



# Nimble Storage Exchange 2013 100,000-Mailbox Resiliency Storage Solution

Tested with: ESRP Storage Version 4.0

Test date: May 20, 2014

## Overview

This document provides information on Nimble Storage's iSCSI storage solution for Microsoft Exchange Server, based on the *Microsoft Exchange Solution Reviewed Program (ESRP) – Storage program\**. For any questions or comments regarding the contents of this document, see [Contact for additional information](#).

\*The *ESRP – Storage* program was developed by Microsoft Corporation to provide a common storage testing framework for vendors to provide information on its storage solutions for Microsoft Exchange Server software. For more details on the *Microsoft ESRP – Storage* program, please visit: <http://technet.microsoft.com/en-us/exchange/ff182054.aspx>



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The information contained in this document represents the current view of Nimble Storage on the issues discussed as of the date of publication. Due to changing market conditions, it should not be interpreted to be a commitment on the part of Nimble Storage, and Nimble Storage cannot guarantee the accuracy of any information presented after the date of publication.



## Features

This document describes the testing of a 100,000 mailbox resiliency (2-copy) database availability group (DAG) configuration for Exchange Server 2013 with a Nimble Storage CS700 storage system. Nimble Storage has developed an entirely new approach to data storage that converges primary and backup storage into one array, dramatically cutting costs and complexity.

## **About Nimble Storage**

Nimble Storage thinks that enterprises shouldn't compromise on performance, capacity, ease of use, or price. Nimble Storage solutions seamlessly scale to enterprise-class performance and capacity, and offer enhanced backup and disaster recovery for stress-free operations and lower TCO. Nimble's Adaptive Flash platform delivers adjustable performance to meet the fluctuating needs of today's enterprise applications. Nimble Storage enjoys solid partnerships with industry leaders like VMware, Microsoft, Cisco, Citrix, Oracle and CommVault. To learn more about Nimble Storage and Adaptive Flash, visit [www.nimblestorage.com](http://www.nimblestorage.com) and follow us on Twitter: @nimblestorage.

## **The Nimble Storage Adaptive Flash Platform**

*Eliminate performance and capacity trade-offs*

The speed of flash technology has made it an essential component of the modern datacenter. But, flash's performance superiority comes at a steep price, making it impractical for all but a handful of today's enterprise applications. This forces businesses to erect infrastructure silos, resulting in complexity and sprawl, to meet their basic performance and capacity requirements. Nimble Storage's Adaptive Flash Platform eliminates this trade-off delivering performance and capacity in the most efficient way possible.

## **ADAPTIVE FLASH**

Adaptive Flash allows the dynamic and intelligent allocation of storage resources to satisfy diverse and stringent application demands. Adaptive Flash is based on CASL™, Nimble Storage's patented Cache-Accelerated Sequential Layout architecture, and InfoSight™, the company's automated cloud-based management and support system. CASL allows performance and capacity to be scaled seamlessly and independently to accommodate datacenter growth. InfoSight ensures flash will be deployed intelligently to satisfy the fluctuating requirements of enterprise applications, eliminating the wasteful overprovisioning of storage resources.

Adaptive Flash instantly adjusts to satisfy performance-hungry applications. Adaptive Flash can:

- Eliminate storage silos needed for varying application demands.
- Do away with disruptive forklift upgrades.
- Comprehensively protect valuable IT assets.
- Keep storage infrastructure running at peak health with powerful, proactive analytics.

Adaptive Flash customers realize dramatic benefits, including:

- **An up to 10x reduction in data center footprint**, as well as lower power and cooling requirements.
- **A 5x improvement in price/performance** versus other traditional or hybrid solutions.
- **A 5x increase in application protection** compared to the industry's average.
- **A greater than five-nines** level of system availability.

### **Solution Description**

The following section outlines the Exchange 2013 mailbox resiliency solution that Nimble Storage implemented to run the ESRP tests.

Storage:

#### **Nimble Storage CS700 array**

- Dual Storage Controllers
- (4) 10 Gbps Ethernet ports per controller with Jumbo Frames
- Nimble Operating System 2.1.2
- 60 TB of Effective Storage Capacity \*
- 8.2 TB of Effective Flash Cache \*
- Link to CS700 Windows Server Catalog listing:  
<http://windowsservercatalog.com/item.aspx?idItem=b2c90166-d8c6-468e-da2c-11025c23e59a&bCatID=1282>

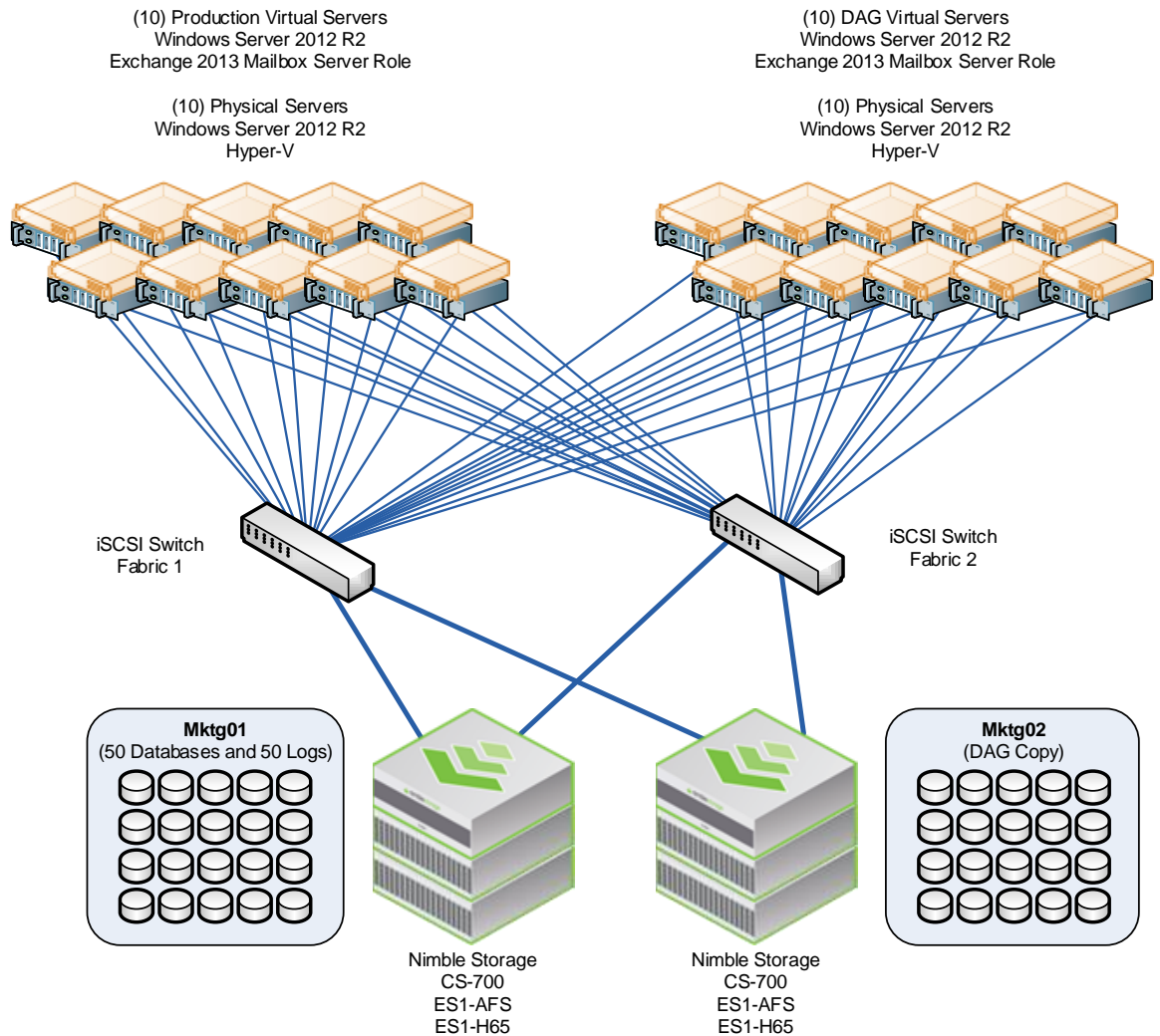
#### **Nimble Storage ES1-AFS (All Flash Expansion Shelf):**

