

# PS SERIES STORAGE ARRAYS

## 90,000-USER STORAGE SOLUTION FOR MICROSOFT® EXCHANGE SERVER 2007

ESRP – Storage Version 2.1

PS Series Firmware Version 4.0.1



Tested with: ESRP – Storage Version 2.1

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## PREFACE

Thank you for your interest in Dell™ EqualLogic™ PS Series storage products. We hope you will find the PS Series products intuitive and simple to configure and manage.

PS Series arrays optimize resources by automating volume and network load balancing. Additionally, PS Series arrays offer all-inclusive array management software, host software, and free firmware updates. The following value-add features and products integrate with PS Series arrays and are available at no additional cost:

**Note:** The highlighted text denotes the focus of this document.

- **PS Series Array Software**

- **Firmware** – Installed on each array, this software allows you to manage your storage environment and provides capabilities such as volume snapshots, clones, and replicas to ensure data hosted on the arrays can be protected in the event of an error or disaster.
  - **Group Manager GUI:** Provides a graphical user interface for managing your array
  - **Group Manager CLI:** Provides a command line interface for managing your array.
- **Manual Transfer Utility (MTU):** Runs on Windows and Linux host systems and enables secure transfer of large amounts of data to a replication partner site when configuring disaster tolerance. You use portable media to eliminate network congestion, minimize downtime, and quick-start replication.

- **Host Software for Windows**

- **Host Integration Tools**
  - **Remote Setup Wizard (RSW):** Initializes new PS Series arrays, configures host connections to PS Series SANs, and configures and manages multipathing.
  - **Multipath I/O Device Specific Module (MPIO DSM):** Includes a connection awareness-module that understands PS Series network load balancing and facilitates host connections to PS Series volumes.
  - **VSS and VDS Provider Services:** Allows 3<sup>rd</sup> party backup software vendors to perform off-host backups.
  - **Auto-Snapshot Manager/Microsoft Edition (ASM/ME):** Provides point-in-time SAN protection of critical application data using PS Series snapshots, clones, and replicas of supported applications such as SQL Server, Exchange Server, Hyper-V, and NTFS file shares.
- **SAN Headquarters (SAN HQ):** Provides centralized monitoring, historical performance trending, and event reporting for multiple PS Series groups.

- **Host Software for VMware**

- **Storage Adapter for Site Recovery Manager (SRM):** Allows SRM to understand and recognize PS Series replication for full SRM integration.
- **Auto-Snapshot Manager/VMware Edition (ASM/VE):** Integrates with VMware Virtual Center and PS Series snapshots to allow administrators to enable Smart Copy protection of Virtual Center folders, datastores, and virtual machines.
- **MPIO Plug-In for VMware ESX:** Provides enhancements to existing VMware multipathing functionality.

**Current Customers Please Note:** You may not be running the latest versions of the tools and software listed above. If you are under valid warranty or support agreements for your PS Series array, you are entitled to obtain the latest updates and new releases as they become available.

To learn more about any of these products, contact your local sales representative or visit the Dell EqualLogic site at <http://www.equallogic.com>. To set up a Dell EqualLogic support account to download the latest available PS Series firmware and software kits visit: <https://www.equallogic.com/secure/login.aspx?ReturnUrl=%2fsupport%2fDefault.aspx>



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## OVERVIEW

This document provides information on Dell's storage solution for Microsoft® Exchange Server, based on the *Microsoft Exchange Solution Reviewed Program (ESRP) – Storage* program<sup>1</sup>. This solution supports 90,000 simulated Exchange users using 14 Dell EqualLogic PS5000XV arrays with Seagate Cheetah 15K.6 450G 15,000 rpm SAS drives. For any questions or comments regarding the contents of this document, contact Dell.

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## PS SERIES STORAGE ARRAY FEATURES

Using PS Series storage arrays, businesses can leverage their existing Ethernet infrastructure and deploy a complete, easy-to-manage iSCSI SAN, with enterprise-level features included at no extra cost. The revolutionary PS Series architecture was specifically designed to decrease the storage management burden on IT administrators and also alleviate CIO planning and budgetary concerns. Dell chose the iSCSI protocol—with its networking and connectivity advantages—as the basis of the storage solution, and then built intelligence, automation, and redundancy into each PS Series storage array.

PS Series storage arrays use storage virtualization technology to mask the underlying complexity of the storage configuration. This virtualization occurs within and across multiple arrays that are logically grouped together, making management simple and efficient. Reliable hardware, intuitive graphical and command line user interfaces, and automated operations improve productivity and service levels, while RAID configuration, storage expansion, disk sparing, and performance optimization occur automatically.

An IP network is used to connect hosts and applications to storage volumes, and also to connect arrays to each other, providing a communication mechanism that the arrays use to share configuration data and collaborate during data provisioning and load balancing. With the self-managing capabilities of PS Series storage arrays, administrators can provision data on-demand and make configuration changes quickly and easily—without disrupting running applications.

The PS Series storage array is a true modular storage system. Each array contains redundant hot-swappable components for high availability; exceeding 99.999% reliability. An array does not act individually, but as part of a group of one or more arrays, accessed through a single IP address. Each array is configured with the RAID level of your choice. Performance load balancing enables volume data to be stored where the RAID configuration is optimal. When more capacity is needed,

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<sup>1</sup> The *ESRP – Storage* program was developed by Microsoft Corporation to provide a common storage testing framework for vendors to provide information on their storage solutions for Microsoft Exchange Server software. For more details on the *Microsoft ESRP – Storage* program, see the following URL: <http://www.microsoft.com/technet/prodtechnol/exchange/2007/esrp.mspx>

you simply add another member to the group—capacity and performance scale automatically and linearly. Whether you have one array or many, the group provides a single management view, and the administrative effort remains the same.

Using a PS Series group for disk storage, diverse operating systems and a wide range of applications can share a reliable and high-performance storage system that can scale from hundreds of gigabytes to more than 100 terabytes. Administrators can access the group through a web browser, network connection, or serial connection. The graphical and command line user interfaces present a unified view of the storage that makes provisioning quick and easy. You can instantly create, expand, and delete volumes. Group storage space can be organized into a single pool or multiple pools for increased control and optimal flexibility. In addition, volume snapshots and replicas can be created on demand or through a schedule, providing online backup and restore capabilities with unmatched performance.

Event notification mechanisms—including e-mail, syslog, and SNMP—ensure that any problems in the SAN can be quickly identified and resolved. Automatic controller failover and disk sparing means that failures are handled without requiring user intervention. Servicing the system (including replacing disks, controllers, fans, and power supplies) is all done online.

For a complete storage solution, Dell also provides host-based utilities at no extra cost. The Host Integration Tools enable easy point-and-click array initialization and host configuration. In addition, multipath I/O support enables you to create a reliable and high-performance I/O path between servers and PS Series group data, while Auto-Snapshot Manager (VSS provider) enables you to create snapshots that are coordinated with Windows applications.

In order to provide a truly complete system, Dell includes numerous advanced features as standard functionality in every PS Series storage array, so there are no hardware add-ons or software licenses to deal with:

- **Modular hardware.** A PS Series group can easily grow or shrink to accommodate workload changes, so administrators can purchase only the storage they need—when they need it. Future products will fully interoperate with first-generation arrays, protecting your initial investment.
  - **Fully-redundant, fault-tolerant storage array.** Each array includes redundant, hot-swappable components—disks, control modules, fans, and power supplies—for a no-single-point-of-failure configuration. Components fail over automatically, without user intervention or disrupting data availability. In addition, data in each array is protected with RAID technology.
  - **Support for RAID 10, RAID 5, and RAID 50.** You can choose to configure arrays with RAID 10, RAID 5, or RAID 50, depending on your capacity and application needs.
  - **Support for a variety of disk drives.** Serial ATA (SATA) and Serial-Attached SCSI (SAS) provide flexibility in capacity and performance to meet all needs.
  - **Automatic spare configuration and utilization.** Disk spares are automatically configured and used to replace failed disks - no user intervention is required.
  - **Auto-Stat Disk Monitoring System (ADMS).** By continually monitoring disk drive health within a PS Series storage array or across a PS Series group, ADMS ensures optimal data availability. ADMS automatically scans drives in the background to proactively detect and correct media anomalies.
  - **High performance control modules.** Dual control modules provide support for network interface and control module failover. Nonvolatile write-back caches are mirrored across

the control modules to protect data. Each control module has three Gigabit Ethernet interfaces and copper-based network connectors.

