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.12 has 1.4 for I/O Log Writes Average Latency.  
11/1/2010 4:07:52 AM -- Instance2512.12 has 1.4 for I/O Log Reads Average Latency.  
11/1/2010 4:07:52 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
11/1/2010 4:07:52 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
11/1/2010 4:07:52 AM --  
C:\USPV\_2TBSATA\_1GBMbox\SoftRecovery\Performance\_2010\_11\_1\_1\_42\_16.xml has 579 samples queried.

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