- 16.5 TB of Usable Flash Cache \*

#### **Nimble Storage ES1-H65 (Capacity Expansion Shelf):**

- 79 TB of Effective Storage Capacity \*

\* Based on Exchange 2013 customer average compression ratios.



The primary copy storage is described in this document. The secondary copy storage is configured identically (from the host on down to the spindle including brand, model, firmware, drivers, etc.).

The Exchange DAG storage was configured as follows:

- 10 Active Mailbox Servers and 10 Passive Mailbox Servers.
- 2 Nimble Storage CS700 Arrays, each with an ES1-AFS and ES1-H65 expansion shelf.
- 50 Active Databases, 2,000 mailboxes per database.
- Nimble Storage arrays use triple-parity to protect against drive failure.
- The Nimble Storage CASL file system uses a block checksum to ensure data integrity.
- 2 copies of each database.

The ESRP-Storage program focuses on storage solution testing to address performance and reliability issues with storage design. However, storage is not the only factor to take into consideration when designing a scale up Exchange solution. Other factors which affect the server scalability are: server processor utilization, server physical and virtual memory limitations, resource requirements for other applications, directory and network service latencies, network infrastructure limitations, replication and recovery requirements, and client usage profiles. All these factors are beyond the scope for ESRP-Storage. Therefore, the number of mailboxes hosted per server as part of the tested configuration may not necessarily be viable for some customer deployments.

For more information on identifying and addressing performance bottlenecks in an Exchange system, please refer to Microsoft's Troubleshooting Microsoft Exchange Server Performance, available at <http://technet.microsoft.com/en-us/library/dd335215.aspx>.

### **Targeted Customer Profile**

The Nimble Storage solution for a mid to large-sized Enterprise Exchange environment is designed to support:

- 100,000 Mailboxes
- 20 Servers (10 Active, 10 Passive)
- 0.101 IOPS / Mailbox (0.526 IOPS / Mailbox achieved for 80% headroom)
- 1,000 MB per mailbox
- 24 x 7 background database maintenance enabled
- Providing controller capacity for replication and disk reconstruction
- Permitting space for backups and restores using Nimble Storage Snapshot Backup technology
- Mailbox Resiliency (2-Copy)

## Tested Deployment

The following tables summarize the testing environment:

### Simulated Exchange Configuration:

Number of Exchange mailboxes simulated	100,000
Number of Database Availability Groups (DAGs)	2
Number of servers/DAG	10
Number of active mailboxes/server	10,000
Number of databases/host	5 (50 Total)
Number of copies/database	2
Number of mailboxes/database	2,000
Simulated profile: I/O's per second per mailbox (IOPS, include at least 20% headroom)	0.101 IOPS / Mailbox (0.526 IOPS / Mailbox achieved for 80% headroom)
Database LUN size	2.08 TB
Log LUN size	250 GB
Total database size for performance testing	104 TB
% storage capacity used by Exchange database**	90%

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

### Storage Hardware

Storage Connectivity (Fiber Channel, SAS, SATA, iSCSI)	iSCSI SAN
Storage model and OS/firmware revision	CS700 Nimble OS 2.1.2
Storage cache	4 GB NVDIMM Cache (Write), plus 80 GB RAM Cache, plus 3.2 TB Flash Cache (Read)
Number of storage controllers	2
Number of storage ports	(4) 10 Gbps Ethernet per Controller
Maximum bandwidth of storage connectivity to host	40 Gbps
Switch type/model/firmware revision	Extreme Summit X670-48x-FB 10 Gigabit Ethernet Switch
HBA model and firmware	Silicom PE210G2SPI9-XR v:1.4 Jumbo Frames enabled
Number of HBA's/host	2
Total number of disks tested in solution	<ul style="list-style-type: none"><li>• 12 HDD and 4 Flash SSD Cache drives per array</li><li>• 8 Flash SSD Cache drives in AFS</li><li>• 15 HDD and 1 Flash Cache drive per shelf</li></ul>
Maximum number of spindles can be hosted in the storage	408 HDD and 104 Flash SSD Cache drives per storage cluster

## Storage Software

HBA driver	Intel 10 Gbps PCIe v. 2.1.4
HBA QueueTarget Setting	N/A
HBA QueueDepth Setting	512
Multi-Pathing	Nimble Operating System 2.1.2, Windows MPIO
Host OS	Windows 2012 R2 HyperV
Guest OS	Windows 2012 R2
ESE.dll file version	15.00.0516.026
Replication solution name/version	N/A for Exchange 2013 DAG Solutions

## Storage Disk Configuration (Mailbox Store/Log Disks)

Disk type, speed and firmware revision	SAS and SATA 7,200 RPM SATA Flash SSD Cache
Raw capacity per disk (GB)	HDD: 3 TB Flash SSD Cache: 800 GB
Number of physical disks in test	HDD: 27 Flash SSD Cache: 13
Total raw storage capacity (GB)	HDD: 81 TB Flash SSD Cache: 10.4 TB  Nimble native 61.2% compression Exchange 2013 data HDD: 139 TB effective Flash Cache: 24.7 TB effective
Disk slice size (GB)	N/A
Number of slices per LUN or number of disks per LUN	27 Disks for both database and log files
Raid level	RAID 6 ***
Total formatted capacity	112 TB
Storage capacity utilization****	138% (Formatted Capacity / Raw Capacity) 80.5% (Formatted Capacity / Effective Capacity)
Database capacity utilization****	128% (Database & Log Size / Raw Capacity) 74.8% (Database & Log Size / Effective Capacity)

\*\*\*Nimble's CASL file system uses a performance optimized RAID6 scheme that greatly reduces the rebuild time of traditional RAID6 implementations. CASL intelligently decides which drive sectors to rebuild (for example only populated data blocks are rebuilt and not empty drive space). As a result a lightly loaded array can rebuild a whole 1TB drive in about 4 hours, and a 2TB drive in about 7 hours. If the drive is not full the rebuild time would be proportionally shorter. So a half full drive 2TB drive would only take 3.5 hours to rebuild on a lightly loaded system. When the storage array is very busy, rebuild times can take longer to reduce performance latency for active applications.