- **Simple hardware installation.** Only a single network connection on an array is required for operation. Additional network connections can be added at any time (up to a maximum of three on each array) for increased bandwidth and reliability.
- **Support for standard Ethernet networks.** Because PS Series storage arrays use standard Ethernet connections to provide access to storage, there is no need to train administrators in unfamiliar and complex technologies like Fibre Channel. Also, costs are reduced due to the high volumes and intense vendor competition among Ethernet hardware vendors.
- **Easy setup and management.** A simple setup utility lets you quickly configure an array on the network and create a PS Series group; in minutes, you have a functioning iSCSI SAN. By automating complex operations like RAID configuration, disk sparing, data provisioning, and load balancing, even novices can effectively manage the SAN.
  - **Graphical and command line user interfaces.** Password-protected management interfaces provide a single-system view of the storage. Administrators do not need multiple consoles to perform storage management tasks. Using the Group Manager GUI, creating and managing volumes and configuring security, networking, and event notification are point-and-click operations. Also available is an equivalent command line interface (CLI) that can be accessed through telnet, SSH, or a serial connection, or used in scripts.
  - **Automatic data provisioning.** There is no need for administrators to manually create RAIDsets or map data onto disks or individual controllers. Arrays in a group contribute space to a shared pool of storage, from which you create volumes. Each volume has a specific size and access controls. To increase a volume, just specify a new size. The group handles storage allocation and capacity balancing across the disks and arrays.
  - **Dynamic load balancing.** As the workload changes, data and network I/O are automatically load balanced within and across arrays in the group—with no impact on applications and no user intervention. Thus, “hot spots” can be quickly detected and eliminated.
- **Online and seamless scalability.** Increasing array capacity is as easy as installing additional drives or adding more network connections. You can seamlessly expand overall group capacity adding another array to a PS Series group. In all cases, performance scales automatically as disk data and network I/O are load balanced across the added resources. Processing power also increases due to the additional controllers and caches. Meanwhile, volumes remain available with no impact on hosts and applications. There is no need to open a server cabinet or reconfigure an operating system. The additional storage space and network bandwidth are immediately available for use.

More than 100 TB of storage can be configured in a single group. Notably, as the group expands, the management effort remains constant. A group with one array is as easy to manage as a multimember group.

Future Dell products featuring the latest technology will fully interoperate with existing arrays, protecting your initial investment. In a PS Series group, there is no need for arrays to be the same model. The peer storage architecture ensures that all devices are utilized optimally—and automatically.

- **Robust security for both data and management access.** Security between an iSCSI initiator (host) and iSCSI target (volume) can be based on IP address, iSCSI initiator name, or CHAP



user name, eliminating the need to understand complicated security technologies (such as Fibre Channel Switch Zoning or LUN Masking). CHAP authentication can be provided through the PS Series group itself or an external RADIUS server.

In addition, access to the group for management purposes requires an administrative account and password. Accounts can have either read-write or read-only privileges.

- **Advanced features are standard in all arrays.** A key PS Series design principle is to include advanced functionality in all arrays. The result is a complete solution with built-in intelligence and advanced features. All the features described below are standard on each array and require no additional software, licenses, or cost.
  - **Cloning.** A clone is an image copy of a volume. Cloning is commonly used in multiple server deployments; for example, a master image of a system can be created and then cloned for each server. Cloning can dramatically reduce overhead when deploying replicated servers, such as blade servers and web servers.
  - **Snapshots.** A snapshot quickly captures a volume's contents at a specific point in time and can be used for backups, testing, and upgrades. Both instant and scheduled snapshots are supported. Snapshots greatly simplify and improve the performance of backup and recovery operations. Consistency groups can be created for simultaneous snapshots, maintaining application synchronization across multiple data volumes.
  - **Volume Shadow Copy Service (VSS).** EqualLogic arrays are integrated with Microsoft's VSS framework, which is included with Windows Server 2003. This feature enables "turnkey" snapshot backups that can offload the backup process from application servers.
  - **Virtual Disk Service (VDS).** The EqualLogic VDS provider enables you to use Microsoft Storage Manager for SANs to create and manage volumes in a PS Series group.
  - **Replication.** Using two PS Series groups, you can replicate volumes across unlimited distances to protect your data. Replication enables you to set up a simple, yet robust disaster recovery plan that guards against catastrophic events.

A replica represents the contents of a volume at a specific point in time and is similar to a snapshot, except that it must be stored separately from the original volume. If the original volume is destroyed, you can recover data by cloning a replica. This creates a new volume containing the volume data that existed at the time the replica was created.

- **Multipath I/O.** A redundant network path eliminates any point of failure between hosts and disk storage and improves availability. For high performance, you can load balance I/O across multiple ports (HBAs or NICs).
- **SAN Boot.** Booting servers directly from the SAN is operationally identical to a traditional boot process, but can be accomplished easily and efficiently across hundreds of servers.
- **Storage Pools.** With PS Series storage, you can divide SAN space into multiple storage pools in a single PS Series group to build an efficient, flexible, easy-to-manage networked storage environment. Pools can be used for segregation or tiering of data online.
- **Wide-spread interoperability.** PS Series storage arrays are ideal for heterogeneous environments, with support for most major operating systems and cluster software.

## SOLUTION DESCRIPTION

The following sections outline the hardware and software environment that was used to run the ESRP tests.

### Hardware and Software

The hardware environment is described in the following table.

Storage	Drives	Servers	Ethernet connections
14 PS5000XV <sup>2</sup> storage arrays  Configured into two PS Series group, with four data storage pools and one log storage pool (to allow physical separation of data and logs)	224 15K-RPM 450GB Serial Attached SCSI disk drives	Six Dell™ PowerEdge™ 2950 Servers, each with one Intel Xeon 3.00GHz Dual Core CPU and 4GB memory running MS Windows Server 2008 SP1 Standard x64 Edition  Six Dell PowerEdge 1950 Servers, each with one Intel Xeon 3.00GHz Quad Core CPU and 8GB memory running Microsoft Windows Server 2008 SP1 Standard x64 Edition	4 gigabit Ethernet connections per Server: 2 dual port Intel Gigabit Ethernet Adapters (model: PRO/1000 PT, driver v9.9.12.0)

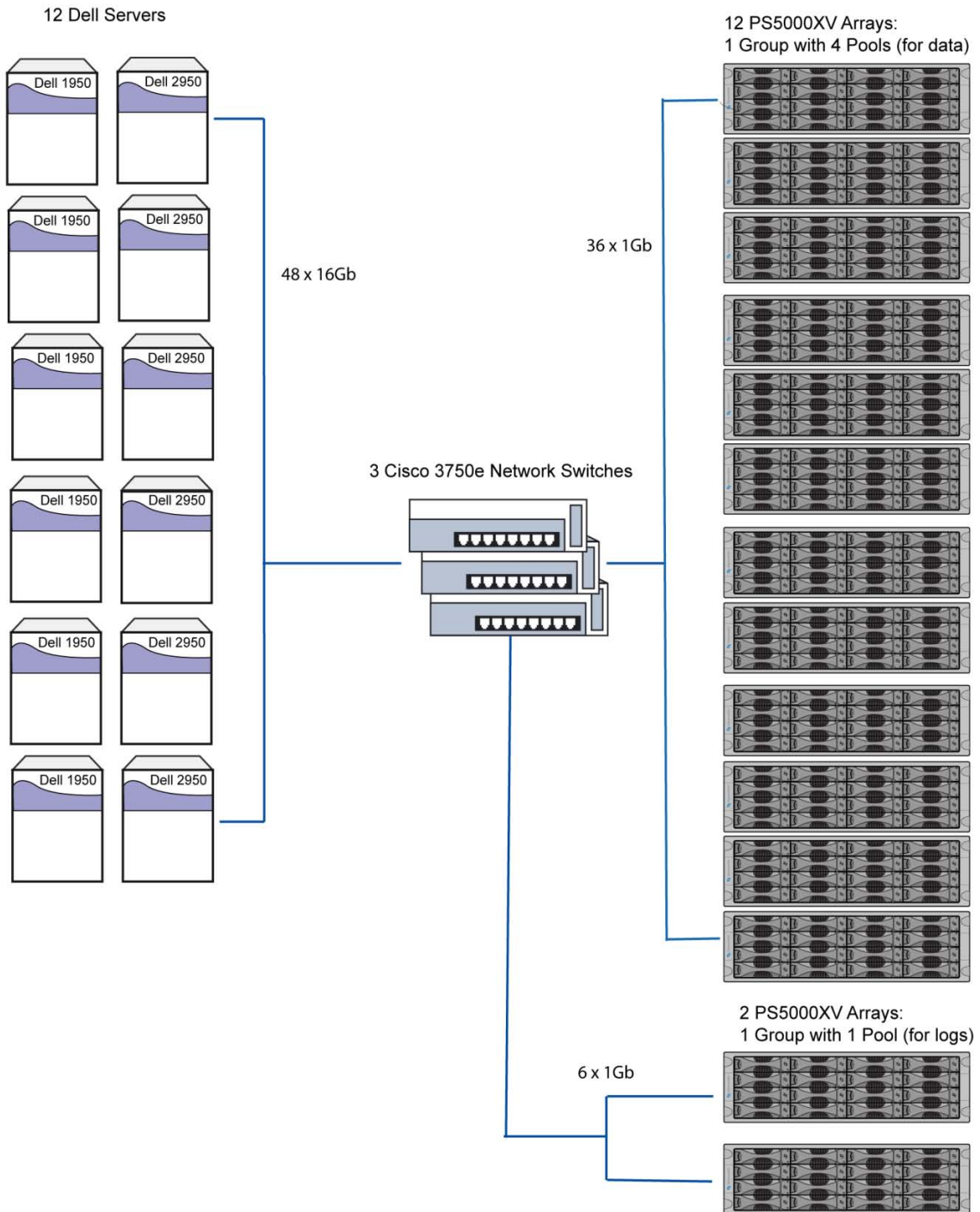
Cisco Catalyst 3750e Gigabit Ethernet Switches were used. All the servers and arrays were connected to three Cisco 3750e switches.