\*\*\*\* Nimble Storage arrays use real-time compression algorithms that provide 61.2% average capacity savings over raw disk sizes for Exchange 2013 databases. Thus, usable capacity is larger than the raw capacity of the storage and represents a more realistic expectation for sizing than raw capacity. These compression metrics are collected across Nimble Storage's customer base that uses Exchange 2013.

## Best Practices

Exchange server is a disk-intensive application. Based on the testing run using the ESRP framework, we would recommend the following to improve the storage performance.

For Exchange 2013 best practices on storage design, please visit <http://technet.microsoft.com/en-us/library/dd346703.aspx>

Nimble Storage provides an auto-tuning storage solution that leverages flash cache and greatly reduces the amount of effort to size and layout Exchange mailstores.

## Core Storage

1. This solution architecture was designed to show the maximum Exchange performance capability of a Nimble Storage array. Environments smaller than 100,000 mailboxes routinely share Nimble Storage arrays with other applications such as SQL Server and SharePoint.
2. Separate Exchange Database and Log volumes since they have different performance characteristics and will tune differently. Use the Nimble OS performance policies for Exchange Database and Exchange Logs when creating the respective volumes.
3. Nimble Storage arrays automatically provision storage from a pool of high-density disks protected by triple-parity and are intelligently accelerated using NVDIMM, DRAM and Flash SSD Cache. Nimble's CASL File System leverages these storage technologies natively to automatically provide performance dramatically higher than traditional tiered storage architectures. Therefore, you do not need to spend extensive time provisioning storage such that legacy storage architectures require. Nimble does this physical provisioning automatically for you to ensure both maximum performance and maximum capacity at the same time. Please contact Nimble Storage for further details on our ground breaking CASL file system.
4. Please consult the "Nimble Storage Best Practices Guide for Exchange" for current implementation best practices.

## Backup strategy

Nimble Storage provides the first converged storage platform that combines primary storage and backup storage in the same architecture. Virtually all enterprise storage systems provide the ability to take snapshots, or point-in-time copies of data. Snapshots provide a very fast and efficient way to recover from user errors and application crashes. However, enterprises are usually limited to keeping at most a few days' worth of snapshots on disk, because storing multiple snapshots can consume large amounts of expensive and limited primary storage capacity. This mandates backing up primary data to a separate disk-based backup system frequently in order to store 60-90 days' worth of backups.

CASL enables instant, application-consistent backups on the same array with very efficient backup capacity optimization. It captures compressed, incremental snapshots of the primary data on low-cost drives at pre-configured intervals. These backups are both extremely fast (on the order of milliseconds)



and non-disruptive, because they do not impact application or storage performance. It therefore becomes feasible for enterprises to capture frequent backups spaced just minutes apart (instead of the typical daily backup), enabling much finer recovery point objectives (RPOs) and improving data protection.

The Nimble approach significantly reduces costs by eliminating the need for a separate backup tier. It also eliminates the complexity and administrative overhead of managing massive data copies between tiers. Finally, it enables much faster restores, with recovery time objectives (RTOs) measured in seconds instead of hours in the event of application corruption or user error, further improving application availability.

### **Contact for additional information**

Nimble Storage, Inc.  
211 River Oaks Parkway  
San Jose, CA 95134  
Main: 408-432-9600  
Support: 877-3NIMBLE (877-364-6253)  
info@nimblestorage.com

### **Sales**

To learn more about Nimble Storage's breakthrough technology or to schedule a briefing, please contact our technical sales team:

Sales: 877-3NIMBLE (877-364-6253)  
sales@nimblestorage.com

## **Test Result Summary**

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

### **Reliability**

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

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

- [There were no errors reported in any of the Event Logs collected for the reliability tests.](#)
- [There were no errors reported during the database and log checksum process.](#)

### **Storage Performance Results**

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

### Individual Server Metrics:

The sum of I/O's across Storage Groups and the average latency across all Storage Groups on a per server basis.

#### Host 1

<b>Database I/O</b>	
Database Disks Transfers/sec	4,569.584
Database Disks Reads/sec	3,089.588
Database Disks Writes/sec	1,479.996
Average Database Disk Read Latency (ms)	2.4852
Average Database Disk Write Latency (ms)	3.5506
<b>Transaction Log I/O</b>	
Log Disks Writes/sec	664.084
Average Log Disk Write Latency (ms)	1.3334

#### Host 2

<b>Database I/O</b>	
Database Disks Transfers/sec	4,458.555
Database Disks Reads/sec	3013.266
Database Disks Writes/sec	1445.289
Average Database Disk Read Latency (ms)	2.6072
Average Database Disk Write Latency (ms)	2.9802
<b>Transaction Log I/O</b>	
Log Disks Writes/sec	650.132
Average Log Disk Write Latency (ms)	1.3518

#### Host 3

<b>Database I/O</b>	
Database Disks Transfers/sec	4,856.615
Database Disks Reads/sec	3,280.058
Database Disks Writes/sec	1,576.557
Average Database Disk Read Latency (ms)	2.4086
Average Database Disk Write Latency (ms)	2.9802
<b>Transaction Log I/O</b>	
Log Disks Writes/sec	703.099
Average Log Disk Write Latency (ms)	1.2512

#### Host 4

<b>Database I/O</b>	
Database Disks Transfers/sec	4,502.142
Database Disks Reads/sec	3,043.734
Database Disks Writes/sec	1,458.408
Average Database Disk Read Latency (ms)	2.5582
Average Database Disk Write Latency (ms)	3.625
<b>Transaction Log I/O</b>	
Log Disks Writes/sec	653.71
Average Log Disk Write Latency (ms)	1.3706

**Host 5**

<b>Database I/O</b>	
Database Disks Transfers/sec	4,520.859
Database Disks Reads/sec	3,056.118
Database Disks Writes/sec	1,464.741
Average Database Disk Read Latency (ms)	2.6698
Average Database Disk Write Latency (ms)	4.4666
<b>Transaction Log I/O</b>	
Log Disks Writes/sec	656.166
Average Log Disk Write Latency (ms)	1.346

**Host 6**

<b>Database I/O</b>	
Database Disks Transfers/sec	4,948.52
Database Disks Reads/sec	3,344.458
Database Disks Writes/sec	1,604.062
Average Database Disk Read Latency (ms)	2.3664
Average Database Disk Write Latency (ms)	2.7458
<b>Transaction Log I/O</b>	
Log Disks Writes/sec	715.364
Average Log Disk Write Latency (ms)	1.2408

**Host 7**

<b>Database I/O</b>	
Database Disks Transfers/sec	4,560.543
Database Disks Reads/sec	3,082.742
Database Disks Writes/sec	1,477.801
Average Database Disk Read Latency (ms)	2.475
Average Database Disk Write Latency (ms)	3.4158
<b>Transaction Log I/O</b>	
Log Disks Writes/sec	659.74
Average Log Disk Write Latency (ms)	1.346

**Host 8**

<b>Database I/O</b>	
Database Disks Transfers/sec	4,942.187
Database Disks Reads/sec	3,339.132
Database Disks Writes/sec	1,603.055
Average Database Disk Read Latency (ms)	2.3186
Average Database Disk Write Latency (ms)	2.6244
<b>Transaction Log I/O</b>	
Log Disks Writes/sec	713.775
Average Log Disk Write Latency (ms)	1.256

## Host 9

<b>Database I/O</b>	
Database Disks Transfers/sec	4,572.835
Database Disks Reads/sec	3,091.866
Database Disks Writes/sec	1,480.969
Average Database Disk Read Latency (ms)	2.5602
Average Database Disk Write Latency (ms)	4.0412
<b>Transaction Log I/O</b>	
Log Disks Writes/sec	664.163
Average Log Disk Write Latency (ms)	1.3432

## Host 10

<b>Database I/O</b>	
Database Disks Transfers/sec	4,930.503
Database Disks Reads/sec	3331.002
Database Disks Writes/sec	1599.501
Average Database Disk Read Latency (ms)	2.3056
Average Database Disk Write Latency (ms)	2.6262
<b>Transaction Log I/O</b>	
Log Disks Writes/sec	710.379
Average Log Disk Write Latency (ms)	1.267

### Aggregate Performance across all servers Metrics:

The sum of I/O's across servers in solution and the average latency across all servers in solution.