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<sup>2</sup> The PS5000XV has been qualified for use with Microsoft products. See the following URL for more information:

<http://www.microsoft.com/windowsserversystem/storage/partnerlist.aspx>

# PS Series Solution for Exchange Server Test Configuration



## **Exchange Storage Group Layout**

To perform the tests, two PS Series groups were created. Twelve Dell EqualLogic PS5000XV storage arrays were configured into a single PS Series group, consisting of four storage pools, all of which were used for data. Two Dell EqualLogic PS5000XV were configured into another PS Series group, consisting of a single storage pool used for the logs.

There are twelve simulated Microsoft Exchange servers in the test. Each Exchange server uses two data volumes in a single data storage pool. Each Exchange server also has two log volumes in the log storage pool to match the number of data volumes as required in the test.

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 scalable Exchange solution.

Other factors that affect server scalability are:

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

All these factors are beyond the scope of the ESRP-Storage test. Therefore, the number of mailboxes hosted per server as part of the tested configuration may not necessarily be viable for some customer deployments.

For more information on identifying and addressing performance bottlenecks in an Exchange system, refer to Microsoft's Troubleshooting Microsoft Exchange Server Performance, available at the following URL:

<http://go.microsoft.com/fwlink/?LinkId=23454>

## **Targeted Customer Profile**

The PS Series storage solution is intended for medium-sized Microsoft Exchange 2007 Server customers who want reliable, high-performance, and easy-to-manage disk storage. The tested configuration can support the following:

- 90,000 users
- 0.32 I/O per second per user (MS Exchange 2007 “heavy” profile: 0.40 IOPS per user including 20% headroom)
- 300MB mailbox size
- Eight storage groups per server, five databases each

## Tested Deployment

The following tables summarize the testing environment.

### Simulated Exchange Configuration

Number of Exchange mailboxes simulated	90,000
Number of hosts	12
Number of mailboxes/host	7,500
Number of storage groups/host	8
Number of mailbox stores/storage group	5
Number of mailboxes/mailbox store	188
Number of mailbox store LUNs/storage group	1
Simulated profile: I/Os per second per mailbox (IOPS, including 20% headroom)	0.32 (0.40 for tests including 20% headroom)
Database LUN size	1,600GB
Log LUN size	20GB
Backup LUN size/storage group	N/A
Total database size for performance testing	26,768GB
Percent storage capacity used by Exchange database	70% <sup>3</sup>

### Primary Storage Hardware

Storage Connectivity	iSCSI
Storage model and OS/firmware revision	Dell EqualLogic PS5000XV Firmware Rev: V4.0.1 <a href="http://www.dell.com/products/view.aspx?id=2509">http://www.dell.com/products/view.aspx?id=2509</a>
Storage cache	14GB (1GB per array)
Number of storage controllers	28 (2 per array)
Number of storage ports	42 (3 per array)
Maximum bandwidth of storage connectivity to host	10Gb Ethernet
Switch type/model/firmware revision	Cisco Catalyst 3750-E Gigabit Ethernet Switch Firmware Rev: V12.2(46)SE
HBA model and firmware	Intel PRO/1000 PT Dual Port Gigabit Ethernet Adapters
Number of HBAs/host	2

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<sup>3</sup> 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.

Host server type	Dell PowerEdge 2950 Intel Xeon Dual Core 3.00GHz with 4GB RAM  Dell PowerEdge 1950 Intel Xeon Quad Core 3.00GHz with 8GB RAM
Total number of disks tested in solution	224
Maximum number of spindles	224

### Primary Storage Software

NIC driver	Intel Driver Version: 9.9.30.0
Multipathing	Dell EqualLogic HIT (Host Integration Toolkit) 3.11
Host OS	Windows Server 2008, Standard x64 Edition, Service Pack 1
ESE.dll file version	08.01.0240.005
Replication solution name/version	N/A

### Primary Storage Disk Configuration (Mailbox Store Disks)

Disk type, speed and firmware revision	Seagate Cheetah 15K.6 450G 15,000 rpm SAS drives Model: ST3450856SS Firmware Revision: XQH6
Raw capacity per disk (GB)	450GB
Number of physical disks in test	192
Total raw storage capacity (GB)	86,400GB
Number of disks per LUN	48
Raid level	RAID10
Total formatted capacity (GB)	38,502GB
Storage capacity utilization	45%
Database capacity utilization	31%

### Primary Storage Disk Configuration (Transaction Log Disks)

Disk type, speed and firmware revision	Seagate Cheetah 15K.6 450G 15,000 rpm SAS drives Model: ST3450856SS Firmware Revision: XQH6
Raw capacity per disk (GB)	450GB
Number of physical disks in test	32
Total raw storage capacity (GB)	14,400GB
Number of disks per LUN	32
Raid level	RAID10
Total formatted capacity (GB)	6,420GB

## BEST PRACTICES

Microsoft Exchange Server is a disk-intensive application. Based on the tests using the ESRP framework, Dell recommends the following best practices to improve storage performance:

- Use `diskpart` (in Windows Server 2008) to align all Exchange-related disks on a 64KB boundary. To do this, use the value of 64 for Dell EqualLogic PS Series arrays.
- Allow the PS Series group to automatically balance the load across arrays, caches, and network links. Automatic load balancing reduces administrator effort as Exchange workloads change over time.
- In large Exchange deployments, isolate the Exchange workload from other application workloads by creating separate storage pools for Exchange-related volumes in a PS Series group and setting up separate servers for Exchange and other applications.
- Depending on the desired level of availability, you can configure Exchange using multiple storage pools in a PS Series group to provide complete resource and hardware isolation between logs and databases. You can also deploy Exchange using a single pool, which provides a high level of availability and makes provisioning simple. Performance and reliability are similar in either a single pool group or multiple-pool group.
- Size and configure first for I/O performance, then for storage capacity.
- Enable Dell EqualLogic Host Integration Tools V3.1 on Exchange servers to ensure highly-available SAN connections with Microsoft's MPIO.
- Use Microsoft iSCSI software initiators in Exchange configurations. In these tests, the Microsoft iSCSI software initiator was used.
- Use separate volumes for Exchange databases and transaction logs to improve backup and recovery operations.
- Place SAN infrastructure on VLANs or subnets that differ from other production network traffic.
- Use non-blocking Gigabit Ethernet switches.

For Exchange 2007 best practices on storage design, visit the following URL:

<http://technet.microsoft.com/en-us/library/bb124518.aspx>

## ADDITIONAL INFORMATION

For more information, see the Dell website ([www.dell.com](http://www.dell.com)). In addition, Dell EqualLogic technical documents may be useful:

<http://support.dell.com/equallogic>

## TEST RESULT SUMMARY

This section provides a high-level summary of the test data from ESRP–Storage. See [Appendix A](#) for detailed information about the test results.

### Reliability Results

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

The following list provides an overview:

- There were errors in the saved event log file, but they were unrelated to the benchmark (for example, “printer driver unavailable” errors were recorded when Remote Desktop connections were established to the server from a remote client during the benchmark run).
- No errors were reported by the database and log checksum process.

### Performance Results

The Primary Storage performance testing is designed to exercise the storage with maximum sustainable Exchange I/O for over two hours. The test shows how long it takes for the storage to respond to an I/O under load. The data below is the sum of all of the logical disk I/Os and the average of all the logical disks’ I/O latency during the test (which was run for six hours). Each server is listed separately and the aggregate numbers across all servers are also presented.

#### Individual Server Metrics

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

**Table 1 BLIZZARD Performance Results**

<b>Database I/O</b>	
Average Database Disk Transfers/sec	3,001.92
Average Database Disk Reads/sec	1,576.84
Average Database Disk Writes/sec	1,425.08
Average Database Disk Read Latency (ms)	19
Average Database Disk Write Latency (ms)	7
<b>Transaction Log I/O</b>	
Average Log Disk Writes/sec	592.46
Average Log Disk Write Latency (ms)	7



**Table 2 CYCLONE Performance Results**

<b>Database I/O</b>	
Average Database Disk Transfers/sec	3,056.04
Average Database Disk Reads/sec	1,659.56
Average Database Disk Writes/sec	1,396.49
Average Database Disk Read Latency (ms)	18
Average Database Disk Write Latency (ms)	7
<b>Transaction Log I/O</b>	
Average Log Disk Writes/sec	572.53
Average Log Disk Write Latency (ms)	7

**Table 3 DOWNPOUR Performance Results**

<b>Database I/O</b>	
Average Database Disk Transfers/sec	3,105.65
Average Database Disk Reads/sec	1,687.30
Average Database Disk Writes/sec	1,418.36
Average Database Disk Read Latency (ms)	18
Average Database Disk Write Latency (ms)	7
<b>Transaction Log I/O</b>	
Average Log Disk Writes/sec	586.51
Average Log Disk Write Latency (ms)	7

**Table 4 FOG Performance Results**

<b>Database I/O</b>	
Average Database Disk Transfers/sec	3,103.11
Average Database Disk Reads/sec	1,685.21
Average Database Disk Writes/sec	1,417.90
Average Database Disk Read Latency (ms)	18
Average Database Disk Write Latency (ms)	7
<b>Transaction Log I/O</b>	
Average Log Disk Writes/sec	586.27
Average Log Disk Write Latency (ms)	7

**Table 5 GALE Performance Results**

<b>Database I/O</b>	
Average Database Disk Transfers/sec	3,062.18
Average Database Disk Reads/sec	1,662.58
Average Database Disk Writes/sec	1,399.59
Average Database Disk Read Latency (ms)	18
Average Database Disk Write Latency (ms)	7
<b>Transaction Log I/O</b>	
Average Log Disk Writes/sec	574.08
Average Log Disk Write Latency (ms)	7

**Table 6 HAIL Performance Results**

<b>Database I/O</b>	
Average Database Disk Transfers/sec	3,025.98
Average Database Disk Reads/sec	1,585.96
Average Database Disk Writes/sec	1,440.02
Average Database Disk Read Latency (ms)	19
Average Database Disk Write Latency (ms)	7
<b>Transaction Log I/O</b>	
Average Log Disk Writes/sec	594.23
Average Log Disk Write Latency (ms)	7

**Table 7 HURRICANE Performance Results**

<b>Database I/O</b>	
Average Database Disk Transfers/sec	2,915.74
Average Database Disk Reads/sec	1,527.95
Average Database Disk Writes/sec	1,387.78
Average Database Disk Read Latency (ms)	18
Average Database Disk Write Latency (ms)	7
<b>Transaction Log I/O</b>	
Average Log Disk Writes/sec	581.72
Average Log Disk Write Latency (ms)	7

**Table 8 ICE Performance Results**

<b>Database I/O</b>	
Average Database Disk Transfers/sec	2,926.25
Average Database Disk Reads/sec	1,535.81
Average Database Disk Writes/sec	1,390.45
Average Database Disk Read Latency (ms)	18
Average Database Disk Write Latency (ms)	7
<b>Transaction Log I/O</b>	
Average Log Disk Writes/sec	574.89
Average Log Disk Write Latency (ms)	7

**Table 9 MIST Performance Results**

<b>Database I/O</b>	
Average Database Disk Transfers/sec	3,256.17
Average Database Disk Reads/sec	1,765.89
Average Database Disk Writes/sec	1,490.28
Average Database Disk Read Latency (ms)	18
Average Database Disk Write Latency (ms)	7
<b>Transaction Log I/O</b>	
Average Log Disk Writes/sec	604.34
Average Log Disk Write Latency (ms)	7

**Table 10 RAIN Performance Results**

<b>Database I/O</b>	
Average Database Disk Transfers/sec	3,110.63
Average Database Disk Reads/sec	1,632.06
Average Database Disk Writes/sec	1,478.57
Average Database Disk Read Latency (ms)	18
Average Database Disk Write Latency (ms)	7
<b>Transaction Log I/O</b>	
Average Log Disk Writes/sec	610.22
Average Log Disk Write Latency (ms)	7

**Table 11 SNOW Performance Results**

<b>Database I/O</b>	
Average Database Disk Transfers/sec	2,925.86
Average Database Disk Reads/sec	1,535.51
Average Database Disk Writes/sec	1,390.34
Average Database Disk Read Latency (ms)	18
Average Database Disk Write Latency (ms)	7
<b>Transaction Log I/O</b>	
Average Log Disk Writes/sec	571.34
Average Log Disk Write Latency (ms)	7

**Table 12 TYPHOON Performance Results**

<b>Database I/O</b>	
Average Database Disk Transfers/sec	3,100.36
Average Database Disk Reads/sec	1,685.18
Average Database Disk Writes/sec	1,415.19
Average Database Disk Read Latency (ms)	18
Average Database Disk Write Latency (ms)	7
<b>Transaction Log I/O</b>	
Average Log Disk Writes/sec	578.90
Average Log Disk Write Latency (ms)	7

**Aggregate Performance Across All Servers**

Aggregate performance is the sum of I/Os across all servers and the average latency across all servers.

<b>Database I/O</b>	
Average Database Disk Transfers/sec	36,589.88
Average Database Disk Reads/sec	19,539.84
Average Database Disk Writes/sec	17,050.04
Average Database Disk Read Latency (ms)	18
Average Database Disk Write Latency (ms)	7
<b>Transaction Log I/O</b>	
Average Log Disk Writes/sec	7,027.48
Average Log Disk Write Latency (ms)	7

## Streaming Backup/Recovery Performance

The test measures the maximum rate at which multiple databases can be backed up in series.

## Database Read-Only Performance

The following table shows the average rate for a single database file.

MB read/sec (avg. per storage group)	25.92
MB read/sec (avg. per system)	207.36
MB read/sec (total)	2,695.73

## Log Read-Only Performance

The test measures 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.

Average time to play one Log file (sec)	0.11
---	------

## CONCLUSION

This document was developed by Dell, Inc., 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 v2.0 test framework. Customers should not quote the data directly for their pre-deployment verification. It is still necessary to go through the exercises to validate the storage design for a specific customer environment.

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

## APPENDIX A

### Microsoft Exchange Server Jetstress Results for BLIZZARD

#### Performance Test Result Report

##### Test Summary

Overall Test Result      Pass

Machine Name      BLIZZARD

Test Description      90,000 User ESRP Configuration

Test Start Time      11/11/2008 5:31:19 PM

Test End Time      11/12/2008 12:54:07 AM

Jetstress Version      08.02.0060.000

Ese Version      08.01.0240.005

Operating System      Windows Server (R) 2008 Standard Service Pack 1 (6.0.6001.65536)

Performance Log      [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_43.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_43.blg)  
                            [C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_12\\_0\\_54\\_7.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_54_7.blg)

##### Database Sizing and Throughput

Achieved I/O per Second      3001.915

Target I/O per Second      3000

Initial database size      2359569285120

Final database size      2396470771712

Database files (count)      40

##### Jetstress System Parameters

Thread count      16 (per-storage group)

Log buffers      9000

Minimum database cache      256.0 MB

Maximum database cache      2048.0 MB

Insert operations	40%
Delete operations	30%
Replace operations	5%
Read operations	25%
Lazy commits	55%

#### Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (R:)	0.019	0.007	788.556	713.748	(n/a)
Database (S:)	0.018	0.007	788.279	711.332	(n/a)
Log (L:)	0.000	0.007	0.000	296.690	6658.435
Log (M:)	0.000	0.007	0.000	295.770	6670.642

#### Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	8.340	5.551	14.610
Available MBytes	1280.414	1274.000	1485.000
Free System Page Table Entries	33558103.034	33557859.000	33558522.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	128108546.844	127959040.000	129085440.000
Pool Paged Bytes	99643995.022	99627008.000	99684352.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log 11/11/2008 5:31:19 PM -- Jetstress testing begins ...

11/11/2008 5:31:19 PM -- Prepare testing begins ...

11/11/2008 5:32:01 PM -- Attaching databases ...

11/11/2008 5:32:01 PM -- Prepare testing ends.

11/11/2008 5:32:01 PM -- Dispatching transactions begins ...

11/11/2008 5:32:01 PM -- Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)

11/11/2008 5:32:01 PM -- Database flush thresholds: (start: 20.5 MB, stop: 41.0 MB)

11/11/2008 5:32:43 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

11/11/2008 5:32:43 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

11/11/2008 5:32:44 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.

11/11/2008 5:32:44 PM -- Performance logging begins (interval: 15000 ms).

11/11/2008 5:32:44 PM -- Attaining prerequisites:

11/11/2008 5:42:11 PM -- \MSEExchange Database(Jetstress Win)\Database Cache Size, Last: 1936278000.0 (lower bound: 1932735000.0, upper bound: none)

11/11/2008 11:42:11 PM -- Performance logging ends.

11/12/2008 12:54:04 AM -- JetInterop batch transaction stats: 152655, 153674, 152648, 152569, 152870, 152592, 152959, and 153158.