<b>Database I/O</b>	
Database Disks Transfers/sec	46,862.343
Database Disks Reads/sec	31,671.96
Database Disks Writes/sec	15,190.38
Average Database Disk Read Latency (ms)	2.47578
Average Database Disk Write Latency (ms)	3.3948
<b>Transaction Log I/O</b>	
Log Disks Writes/sec	6,790.612
Average Log Disk Write Latency (ms)	1.3106

### Database Backup/Recovery Performance

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

### Database Read-only Performance

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

**Host 1**

MB read/sec per database	49.98
MB read/sec total per server	249.91

**Host 2**

MB read/sec per database	51.39
MB read/sec total per server	256.97

**Host 3**

MB read/sec per database	51.55
MB read/sec total per server	257.73

**Host 4**

MB read/sec per database	49.92
MB read/sec total per server	249.61

**Host 5**

MB read/sec per database	49.69
MB read/sec total per server	248.45

**Host 6**

MB read/sec per database	43.10
MB read/sec total per server	215.52

**Host 7**

MB read/sec per database	51.51
MB read/sec total per server	257.55

**Host 8**

MB read/sec per database	51.51
MB read/sec total per server	257.57

**Host 9**

MB read/sec per database	53.42
MB read/sec total per server	267.10

**Host 10**

MB read/sec per database	51.34
MB read/sec total per server	256.68

## Transaction Log Recovery/Replay Performance

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

### Host 1

Average time to play one Log file (sec)	0.687
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### Host 2

Average time to play one Log file (sec)	0.657
---	-------

### Host 3

Average time to play one Log file (sec)	0.640
---	-------

### Host 4

Average time to play one Log file (sec)	0.674
---	-------

### Host 5

Average time to play one Log file (sec)	0.674
---	-------

### Host 6

Average time to play one Log file (sec)	0.747
---	-------

### Host 7

Average time to play one Log file (sec)	0.702
---	-------

### Host 8

Average time to play one Log file (sec)	0.715
---	-------

### Host 9

Average time to play one Log file (sec)	0.682
---	-------

### Host 10

Average time to play one Log file (sec)	0.711
---	-------

## **Conclusion**

This report demonstrates Nimble Storage's ability to easily meet the performance needs of a 100,000 mailbox Exchange 2013 implementation for 150 average messages per mailbox per day (0.101 IOPS) and 1,024 MB per mailbox. The CS700 platform can scale to greater mailbox density using additional flash SSD caching drives and expansion shelves. Nimble's CASL file system provides adaptive flash technology by combining high-density storage with flash SSD to enable groundbreaking performance within a small rack form factor. The Nimble Storage architecture also provides additional space for highly-efficient redirect on write snapshots to provide fast full backups of Exchange using Microsoft VSS and Nimble Protection Manager.

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

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

Nimble Storage provides complete sizing information for Exchange Server deployments through its systems engineers. Contact your local Nimble Storage sales office for additional information.



## Appendix A - Test Results

This section provides representative test results from one of the ten Exchange servers under test:

Host 1 (ESRP). It is also representative of each server's test results, which are virtually identical.

### 24-Hour Stress Test Results

## Microsoft Exchange Jetstress 2013

### *Stress Test Result Report*

#### Test Summary

**Overall Test Result** Pass

**Machine Name** NS-ESRP1

#### Test Description

**Test Start Time** 5/16/2014 11:53:57 PM

**Test End Time** 5/18/2014 12:07:18 AM

**Collection Start Time** 5/16/2014 11:54:42 PM

**Collection End Time** 5/17/2014 11:54:29 PM

**Jetstress Version** 15.00.0775.000

**ESE Version** 15.00.0516.026

**Operating System** Windows Server 2012 R2 Standard (6.2.9200.0)

**Performance Log** [C:\Users\Administrator\Documents\Stress\\_2014\\_5\\_16\\_23\\_54\\_8.blg](C:\Users\Administrator\Documents\Stress_2014_5_16_23_54_8.blg)

#### Database Sizing and Throughput

**Achieved Transactional I/O per Second** 4413.633

**Target Transactional I/O per Second** 1010

**Initial Database Size (bytes)** 10737481482240

**Final Database Size (bytes)** 10825419259904

**Database Files (Count)** 5

#### Jetstress System Parameters

**Thread Count** 16

**Minimum Database Cache** 160.0 MB

**Maximum Database Cache** 1280.0 MB

**Insert Operations** 40%

**Delete Operations** 20%

**Replace Operations** 5%

**Read Operations** 35%

**Lazy Commits** 70%

**Run Background Database Maintenance** True

**Number of Copies per Database** 2

#### Database Configuration

**Instance2176.1** Log path: F:\

Database: E:\Jetstress001001.edb

**Instance2176.2** Log path: H\  
Database: G:\Jetstress002001.edb

**Instance2176.3** Log path: J\  
Database: I:\Jetstress003001.edb

**Instance2176.4** Log path: L\  
Database: K:\Jetstress004001.edb

**Instance2176.5** Log path: N\  
Database: M:\Jetstress005001.edb

Transactional I/O Performance

<b>MSExchange Database ==&gt; Instances</b>	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads /sec	I/O Database Writes /sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads /sec	I/O Log Writes /sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
<b>Instance 2176.1</b>	2.851	2.712	596.786	286.451	32847.382	34379.835	0.000	1.368	0.000	127.560	0.000	7924.153
<b>Instance 2176.2</b>	2.533	3.105	596.130	287.226	32846.011	34373.718	0.000	1.367	0.000	127.812	0.000	7916.044
<b>Instance 2176.3</b>	2.540	3.612	595.550	286.857	32845.365	34374.250	0.000	1.366	0.000	127.836	0.000	7919.440
<b>Instance 2176.4</b>	2.543	4.134	595.665	286.927	32845.570	34373.456	0.000	1.336	0.000	128.007	0.000	7913.222
<b>Instance 2176.5</b>	2.555	4.610	595.496	286.545	32845.046	34373.425	0.000	1.332	0.000	127.892	0.000	7913.272