11/12/2008 12:54:04 AM -- Dispatching transactions ends.

11/12/2008 12:54:04 AM -- Shutting down databases ...

11/12/2008 12:54:07 AM -- Instance304.1 (complete), Instance304.2 (complete), Instance304.3 (complete), Instance304.4 (complete), Instance304.5 (complete), Instance304.6 (complete), Instance304.7 (complete), and Instance304.8 (complete)

11/12/2008 12:54:08 AM -- Performance logging begins (interval: 30000 ms).

11/12/2008 12:54:08 AM -- Verifying database checksums ...

11/12/2008 3:39:09 AM -- R: (100% processed), and S: (100% processed)

11/12/2008 3:39:09 AM -- Performance logging ends.

11/12/2008 3:39:09 AM -- [C:\Program Files\Exchange Jetstress\ESRP Results\DBCchecksum\\_2008\\_11\\_12\\_0\\_54\\_7.blg](#) has 329 samples.

11/12/2008 3:39:11 AM -- [C:\Program Files\Exchange Jetstress\ESRP Results\DBCchecksum\\_2008\\_11\\_12\\_0\\_54\\_7.html](#) is saved.

11/12/2008 3:39:11 AM -- Verifying log checksums ...

11/12/2008 3:39:14 AM -- L:\log01 (2 logs passed), L:\log02 (2 logs passed), L:\log03 (3 logs passed), L:\log04 (2 logs passed), M:\log05 (3 logs passed), M:\log06 (2 logs passed), M:\log07 (3 logs passed), and M:\log08 (2 logs passed)

11/12/2008 3:39:14 AM -- [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_43.blg](#) has 1477 samples.

11/12/2008 3:39:14 AM -- Creating test report ...

11/12/2008 3:39:19 AM -- Volume R: has 0.0188 for Avg. Disk sec/Read.

11/12/2008 3:39:19 AM -- Volume S: has 0.0182 for Avg. Disk sec/Read.

11/12/2008 3:39:19 AM -- Volume L: has 0.0066 for Avg. Disk sec/Write.

11/12/2008 3:39:19 AM -- Volume L: has 0.0000 for Avg. Disk sec/Read.

11/12/2008 3:39:19 AM -- Volume M: has 0.0066 for Avg. Disk sec/Write.

11/12/2008 3:39:19 AM -- Volume M: has 0.0000 for Avg. Disk sec/Read.

11/12/2008 3:39:19 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.

11/12/2008 3:39:19 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.

11/12/2008 3:39:19 AM -- [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_43.xml](#) has 1439 samples queried.

## Database Checksum Report

Checksum Statistics - All

Database	Seen pages	Bad pages	Correctable pages	Wrong page no pages	File length / seconds taken
R:\esrp01\Jetstress1.edb	7312194	0	0	0	57126 MBytes / 513 seconds
R:\esrp01\Jetstress2.edb	7312450	0	0	0	57128 MBytes / 466

					seconds
R:\esrp01\Jetstress3.edb	7314498	0	0	0	57144 MBytes / 487 seconds
R:\esrp01\Jetstress4.edb	7313474	0	0	0	57136 MBytes / 484 seconds
R:\esrp01\Jetstress5.edb	7311938	0	0	0	57124 MBytes / 482 seconds
R:\esrp02\Jetstress1.edb	7313474	0	0	0	57136 MBytes / 493 seconds
R:\esrp02\Jetstress2.edb	7315010	0	0	0	57148 MBytes / 487 seconds
R:\esrp02\Jetstress3.edb	7313474	0	0	0	57136 MBytes / 473 seconds
R:\esrp02\Jetstress4.edb	7313986	0	0	0	57140 MBytes / 469 seconds
R:\esrp02\Jetstress5.edb	7315266	0	0	0	57150 MBytes / 470 seconds
R:\esrp03\Jetstress1.edb	7311682	0	0	0	57122 MBytes / 474 seconds
R:\esrp03\Jetstress2.edb	7314498	0	0	0	57144 MBytes / 471 seconds
R:\esrp03\Jetstress3.edb	7312450	0	0	0	57128 MBytes / 476 seconds
R:\esrp03\Jetstress4.edb	7315266	0	0	0	57150 MBytes / 482 seconds
R:\esrp03\Jetstress5.edb	7313218	0	0	0	57134 MBytes / 472 seconds
R:\esrp04\Jetstress1.edb	7313474	0	0	0	57136 MBytes / 484 seconds
R:\esrp04\Jetstress2.edb	7313218	0	0	0	57134 MBytes / 484 seconds
R:\esrp04\Jetstress3.edb	7312450	0	0	0	57128 MBytes / 484 seconds
R:\esrp04\Jetstress4.edb	7314498	0	0	0	57144 MBytes / 465 seconds
R:\esrp04\Jetstress5.edb	7313218	0	0	0	57134 MBytes / 457 seconds



S:\esrp05\Jetstress1.edb	7312962	0	0	0	57132 MBytes / 600 seconds
S:\esrp05\Jetstress2.edb	7315010	0	0	0	57148 MBytes / 492 seconds
S:\esrp05\Jetstress3.edb	7312450	0	0	0	57128 MBytes / 495 seconds
S:\esrp05\Jetstress4.edb	7312194	0	0	0	57126 MBytes / 496 seconds
S:\esrp05\Jetstress5.edb	7314498	0	0	0	57144 MBytes / 485 seconds
S:\esrp06\Jetstress1.edb	7311938	0	0	0	57124 MBytes / 493 seconds
S:\esrp06\Jetstress2.edb	7315010	0	0	0	57148 MBytes / 484 seconds
S:\esrp06\Jetstress3.edb	7311938	0	0	0	57124 MBytes / 490 seconds
S:\esrp06\Jetstress4.edb	7315010	0	0	0	57148 MBytes / 487 seconds
S:\esrp06\Jetstress5.edb	7312194	0	0	0	57126 MBytes / 503 seconds
S:\esrp07\Jetstress1.edb	7312450	0	0	0	57128 MBytes / 487 seconds
S:\esrp07\Jetstress2.edb	7313474	0	0	0	57136 MBytes / 492 seconds
S:\esrp07\Jetstress3.edb	7314242	0	0	0	57142 MBytes / 494 seconds
S:\esrp07\Jetstress4.edb	7314754	0	0	0	57146 MBytes / 497 seconds
S:\esrp07\Jetstress5.edb	7314754	0	0	0	57146 MBytes / 492 seconds
S:\esrp08\Jetstress1.edb	7313474	0	0	0	57136 MBytes / 492 seconds
S:\esrp08\Jetstress2.edb	7313730	0	0	0	57138 MBytes / 512 seconds
S:\esrp08\Jetstress3.edb	7311682	0	0	0	57122 MBytes / 494 seconds
S:\esrp08\Jetstress4.edb	7313218	0	0	0	57134 MBytes / 516

				seconds
S:\esrp08\Jetstress5.edb	7313218	0	0	57134 MBytes / 389 seconds
(Sum)	292537936	0	0	2285452 MBytes / 9900 seconds

Disk Subsystem Performance (of checksum)

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec
R:	0.083	0.000	1908.291	0.000
S:	0.085	0.000	1846.595	0.000

Memory System Performance (of checksum)

Counter	Average	Minimum	Maximum
% Processor Time	27.736	15.074	30.742
Available MBytes	3387.687	3371.000	3399.000
Free System Page Table Entries	33559697.340	33558313.000	33560079.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	129178290.967	127995904.000	134225920.000
Pool Paged Bytes	99134566.711	98684928.000	99143680.000

Test Log 11/11/2008 5:31:19 PM -- Jetstress testing begins ...  
 11/11/2008 5:31:19 PM -- Prepare testing begins ...  
 11/11/2008 5:32:01 PM -- Attaching databases ...  
 11/11/2008 5:32:01 PM -- Prepare testing ends.  
 11/11/2008 5:32:01 PM -- Dispatching transactions begins ...  
 11/11/2008 5:32:01 PM -- Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)  
 11/11/2008 5:32:01 PM -- Database flush thresholds: (start: 20.5 MB, stop: 41.0 MB)  
 11/11/2008 5:32:43 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).  
 11/11/2008 5:32:43 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).  
 11/11/2008 5:32:44 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.  
 11/11/2008 5:32:44 PM -- Performance logging begins (interval: 15000 ms).  
 11/11/2008 5:32:44 PM -- Attaining prerequisites:  
 11/11/2008 5:42:11 PM -- \MSEExchange Database(Jetstress Win)\Database Cache Size, Last: 1936278000.0 (lower bound: 1932735000.0, upper bound: none)  
 11/11/2008 11:42:11 PM -- Performance logging ends.  
 11/12/2008 12:54:04 AM -- JetInterop batch transaction stats: 152655, 153674, 152648, 152569, 152870, 152592, 152959, and 153158.  
 11/12/2008 12:54:04 AM -- Dispatching transactions ends.