Background Database Maintenance I/O Performance

<b>MSExchange Database ==&gt; Instances</b>	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
<b>Instance2176.1</b>	9.118	261933.032
<b>Instance2176.2</b>	9.131	261927.804
<b>Instance2176.3</b>	9.131	261940.155
<b>Instance2176.4</b>	9.131	261949.401
<b>Instance2176.5</b>	9.130	261950.454

Log Replication I/O Performance

<b>MSExchange Database ==&gt; Instances</b>	I/O Log Reads/sec	I/O Log Reads Average Bytes
<b>Instance2176.1</b>	3.025	232560.290

<b>Instance2176.2</b>	3.022	232561.026
<b>Instance2176.3</b>	3.025	232560.472
<b>Instance2176.4</b>	3.024	232519.457
<b>Instance2176.5</b>	3.022	232518.464

Total I/O Performance

<b>MSExchange Database ==&gt; Instance s</b>	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads /sec	I/O Database Writes s/sec	I/O Database Average Bytes	I/O Database Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads /sec	I/O Log Writes s/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
<b>Instance 2176.1</b>	2.851	2.712	605.904	286.451	36294.731	34379.835	2.606	1.368	3.025	127.560	232560.290	7924.153
<b>Instance 2176.2</b>	2.533	3.105	605.261	287.226	36301.967	34373.718	2.713	1.367	3.022	127.812	232561.026	7916.044
<b>Instance 2176.3</b>	2.540	3.612	604.681	286.857	36304.847	34374.250	2.543	1.366	3.025	127.836	232560.472	7919.440
<b>Instance 2176.4</b>	2.543	4.134	604.795	286.927	36304.416	34373.456	2.565	1.336	3.024	128.007	232519.457	7913.222
<b>Instance 2176.5</b>	2.555	4.610	604.626	286.545	36304.737	34373.425	2.511	1.332	3.022	127.892	232518.464	7913.272

Host System Performance

<b>Counter</b>	<b>Average</b>	<b>Minimum</b>	<b>Maximum</b>
<b>% Processor Time</b>	24.030	3.119	34.200
<b>Available MBytes</b>	1938.232	1908.000	1960.000
<b>Free System Page Table Entries</b>	16637693.134	16635852.000	16637910.000
<b>Transition Pages RePurposed/sec</b>	0.655	0.000	277.670
<b>Pool Nonpaged Bytes</b>	73906265.509	65798144.000	81092608.000
<b>Pool Paged Bytes</b>	99062565.221	98967552.000	99311616.000
<b>Database Page Fault Stalls/sec</b>	0.000	0.000	0.000

Test Log5/16/2014 11:53:57 PM -- Preparing for testing ...

5/16/2014 11:54:03 PM -- Attaching databases ...

5/16/2014 11:54:03 PM -- Preparations for testing are complete.

5/16/2014 11:54:03 PM -- Starting transaction dispatch ..

5/16/2014 11:54:03 PM -- Database cache settings: (minimum: 160.0 MB, maximum: 1.2 GB)

5/16/2014 11:54:03 PM -- Database flush thresholds: (start: 12.8 MB, stop: 25.6 MB)

5/16/2014 11:54:08 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 200 msec/read).

5/16/2014 11:54:08 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 200 msec/write).

5/16/2014 11:54:10 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.

5/16/2014 11:54:10 PM -- Performance logging started (interval: 15000 ms).

5/16/2014 11:54:10 PM -- Attaining prerequisites:  
5/16/2014 11:54:42 PM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last: 1220452000.0 (lower bound: 1207960000.0, upper bound: none)  
5/17/2014 11:54:43 PM -- Performance logging has ended.  
5/18/2014 12:07:15 AM -- JetInterop batch transaction stats: 1254568, 1254568, 1254568, 1254567 and 1254567.  
5/18/2014 12:07:15 AM -- Dispatching transactions ends.  
5/18/2014 12:07:15 AM -- Shutting down databases ...  
5/18/2014 12:07:18 AM -- Instance2176.1 (complete), Instance2176.2 (complete), Instance2176.3 (complete), Instance2176.4 (complete) and Instance2176.5 (complete)  
5/18/2014 12:07:18 AM --  
<C:\Users\Administrator\Documents\Stress 2014 5 16 23 54 8.blq> has 5745 samples.  
5/18/2014 12:07:18 AM -- Creating test report ...  
5/18/2014 12:07:44 AM -- Instance2176.1 has 2.9 for I/O Database Reads Average Latency.  
5/18/2014 12:07:44 AM -- Instance2176.1 has 1.4 for I/O Log Writes Average Latency.  
5/18/2014 12:07:44 AM -- Instance2176.1 has 1.4 for I/O Log Reads Average Latency.  
5/18/2014 12:07:44 AM -- Instance2176.2 has 2.5 for I/O Database Reads Average Latency.  
5/18/2014 12:07:44 AM -- Instance2176.2 has 1.4 for I/O Log Writes Average Latency.  
5/18/2014 12:07:44 AM -- Instance2176.2 has 1.4 for I/O Log Reads Average Latency.  
5/18/2014 12:07:44 AM -- Instance2176.3 has 2.5 for I/O Database Reads Average Latency.  
5/18/2014 12:07:44 AM -- Instance2176.3 has 1.4 for I/O Log Writes Average Latency.  
5/18/2014 12:07:44 AM -- Instance2176.3 has 1.4 for I/O Log Reads Average Latency.  
5/18/2014 12:07:44 AM -- Instance2176.4 has 2.5 for I/O Database Reads Average Latency.  
5/18/2014 12:07:44 AM -- Instance2176.4 has 1.3 for I/O Log Writes Average Latency.  
5/18/2014 12:07:44 AM -- Instance2176.4 has 1.3 for I/O Log Reads Average Latency.  
5/18/2014 12:07:44 AM -- Instance2176.5 has 2.6 for I/O Database Reads Average Latency.  
5/18/2014 12:07:44 AM -- Instance2176.5 has 1.3 for I/O Log Writes Average Latency.  
5/18/2014 12:07:44 AM -- Instance2176.5 has 1.3 for I/O Log Reads Average Latency.  
5/18/2014 12:07:44 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
5/18/2014 12:07:44 AM -- The test has 0 Database Page Fault Stalls/sec samples higher than 0.  
5/18/2014 12:07:44 AM --  
<C:\Users\Administrator\Documents\Stress 2014 5 16 23 54 8.xml> has 5742 samples queried.