11/12/2008 12:54:04 AM -- Shutting down databases ...  
11/12/2008 12:54:07 AM -- Instance304.1 (complete), Instance304.2 (complete), Instance304.3 (complete), Instance304.4 (complete), Instance304.5 (complete), Instance304.6 (complete), Instance304.7 (complete), and Instance304.8 (complete)  
11/12/2008 12:54:08 AM -- Performance logging begins (interval: 30000 ms).  
11/12/2008 12:54:08 AM -- Verifying database checksums ...  
11/12/2008 3:39:09 AM -- R: (100% processed), and S: (100% processed)  
11/12/2008 3:39:09 AM -- Performance logging ends.  
11/12/2008 3:39:09 AM -- [C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_12\\_0\\_54\\_7.blg](#) has 329 samples.

## Stress Test Result Report

### Test Summary

Overall Test Result      Pass

Machine Name      BLIZZARD

Test Description      90,000 User ESRP Configuration

Test Start Time      11/12/2008 8:59:31 AM

Test End Time      11/13/2008 9:41:23 AM

Jetstress Version      08.02.0060.000

Ese Version      08.01.0240.005

Operating System      Windows Server (R) 2008 Standard Service Pack 1 (6.0.6001.65536)

Performance Log      [C:\Program Files\Exchange Jetstress\ESRP Results\Stress\\_2008\\_11\\_12\\_9\\_0\\_55.blg](#)  
[C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_13\\_9\\_41\\_23.blg](#)

### Database Sizing and Throughput

Achieved I/O per Second      2927.739

Target I/O per Second      3000

Initial database size      2396470771712

Final database size      2504058863616

Database files (count)      40

### Jetstress System Parameters

Thread count      16 (per-storage group)

Log buffers 9000  
 Minimum database cache 256.0 MB  
 Maximum database cache 2048.0 MB  
 Insert operations 40%  
 Delete operations 30%  
 Replace operations 5%  
 Read operations 25%  
 Lazy commits 55%

#### Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (R:)	0.020	0.007	795.566	670.622	(n/a)
Database (S:)	0.020	0.007	794.803	666.749	(n/a)
Log (L:)	0.000	0.006	0.000	300.347	6042.642
Log (M:)	0.000	0.006	0.000	301.158	6029.536

#### Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	8.211	4.840	17.151
Available MBytes	1264.900	1255.000	1467.000
Free System Page Table Entries	33559034.347	33558448.000	33559246.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	128248436.594	127934464.000	130244608.000
Pool Paged Bytes	101560190.510	101376000.000	101941248.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log 11/12/2008 8:59:31 AM -- Jetstress testing begins ...  
 11/12/2008 8:59:31 AM -- Prepare testing begins ...  
 11/12/2008 9:00:13 AM -- Attaching databases ...  
 11/12/2008 9:00:13 AM -- Prepare testing ends.  
 11/12/2008 9:00:13 AM -- Dispatching transactions begins ...  
 11/12/2008 9:00:13 AM -- Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)

11/12/2008 9:00:13 AM -- Database flush thresholds: (start: 20.5 MB, stop: 41.0 MB)  
11/12/2008 9:00:55 AM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.1 seconds/read).  
11/12/2008 9:00:55 AM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.1 seconds/write).  
11/12/2008 9:00:55 AM -- Operation mix: Sessions 16, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.  
11/12/2008 9:00:55 AM -- Performance logging begins (interval: 15000 ms).  
11/12/2008 9:00:56 AM -- Attaining prerequisites:  
11/12/2008 9:09:05 AM -- \MSEExchange Database(JetstressWin)\Database Cache Size, Last: 1935237000.0 (lower bound: 1932735000.0, upper bound: none)  
11/13/2008 9:09:06 AM -- Performance logging ends.  
11/13/2008 9:41:19 AM -- JetInterop batch transaction stats: 483203, 483525, 484170, 483507, 483006, 482239, 483633, and 483574.  
11/13/2008 9:41:20 AM -- Dispatching transactions ends.  
11/13/2008 9:41:20 AM -- Shutting down databases ...  
11/13/2008 9:41:23 AM -- Instance1168.1 (complete), Instance1168.2 (complete), Instance1168.3 (complete), Instance1168.4 (complete), Instance1168.5 (complete), Instance1168.6 (complete), Instance1168.7 (complete), and Instance1168.8 (complete)  
11/13/2008 9:41:23 AM -- Performance logging begins (interval: 30000 ms).  
11/13/2008 9:41:23 AM -- Verifying database checksums ...  
11/13/2008 12:34:07 PM -- R: (100% processed), and S: (100% processed)  
11/13/2008 12:34:07 PM -- Performance logging ends.  
11/13/2008 12:34:07 PM -- [C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_13\\_9\\_41\\_23.blg](#) has 345 samples.  
11/13/2008 12:34:08 PM -- [C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_13\\_9\\_41\\_23.html](#) is saved.  
11/13/2008 12:34:08 PM -- Verifying log checksums ...  
11/13/2008 12:34:11 PM -- L:\log01 (2 logs passed), L:\log02 (3 logs passed), L:\log03 (3 logs passed), L:\log04 (3 logs passed), M:\log05 (2 logs passed), M:\log06 (2 logs passed), M:\log07 (3 logs passed), and M:\log08 (2 logs passed)  
11/13/2008 12:34:11 PM -- [C:\Program Files\Exchange Jetstress\ESRP Results\Stress\\_2008\\_11\\_12\\_9\\_0\\_55.blg](#) has 5789 samples.  
11/13/2008 12:34:11 PM -- Creating test report ...  
11/13/2008 12:34:34 PM -- Volume R: has 0.0200 for Avg. Disk sec/Read.  
11/13/2008 12:34:34 PM -- Volume S: has 0.0195 for Avg. Disk sec/Read.  
11/13/2008 12:34:34 PM -- Volume L: has 0.0057 for Avg. Disk sec/Write.  
11/13/2008 12:34:34 PM -- Volume L: has 0.0000 for Avg. Disk sec/Read.  
11/13/2008 12:34:34 PM -- Volume M: has 0.0057 for Avg. Disk sec/Write.  
11/13/2008 12:34:34 PM -- Volume M: has 0.0000 for Avg. Disk sec/Read.  
11/13/2008 12:34:34 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
11/13/2008 12:34:34 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
11/13/2008 12:34:34 PM -- [C:\Program Files\Exchange Jetstress\ESRP Results\Stress\\_2008\\_11\\_12\\_9\\_0\\_55.xml](#) has 5756 samples queried.

## Streaming Backup Test Result Report

Streaming Backup Statistics - All

Database Instance Database Size (MBytes) Elapsed Backup Time MBytes Transferred/sec

Instance3556.1	298460.62	03:15:48	25.40
Instance3556.2	298518.62	03:14:54	25.53
Instance3556.3	298500.62	03:16:51	25.27
Instance3556.4	298528.62	03:14:17	25.61
Instance3556.5	298478.62	03:03:02	27.18
Instance3556.6	298406.62	03:01:22	27.42
Instance3556.7	298568.62	03:00:27	27.57
Instance3556.8	298514.62	02:58:59	27.80

#### Jetstress System Parameters

Thread count	16 (per-storage group)
Log buffers	9000
Minimum database cache	256.0 MB
Maximum database cache	2048.0 MB
Insert operations	40%
Delete operations	30%
Replace operations	5%
Read operations	25%
Lazy commits	55%

#### Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (R:)	0.005	0.000	812.436	0.013	(n/a)
Database (S:)	0.005	0.000	812.187	0.017	(n/a)
Log (L:)	0.000	0.000	0.000	0.008	36.241
Log (M:)	0.000	0.000	0.000	0.011	48.200

#### Host System Performance

Counter	Average	Minimum	Maximum
---------	---------	---------	---------

% Processor Time	19.223	2.103	25.899
Available MBytes	3391.758	3382.000	3393.000
Free System Page Table Entries	33559989.349	33559675.000	33560151.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	129193030.351	128020480.000	130232320.000
Pool Paged Bytes	103755171.501	102789120.000	104112128.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log 11/13/2008 2:27:07 PM -- Jetstress testing begins ...  
 11/13/2008 2:27:07 PM -- Prepare testing begins ...  
 11/13/2008 2:27:49 PM -- Attaching databases ...  
 11/13/2008 2:27:49 PM -- Prepare testing ends.  
 11/13/2008 2:28:31 PM -- Performance logging begins (interval: 30000 ms).  
 11/13/2008 2:28:31 PM -- Streaming backup databases ...  
 11/13/2008 5:45:23 PM -- Performance logging ends.  
 11/13/2008 5:45:23 PM -- Instance3556.1 (100% processed), Instance3556.2 (100% processed),  
 Instance3556.3 (100% processed), Instance3556.4 (100% processed), Instance3556.5 (100%  
 processed), Instance3556.6 (100% processed), Instance3556.7 (100% processed), and  
 Instance3556.8 (100% processed)  
 11/13/2008 5:45:23 PM -- [C:\Program Files\Exchange Jetstress\ESRP  
 Results\StreamingBackup\\_2008\\_11\\_13\\_14\\_27\\_49.blg](#) has 393 samples.  
 11/13/2008 5:45:23 PM -- Creating test report ...