## Microsoft Exchange Jetstress 2013

### *Performance Test Result Report*

#### Test Summary

**Overall Test Result** **Pass**

**Machine Name** NS-ESRP1

#### **Test Description**

**Test Start Time** 5/8/2014 12:44:28 PM

**Test End Time** 5/8/2014 3:08:36 PM

**Collection Start Time** 5/8/2014 12:45:26 PM

**Collection End Time** 5/8/2014 2:45:25 PM

**Jetstress Version** 15.00.0775.000

**ESE Version** 15.00.0516.026

**Operating System** Windows Server 2012 R2 Standard (6.2.9200.0)

**Performance Log** [C:\Users\Administrator\Documents\Performance\\_2014\\_5\\_8\\_12\\_44\\_39.blg](C:\Users\Administrator\Documents\Performance_2014_5_8_12_44_39.blg)

#### Database Sizing and Throughput

**Achieved Transactional I/O per Second** 4948.52

**Target Transactional I/O per Second** 1010

**Initial Database Size (bytes)** 10746876723200

**Final Database Size (bytes)** 10756590731264

**Database Files (Count)** 5

#### Jetstress System Parameters

**Thread Count** 16

**Minimum Database Cache** 160.0 MB

**Maximum Database Cache** 1280.0 MB

**Insert Operations** 40%

**Delete Operations** 20%

**Replace Operations** 5%

**Read Operations** 35%

**Lazy Commits** 70%

**Run Background Database Maintenance** True

**Number of Copies per Database** 2

#### Database Configuration

**Instance720.1** Log path: F:\

Database: E:\Jetstress001001.edb

**Instance720.2** Log path: H:\  
Database: G:\Jetstress002001.edb

**Instance720.3** Log path: J:\  
Database: I:\Jetstress003001.edb

**Instance720.4** Log path: L:\  
Database: K:\Jetstress004001.edb

**Instance720.5** Log path: N:\  
Database: M:\Jetstress005001.edb

#### Transactional I/O Performance

<b>MSExchange Database ==&gt; Instance</b>	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads /sec	I/O Database Writes /sec	I/O Database Average Bytes	I/O Database Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads /sec	I/O Log Writes /sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
<b>Instance720.1</b>	2.372	2.586	671.423	322.482	32840.589	34531.354	0.000	1.245	0.000	142.721	0.000	7941.990
<b>Instance720.2</b>	2.364	2.633	670.186	321.142	32839.041	34539.654	0.000	1.246	0.000	142.619	0.000	7946.494
<b>Instance720.3</b>	2.363	2.709	668.210	320.401	32841.396	34548.909	0.000	1.245	0.000	143.031	0.000	7971.098
<b>Instance720.4</b>	2.369	2.830	665.871	318.605	32839.657	34546.531	0.000	1.234	0.000	143.287	0.000	7962.770
<b>Instance720.5</b>	2.364	2.971	668.768	321.432	32839.395	34543.882	0.000	1.234	0.000	143.706	0.000	7950.742

#### Background Database Maintenance I/O Performance

<b>MSExchange Database ==&gt; Instances</b>	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
<b>Instance720.1</b>	9.141	261928.662
<b>Instance720.2</b>	9.141	261943.507
<b>Instance720.3</b>	9.140	261957.090
<b>Instance720.4</b>	9.139	261986.873
<b>Instance720.5</b>	9.143	261853.803

#### Log Replication I/O Performance

<b>MSExchange Database ==&gt; Instances</b>	I/O Log Reads/sec	I/O Log Reads Average Bytes
<b>Instance720.1</b>	3.388	232558.120
<b>Instance720.2</b>	3.390	232563.097
<b>Instance720.3</b>	3.417	232560.858

<b>Instance720.4</b>	3.420	232562.053
<b>Instance720.5</b>	3.421	232560.879

Total I/O Performance

<b>MSExchange Database =&gt; Instance</b>	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads /sec	I/O Database Writes /sec	I/O Database Average Bytes	I/O Database Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads /sec	I/O Log Writes /sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
<b>Instance 720.1</b>	2.372	2.586	680.564	322.482	35917.603	34531.354	2.359	1.245	3.388	142.721	232558.120	7941.990
<b>Instance 720.2</b>	2.364	2.633	679.327	321.142	35921.787	34539.654	2.204	1.246	3.390	142.619	232563.097	7946.494
<b>Instance 720.3</b>	2.363	2.709	677.350	320.401	35933.008	34548.909	2.352	1.245	3.417	143.031	232560.858	7971.098
<b>Instance 720.4</b>	2.369	2.830	675.011	318.605	35942.222	34546.531	2.200	1.234	3.420	143.287	232562.053	7962.770
<b>Instance 720.5</b>	2.364	2.971	677.911	321.432	35928.257	34543.882	2.154	1.234	3.421	143.706	232560.879	7950.742

Host System Performance

<b>Counter</b>	<b>Average</b>	<b>Minimum</b>	<b>Maximum</b>
<b>% Processor Time</b>	13.535	8.160	18.503
<b>Available MBytes</b>	1951.652	1929.000	2044.000
<b>Free System Page Table Entries</b>	16637672.831	16635919.000	16637903.000
<b>Transition Pages RePurposed/sec</b>	0.000	0.000	0.000
<b>Pool Nonpaged Bytes</b>	48194295.467	43552768.000	49352704.000
<b>Pool Paged Bytes</b>	96030830.933	95801344.000	96174080.000
<b>Database Page Fault Stalls/sec</b>	0.000	0.000	0.000

Test Log5/8/2014 12:44:28 PM -- Preparing for testing ...

5/8/2014 12:44:34 PM -- Attaching databases ...

5/8/2014 12:44:34 PM -- Preparations for testing are complete.

5/8/2014 12:44:34 PM -- Starting transaction dispatch ..

5/8/2014 12:44:34 PM -- Database cache settings: (minimum: 160.0 MB, maximum: 1.2 GB)

5/8/2014 12:44:34 PM -- Database flush thresholds: (start: 12.8 MB, stop: 25.6 MB)

5/8/2014 12:44:39 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).

5/8/2014 12:44:39 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).

5/8/2014 12:44:41 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.

5/8/2014 12:44:41 PM -- Performance logging started (interval: 15000 ms).

5/8/2014 12:44:41 PM -- Attaining prerequisites:

5/8/2014 12:45:26 PM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last: 1212768000.0 (lower bound: 1207960000.0, upper bound: none)

5/8/2014 2:45:27 PM -- Performance logging has ended.  
5/8/2014 3:08:34 PM -- JetInterop batch transaction stats: 139132, 139132, 139132, 139132 and 139132.  
5/8/2014 3:08:34 PM -- Dispatching transactions ends.  
5/8/2014 3:08:34 PM -- Shutting down databases ...  
5/8/2014 3:08:36 PM -- Instance720.1 (complete), Instance720.2 (complete), Instance720.3 (complete), Instance720.4 (complete) and Instance720.5 (complete)  
5/8/2014 3:08:36 PM --  
[C:\Users\Administrator\Documents\Performance\\_2014\\_5\\_8\\_12\\_44\\_39.blg](C:\Users\Administrator\Documents\Performance_2014_5_8_12_44_39.blg) has 482 samples.  
5/8/2014 3:08:36 PM -- Creating test report ...  
5/8/2014 3:08:38 PM -- Instance720.1 has 2.4 for I/O Database Reads Average Latency.  
5/8/2014 3:08:38 PM -- Instance720.1 has 1.2 for I/O Log Writes Average Latency.  
5/8/2014 3:08:38 PM -- Instance720.1 has 1.2 for I/O Log Reads Average Latency.  
5/8/2014 3:08:38 PM -- Instance720.2 has 2.4 for I/O Database Reads Average Latency.  
5/8/2014 3:08:38 PM -- Instance720.2 has 1.2 for I/O Log Writes Average Latency.  
5/8/2014 3:08:38 PM -- Instance720.2 has 1.2 for I/O Log Reads Average Latency.  
5/8/2014 3:08:38 PM -- Instance720.3 has 2.4 for I/O Database Reads Average Latency.  
5/8/2014 3:08:38 PM -- Instance720.3 has 1.2 for I/O Log Writes Average Latency.  
5/8/2014 3:08:38 PM -- Instance720.3 has 1.2 for I/O Log Reads Average Latency.  
5/8/2014 3:08:38 PM -- Instance720.4 has 2.4 for I/O Database Reads Average Latency.  
5/8/2014 3:08:38 PM -- Instance720.4 has 1.2 for I/O Log Writes Average Latency.  
5/8/2014 3:08:38 PM -- Instance720.4 has 1.2 for I/O Log Reads Average Latency.  
5/8/2014 3:08:38 PM -- Instance720.5 has 2.4 for I/O Database Reads Average Latency.  
5/8/2014 3:08:38 PM -- Instance720.5 has 1.2 for I/O Log Writes Average Latency.  
5/8/2014 3:08:38 PM -- Instance720.5 has 1.2 for I/O Log Reads Average Latency.  
5/8/2014 3:08:38 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
5/8/2014 3:08:38 PM -- The test has 0 Database Page Fault Stalls/sec samples higher than 0.  
5/8/2014 3:08:38 PM --  
[C:\Users\Administrator\Documents\Performance\\_2014\\_5\\_8\\_12\\_44\\_39.xml](C:\Users\Administrator\Documents\Performance_2014_5_8_12_44_39.xml) has 479 samples queried.