### SoftRecovery Test Result Report

Soft-Recovery Statistics - All

Database Instance Log files replayed Elapsed seconds

Instance2692.1	507	459.2251488
Instance2692.2	504	458.9599352
Instance2692.3	507	441.3310312
Instance2692.4	500	459.4903624
Instance2692.5	509	434.4354776
Instance2692.6	502	457.5090608
Instance2692.7	510	424.3573608
Instance2692.8	504	455.6525656

Disk Subsystem Performance

LogicalDisk	Avg. Disk	Avg. Disk	Disk	Disk	Avg. Disk
-------------	-----------	-----------	------	------	-----------

	sec/Read	sec/Write	Reads/sec	Writes/sec	Bytes/Write
Database (R:)	0.054	0.003	3107.070	147.511	(n/a)
Database (S:)	0.056	0.003	2974.995	149.111	(n/a)
Log (L:)	0.003	0.000	146.152	0.088	322.832
Log (M:)	0.003	0.000	147.425	0.219	435.123

#### Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	24.277	0.780	54.088
Available MBytes	1516.079	1220.000	3318.000
Free System Page Table Entries	33559373.851	33559048.000	33559520.000
Transition Pages RePurposed/sec	46.747	0.000	1911.257
Pool Nonpaged Bytes	130657226.105	129159168.000	130895872.000
Pool Paged Bytes	104407291.509	103366656.000	104615936.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log 11/13/2008 7:03:08 PM -- Jetstress testing begins ...

11/13/2008 7:03:08 PM -- Prepare testing begins ...

11/13/2008 7:03:50 PM -- Attaching databases ...

11/13/2008 7:03:50 PM -- Prepare testing ends.

11/13/2008 7:03:50 PM -- Dispatching transactions begins ...

11/13/2008 7:03:50 PM -- Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)

11/13/2008 7:03:50 PM -- Database flush thresholds: (start: 20.5 MB, stop: 41.0 MB)

11/13/2008 7:04:31 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

11/13/2008 7:04:31 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

11/13/2008 7:04:33 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.

11/13/2008 7:04:33 PM -- Performance logging begins (interval: 15000 ms).

11/13/2008 7:04:33 PM -- Generating log files ...

11/13/2008 7:40:28 PM -- L:\log01 (101.6% generated), L:\log02 (100.8% generated), L:\log03 (101.6% generated), L:\log04 (100.2% generated), M:\log05 (102.0% generated), M:\log06 (100.6% generated), M:\log07 (102.0% generated), and M:\log08 (101.0% generated)

11/13/2008 7:40:28 PM -- Performance logging ends.

11/13/2008 7:40:28 PM -- JetInterop batch transaction stats: 13605, 13486, 13750, 13671, 13706, 13600, 13803, and 13533.

11/13/2008 7:40:28 PM -- Dispatching transactions ends.

11/13/2008 7:40:28 PM -- Shutting down databases ...



11/13/2008 7:40:32 PM -- Instance2692.1 (complete), Instance2692.2 (complete), Instance2692.3 (complete), Instance2692.4 (complete), Instance2692.5 (complete), Instance2692.6 (complete), Instance2692.7 (complete), and Instance2692.8 (complete)

11/13/2008 7:40:32 PM -- [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_13\\_19\\_4\\_31.blg](#) has 143 samples.

11/13/2008 7:40:32 PM -- Creating test report ...

11/13/2008 7:40:33 PM -- Volume R: has 0.0118 for Avg. Disk sec/Read.

11/13/2008 7:40:33 PM -- Volume S: has 0.0115 for Avg. Disk sec/Read.

11/13/2008 7:40:33 PM -- Volume L: has 0.0020 for Avg. Disk sec/Write.

11/13/2008 7:40:33 PM -- Volume L: has 0.0014 for Avg. Disk sec/Read.

11/13/2008 7:40:33 PM -- Volume M: has 0.0021 for Avg. Disk sec/Write.

11/13/2008 7:40:33 PM -- Volume M: has 0.0016 for Avg. Disk sec/Read.

11/13/2008 7:40:33 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.

11/13/2008 7:40:33 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.

11/13/2008 7:40:33 PM -- [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_13\\_19\\_4\\_31.xml](#) has 142 samples queried.

11/13/2008 7:40:33 PM -- [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_13\\_19\\_4\\_31.html](#) is saved.

11/14/2008 11:20:36 AM -- Performance logging begins (interval: 4000 ms).

11/14/2008 11:20:36 AM -- Recovering databases ...

11/14/2008 11:28:16 AM -- Performance logging ends.

11/14/2008 11:28:16 AM -- Instance2692.1 (459.2251488), Instance2692.2 (458.9599352), Instance2692.3 (441.3310312), Instance2692.4 (459.4903624), Instance2692.5 (434.4354776), Instance2692.6 (457.5090608), Instance2692.7 (424.3573608), and Instance2692.8 (455.6525656)

11/14/2008 11:28:16 AM -- [C:\Program Files\Exchange Jetstress\ESRP Results\SoftRecovery\\_2008\\_11\\_14\\_11\\_20\\_32.blg](#) has 114 samples.

11/14/2008 11:28:16 AM -- Creating test report ...

## Microsoft Exchange Server Jetstress Results for CYCLONE

### Performance Test Result Report

#### Test Summary

Overall Test Result      Pass

Machine Name      CYCLONE

Test Description      90,000 User ESRP Configuration

Test Start Time      11/11/2008 5:31:14 PM

Test End Time      11/12/2008 12:54:02 AM

Jetstress Version      08.02.0060.000

Ese Version      08.01.0240.005

Operating System      Windows Server (R) 2008 Standard Service Pack 1 (6.0.6001.65536)

Performance Log      [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_36.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_36.blg)  
[C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_12\\_0\\_54\\_2.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_54_2.blg)

#### Database Sizing and Throughput

Achieved I/O per Second      3056.043

Target I/O per Second      3000

Initial database size      2359401512960

Final database size      2393696239616

Database files (count)      40

#### Jetstress System Parameters

Thread count      16 (per-storage group)

Log buffers      9000

Minimum database cache      256.0 MB

Maximum database cache      2048.0 MB

Insert operations      40%

Delete operations      30%

Replace operations	5%
Read operations	25%
Lazy commits	55%

#### Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (R:)	0.019	0.007	829.985	700.585	(n/a)
Database (S:)	0.018	0.007	829.573	695.900	(n/a)
Log (L:)	0.000	0.007	0.000	285.622	6716.192
Log (M:)	0.000	0.007	0.000	286.906	6705.206

#### Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	5.269	2.523	8.480
Available MBytes	5145.149	5121.000	5334.000
Free System Page Table Entries	33558422.628	33557873.000	33558684.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	197244952.195	196993024.000	198152192.000
Pool Paged Bytes	104798590.844	104665088.000	128303104.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log 11/11/2008 5:31:14 PM -- Jetstress testing begins ...

11/11/2008 5:31:14 PM -- Prepare testing begins ...

11/11/2008 5:31:55 PM -- Attaching databases ...

11/11/2008 5:31:55 PM -- Prepare testing ends.

11/11/2008 5:31:55 PM -- Dispatching transactions begins ...

11/11/2008 5:31:55 PM -- Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)

11/11/2008 5:31:55 PM -- Database flush thresholds: (start: 20.5 MB, stop: 41.0 MB)

11/11/2008 5:32:36 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

11/11/2008 5:32:36 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

11/11/2008 5:32:37 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.

11/11/2008 5:32:37 PM -- Performance logging begins (interval: 15000 ms).