#### Database Backup Test Results

## Microsoft Exchange Jetstress 2013

### Database backup Test Result Report

#### Database Backup Statistics - All

Database Instance	Database Size (MBytes)	Elapsed Backup Time	MBytes Transferred/sec
<b>Instance2176.1</b>	2064788.09	11:30:35	49.83
<b>Instance2176.2</b>	2064764.09	11:29:35	49.90
<b>Instance2176.3</b>	2064788.09	11:28:30	49.98
<b>Instance2176.4</b>	2064780.09	11:26:14	50.15
<b>Instance2176.5</b>	2064764.09	11:27:38	50.04
<b>Avg</b>			49.98
<b>Sum</b>			249.91

#### Jetstress System Parameters

**Thread Count** 16



**Minimum Database Cache** 160.0 MB  
**Maximum Database Cache** 1280.0 MB  
**Insert Operations** 40%  
**Delete Operations** 20%  
**Replace Operations** 5%  
**Read Operations** 35%  
**Lazy Commits** 70%

Database Configuration

**Instance2176.1** Log path: F:\  
 Database: E:\Jetstress001001.edb

**Instance2176.2** Log path: H:\  
 Database: G:\Jetstress002001.edb

**Instance2176.3** Log path: J:\  
 Database: I:\Jetstress003001.edb

**Instance2176.4** Log path: L:\  
 Database: K:\Jetstress004001.edb

**Instance2176.5** Log path: N:\  
 Database: M:\Jetstress005001.edb

Transactional I/O Performance

MSExchange Database ==> Instances	I/O Database Reads /sec	I/O Database Writes /sec	I/O Database Reads /sec	I/O Database Writes /sec	I/O Database Average Bytes	I/O Database Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads /sec	I/O Log Writes /sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
<b>Instance 2176.1</b>	8.058	0.000	198.833	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Instance 2176.2</b>	8.021	0.000	199.265	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Instance 2176.3</b>	7.995	0.000	199.699	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Instance 2176.4</b>	7.944	0.000	200.529	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Instance 2176.5</b>	7.970	0.000	199.950	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Host System Performance

Counter	Average	Minimum	Maximum
<b>% Processor Time</b>	11.490	9.482	24.337

<b>Available MBytes</b>	3286.663	3272.000	3299.000
<b>Free System Page Table Entries</b>	16637923.738	16636153.000	16638152.000
<b>Transition Pages RePurposed/sec</b>	0.103	0.000	66.731
<b>Pool Nonpaged Bytes</b>	86256315.498	85999616.000	86749184.000
<b>Pool Paged Bytes</b>	102833240.365	102723584.000	102977536.000
<b>Database Page Fault Stalls/sec</b>	0.000	0.000	0.000

Test Log5/18/2014 2:00:42 PM -- Preparing for testing ...  
5/18/2014 2:00:47 PM -- Attaching databases ...  
5/18/2014 2:00:47 PM -- Preparations for testing are complete.  
5/18/2014 2:00:54 PM -- Performance logging started (interval: 30000 ms).  
5/18/2014 2:00:54 PM -- Backing up databases ...  
5/19/2014 1:31:30 AM -- Performance logging has ended.  
5/19/2014 1:31:30 AM -- Instance2176.1 (100% processed), Instance2176.2 (100% processed), Instance2176.3 (100% processed), Instance2176.4 (100% processed) and Instance2176.5 (100% processed)  
5/19/2014 1:31:30 AM --  
[C:\Users\Administrator\Documents\DatabaseBackup\\_2014\\_5\\_18\\_14\\_0\\_47.blg](C:\Users\Administrator\Documents\DatabaseBackup_2014_5_18_14_0_47.blg) has 1379 samples.  
5/19/2014 1:31:30 AM -- Creating test report ...

#### Soft Recovery Test Results

## Microsoft Exchange Jetstress 2013

### SoftRecovery Test Result Report

Soft-Recovery Statistics - All

Database Instance	Log files replayed	Elapsed seconds
<b>Instance2176.1</b>	503	341.7187494
<b>Instance2176.2</b>	505	345.1718878
<b>Instance2176.3</b>	501	353.9375588
<b>Instance2176.4</b>	508	351.2812469
<b>Instance2176.5</b>	511	345.1718878
<b>Avg</b>	505	347.456
<b>Sum</b>	2528	1737.2813307

Database Configuration

**Instance2176.1** Log path: F:\  
Database: E:\Jetstress001001.edb

**Instance2176.2** Log path: H:\  
Database: G:\Jetstress002001.edb

**Instance2176.3** Log path: J:\

Database: I:\Jetstress003001.edb

**Instance2176.4** Log path: L:\  
Database: K:\Jetstress004001.edb

**Instance2176.5** Log path: N:\  
Database: M:\Jetstress005001.edb

Transactional I/O Performance

<b>MSExchange Database ==&gt; Instances</b>	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
<b>Instance2176.1</b>	5.424	3.085	1301.131	5.830	40452.491	32768.000	7.350	0.000	7.288	0.000	209700.409	0.000
<b>Instance2176.2</b>	5.435	3.007	1314.016	5.773	40500.074	32768.000	7.038	0.000	7.216	0.000	209712.278	0.000
<b>Instance2176.3</b>	5.341	3.051	1252.080	5.512	40417.052	32768.000	7.413	0.000	6.890	0.000	209693.855	0.000
<b>Instance2176.4</b>	5.294	2.941	1281.162	5.754	40422.219	32768.000	6.750	0.000	7.193	0.000	209726.612	0.000
<b>Instance2176.5</b>	5.458	3.025	1290.968	5.838	40359.868	32768.000	6.857	0.000	7.304	0.000	209697.437	0.000

Background Database Maintenance I/O Performance

<b>MSExchange Database ==&gt; Instances</b>	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
<b>Instance2176.1</b>	9.141	261961.787
<b>Instance2176.2</b>	9.141	261959.218
<b>Instance2176.3</b>	9.139	262053.758
<b>Instance2176.4</b>	9.142	262033.162
<b>Instance2176.5</b>	9.141	261963.956

Total I/O Performance

<b>MSExchange Database ==&gt; Instances</b>	I/O Database Reads Average Latency	I/O Database Writes Average Latency	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (ms)	I/O Log Writes Average Latency (ms)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
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	(msec)	(msec)					ec)	ec)				
<b>Instance 2176.1</b>	5.424	3.085	1310.272	5.830	41997.766	32768.000	7.350	0.000	7.288	0.000	20970.409	0.000
<b>Instance 2176.2</b>	5.435	3.007	1323.157	5.773	42030.032	32768.000	7.038	0.000	7.216	0.000	20971.278	0.000
<b>Instance 2176.3</b>	5.341	3.051	1261.219	5.512	42023.079	32768.000	7.413	0.000	6.890	0.000	20969.3855	0.000
<b>Instance 2176.4</b>	5.294	2.941	1290.304	5.754	41992.358	32768.000	6.750	0.000	7.193	0.000	20972.6612	0.000
<b>Instance 2176.5</b>	5.458	3.025	1300.109	5.838	41917.972	32768.000	6.857	0.000	7.304	0.000	20969.7437	0.000

#### Host System Performance

Counter	Average	Minimum	Maximum
<b>% Processor Time</b>	31.419	24.614	55.620
<b>Available MBytes</b>	1904.989	1868.000	3028.000
<b>Free System Page Table Entries</b>	16637642.402	16637374.000	16637831.000
<b>Transition Pages RePurposed/sec</b>	19.309	0.000	1241.349
<b>Pool Nonpaged Bytes</b>	88410370.943	87625728.000	88866816.000
<b>Pool Paged Bytes</b>	100070129.287	99975168.000	100110336.000
<b>Database Page Fault Stalls/sec</b>	0.000	0.000	0.000

Test Log5/19/2014 12:02:27 PM -- Preparing for testing ...

5/19/2014 12:02:33 PM -- Attaching databases ...

5/19/2014 12:02:33 PM -- Preparations for testing are complete.

5/19/2014 12:02:33 PM -- Starting transaction dispatch ..

5/19/2014 12:02:33 PM -- Database cache settings: (minimum: 160.0 MB, maximum: 1.2 GB)

5/19/2014 12:02:33 PM -- Database flush thresholds: (start: 12.8 MB, stop: 25.6 MB)

5/19/2014 12:02:38 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).

5/19/2014 12:02:38 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).

5/19/2014 12:02:39 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.

5/19/2014 12:02:39 PM -- Performance logging started (interval: 15000 ms).

5/19/2014 12:02:39 PM -- Generating log files ...

5/19/2014 12:26:33 PM -- F:\ (100.4% generated), H:\ (101.0% generated), J:\ (100.2% generated), L:\ (101.4% generated) and N:\ (102.2% generated)

5/19/2014 12:26:34 PM -- Performance logging has ended.

5/19/2014 12:26:34 PM -- JetInterop batch transaction stats: 21777, 21777, 21777, 21776 and 21776.

5/19/2014 12:26:34 PM -- Dispatching transactions ends.

5/19/2014 12:26:34 PM -- Shutting down databases ...

5/19/2014 12:26:37 PM -- Instance2176.1 (complete), Instance2176.2 (complete), Instance2176.3 (complete), Instance2176.4 (complete) and Instance2176.5 (complete)

5/19/2014 12:26:37 PM --

[C:\Users\Administrator\Documents\Performance\\_2014\\_5\\_19\\_12\\_2\\_38.blg](C:\Users\Administrator\Documents\Performance_2014_5_19_12_2_38.blg) has 95 samples.

5/19/2014 12:26:37 PM -- Creating test report ...

5/19/2014 12:26:38 PM -- Instance2176.1 has 2.4 for I/O Database Reads Average Latency.

5/19/2014 12:26:38 PM -- Instance2176.1 has 1.2 for I/O Log Writes Average Latency.

5/19/2014 12:26:38 PM -- Instance2176.1 has 1.2 for I/O Log Reads Average Latency.

5/19/2014 12:26:38 PM -- Instance2176.2 has 2.4 for I/O Database Reads Average Latency.  
5/19/2014 12:26:38 PM -- Instance2176.2 has 1.2 for I/O Log Writes Average Latency.  
5/19/2014 12:26:38 PM -- Instance2176.2 has 1.2 for I/O Log Reads Average Latency.  
5/19/2014 12:26:38 PM -- Instance2176.3 has 2.4 for I/O Database Reads Average Latency.  
5/19/2014 12:26:38 PM -- Instance2176.3 has 1.2 for I/O Log Writes Average Latency.  
5/19/2014 12:26:38 PM -- Instance2176.3 has 1.2 for I/O Log Reads Average Latency.  
5/19/2014 12:26:38 PM -- Instance2176.4 has 2.4 for I/O Database Reads Average Latency.  
5/19/2014 12:26:38 PM -- Instance2176.4 has 1.2 for I/O Log Writes Average Latency.  
5/19/2014 12:26:38 PM -- Instance2176.4 has 1.2 for I/O Log Reads Average Latency.  
5/19/2014 12:26:38 PM -- Instance2176.5 has 2.4 for I/O Database Reads Average Latency.  
5/19/2014 12:26:38 PM -- Instance2176.5 has 1.2 for I/O Log Writes Average Latency.  
5/19/2014 12:26:38 PM -- Instance2176.5 has 1.2 for I/O Log Reads Average Latency.  
5/19/2014 12:26:38 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
5/19/2014 12:26:38 PM -- The test has 0 Database Page Fault Stalls/sec samples higher than 0.  
5/19/2014 12:26:38 PM --  
[C:\Users\Administrator\Documents\Performance\\_2014\\_5\\_19\\_12\\_2\\_38.xml](C:\Users\Administrator\Documents\Performance_2014_5_19_12_2_38.xml) has 94 samples queried.  
5/19/2014 12:26:38 PM --  
[C:\Users\Administrator\Documents\Performance\\_2014\\_5\\_19\\_12\\_2\\_38.html](C:\Users\Administrator\Documents\Performance_2014_5_19_12_2_38.html) was saved.  
5/19/2014 12:27:31 PM -- Performance logging started (interval: 4000 ms).  
5/19/2014 12:27:31 PM -- Recovering databases ...  
5/19/2014 12:33:26 PM -- Performance logging has ended.  
5/19/2014 12:33:26 PM -- Instance2176.1 (341.7187494), Instance2176.2 (345.1718878), Instance2176.3 (353.9375588), Instance2176.4 (351.2812469) and Instance2176.5 (345.1718878)  
5/19/2014 12:33:26 PM --  
[C:\Users\Administrator\Documents\SoftRecovery\\_2014\\_5\\_19\\_12\\_27\\_28.blg](C:\Users\Administrator\Documents\SoftRecovery_2014_5_19_12_27_28.blg) has 87 samples.  
5/19/2014 12:33:26 PM -- Creating test report ...

**Nimble Storage, Inc.**

211 River Oaks Parkway, San Jose, CA 95134

Tel: 408-432-9600; 877-364-6253 | [www.nimblestorage.com](http://www.nimblestorage.com) | [info@nimblestorage.com](mailto:info@nimblestorage.com)

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