11/11/2008 5:32:37 PM -- Attaining prerequisites:  
11/11/2008 5:52:11 PM -- \MSEExchange Database(Jetstress Win)\Database Cache Size, Last:  
1933517000.0 (lower bound: 1932735000.0, upper bound: none)  
11/11/2008 11:52:12 PM -- Performance logging ends.  
11/12/2008 12:53:59 AM -- JetInterop batch transaction stats: 143925, 144494, 144505, 144244,  
144715, 143876, 144121, and 144991.  
11/12/2008 12:53:59 AM -- Dispatching transactions ends.  
11/12/2008 12:53:59 AM -- Shutting down databases ...  
11/12/2008 12:54:02 AM -- Instance4000.1 (complete), Instance4000.2 (complete), Instance4000.3  
(complete), Instance4000.4 (complete), Instance4000.5 (complete), Instance4000.6 (complete),  
Instance4000.7 (complete), and Instance4000.8 (complete)  
11/12/2008 12:54:02 AM -- Performance logging begins (interval: 30000 ms).  
11/12/2008 12:54:02 AM -- Verifying database checksums ...  
11/12/2008 3:24:04 AM -- R: (100% processed), and S: (100% processed)  
11/12/2008 3:24:04 AM -- Performance logging ends.  
11/12/2008 3:24:04 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_54\\_2.blg](#) has 299 samples.  
11/12/2008 3:24:06 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_54\\_2.html](#) is saved.  
11/12/2008 3:24:06 AM -- Verifying log checksums ...  
11/12/2008 3:24:09 AM -- L:\log01 (3 logs passed), L:\log02 (2 logs passed), L:\log03 (2 logs  
passed), L:\log04 (3 logs passed), M:\log05 (2 logs passed), M:\log06 (2 logs passed), M:\log07 (2  
logs passed), and M:\log08 (2 logs passed)  
11/12/2008 3:24:09 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_36.blg](#) has 1517 samples.  
11/12/2008 3:24:09 AM -- Creating test report ...  
11/12/2008 3:24:17 AM -- Volume R: has 0.0187 for Avg. Disk sec/Read.  
11/12/2008 3:24:17 AM -- Volume S: has 0.0182 for Avg. Disk sec/Read.  
11/12/2008 3:24:17 AM -- Volume L: has 0.0067 for Avg. Disk sec/Write.  
11/12/2008 3:24:17 AM -- Volume L: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:24:17 AM -- Volume M: has 0.0067 for Avg. Disk sec/Write.  
11/12/2008 3:24:17 AM -- Volume M: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:24:17 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
11/12/2008 3:24:17 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
11/12/2008 3:24:17 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_36.xml](#) has 1438 samples queried.

## Microsoft Exchange Server Jetstress Results for DOWNPOUR

### Performance Test Result Report

#### Test Summary

Overall Test Result      Pass

Machine Name      DOWNPOUR

Test Description      90,000 User ESRP Configuration

Test Start Time      11/11/2008 5:30:55 PM

Test End Time      11/12/2008 12:53:56 AM

Jetstress Version      08.02.0060.000

Ese Version      08.01.0240.005

Operating System      Windows Server (R) 2008 Standard Service Pack 1 (6.0.6001.65536)

Performance Log      [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_17.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_17.blg)  
[C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_56.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_56.blg)

#### Database Sizing and Throughput

Achieved I/O per Second      3105.654

Target I/O per Second      3000

Initial database size      2359569285120

Final database size      2395487207424

Database files (count)      40

#### Jetstress System Parameters

Thread count      16 (per-storage group)

Log buffers      9000

Minimum database cache      256.0 MB

Maximum database cache      2048.0 MB

Insert operations      40%

Delete operations      30%

Replace operations	5%
Read operations	25%
Lazy commits	55%

#### Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (R:)	0.019	0.007	842.991	711.143	(n/a)
Database (S:)	0.018	0.007	844.307	707.213	(n/a)
Log (L:)	0.000	0.007	0.000	292.656	6706.549
Log (M:)	0.000	0.007	0.000	293.854	6700.584

#### Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	5.438	3.616	8.369
Available MBytes	5143.443	5136.000	5325.000
Free System Page Table Entries	33558353.538	33557823.000	33558732.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	197796759.394	197537792.000	198758400.000
Pool Paged Bytes	104663320.372	104546304.000	104919040.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log 11/11/2008 5:30:55 PM -- Jetstress testing begins ...

11/11/2008 5:30:55 PM -- Prepare testing begins ...

11/11/2008 5:31:36 PM -- Attaching databases ...

11/11/2008 5:31:36 PM -- Prepare testing ends.

11/11/2008 5:31:36 PM -- Dispatching transactions begins ...

11/11/2008 5:31:36 PM -- Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)

11/11/2008 5:31:36 PM -- Database flush thresholds: (start: 20.5 MB, stop: 41.0 MB)

11/11/2008 5:32:17 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

11/11/2008 5:32:17 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

11/11/2008 5:32:18 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.

11/11/2008 5:32:18 PM -- Performance logging begins (interval: 15000 ms).

11/11/2008 5:32:18 PM -- Attaining prerequisites:  
11/11/2008 5:38:56 PM -- \MSEExchange Database(Jetstress Win)\Database Cache Size, Last:  
1936097000.0 (lower bound: 1932735000.0, upper bound: none)  
11/11/2008 11:38:57 PM -- Performance logging ends.  
11/12/2008 12:53:53 AM -- JetInterop batch transaction stats: 150694, 149665, 150313, 150412,  
149868, 150048, 150246, and 150885.  
11/12/2008 12:53:54 AM -- Dispatching transactions ends.  
11/12/2008 12:53:54 AM -- Shutting down databases ...  
11/12/2008 12:53:56 AM -- Instance1732.1 (complete), Instance1732.2 (complete), Instance1732.3  
(complete), Instance1732.4 (complete), Instance1732.5 (complete), Instance1732.6 (complete),  
Instance1732.7 (complete), and Instance1732.8 (complete)  
11/12/2008 12:53:56 AM -- Performance logging begins (interval: 30000 ms).  
11/12/2008 12:53:56 AM -- Verifying database checksums ...  
11/12/2008 3:31:38 AM -- R: (100% processed), and S: (100% processed)  
11/12/2008 3:31:38 AM -- Performance logging ends.  
11/12/2008 3:31:38 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_56.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_56.blg) has 315 samples.  
11/12/2008 3:31:40 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_56.html](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_56.html) is saved.  
11/12/2008 3:31:40 AM -- Verifying log checksums ...  
11/12/2008 3:31:42 AM -- L:\log01 (2 logs passed), L:\log02 (2 logs passed), L:\log03 (2 logs  
passed), L:\log04 (2 logs passed), M:\log05 (2 logs passed), M:\log06 (3 logs passed), M:\log07 (2  
logs passed), and M:\log08 (3 logs passed)  
11/12/2008 3:31:42 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_17.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_17.blg) has 1465 samples.  
11/12/2008 3:31:42 AM -- Creating test report ...  
11/12/2008 3:31:49 AM -- Volume R: has 0.0186 for Avg. Disk sec/Read.  
11/12/2008 3:31:49 AM -- Volume S: has 0.0180 for Avg. Disk sec/Read.  
11/12/2008 3:31:49 AM -- Volume L: has 0.0065 for Avg. Disk sec/Write.  
11/12/2008 3:31:49 AM -- Volume L: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:31:49 AM -- Volume M: has 0.0065 for Avg. Disk sec/Write.  
11/12/2008 3:31:49 AM -- Volume M: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:31:49 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
11/12/2008 3:31:49 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
11/12/2008 3:31:49 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_17.xml](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_17.xml) has 1438 samples queried.

## Microsoft Exchange Server Jetstress Results for FOG

### Performance Test Result Report

#### Test Summary

Overall Test Result Pass

Machine Name FOG

Test Description 90,000 User ESRP Configuration

Test Start Time 11/11/2008 5:31:00 PM

Test End Time 11/12/2008 12:53:51 AM

Jetstress Version 08.02.0060.000

Ese Version 08.01.0240.005

Operating System Windows Server (R) 2008 Standard Service Pack 1 (6.0.6001.65536)

Performance Log [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_22.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_22.blg)  
[C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_51.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_51.blg)

#### Database Sizing and Throughput

Achieved I/O per Second 3103.107

Target I/O per Second 3000

Initial database size 2359569285120

Final database size 2395346698240

Database files (count) 40

#### Jetstress System Parameters

Thread count 16 (per-storage group)

Log buffers 9000

Minimum database cache 256.0 MB

Maximum database cache 2048.0 MB

Insert operations 40%

Delete operations 30%



Replace operations	5%
Read operations	25%
Lazy commits	55%

#### Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (R:)	0.019	0.007	842.406	710.446	(n/a)
Database (S:)	0.018	0.007	842.805	707.450	(n/a)
Log (L:)	0.000	0.007	0.000	292.635	6696.557
Log (M:)	0.000	0.007	0.000	293.632	6698.949

#### Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	5.270	3.578	8.761
Available MBytes	5151.007	5144.000	5334.000
Free System Page Table Entries	33557970.452	33557390.000	33558269.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	227796614.849	227586048.000	228732928.000
Pool Paged Bytes	105050871.994	104906752.000	105349120.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log 11/11/2008 5:31:00 PM -- Jetstress testing begins ...

11/11/2008 5:31:00 PM -- Prepare testing begins ...

11/11/2008 5:31:41 PM -- Attaching databases ...

11/11/2008 5:31:41 PM -- Prepare testing ends.

11/11/2008 5:31:41 PM -- Dispatching transactions begins ...

11/11/2008 5:31:41 PM -- Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)

11/11/2008 5:31:41 PM -- Database flush thresholds: (start: 20.5 MB, stop: 41.0 MB)

11/11/2008 5:32:22 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

11/11/2008 5:32:22 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

11/11/2008 5:32:24 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.

11/11/2008 5:32:24 PM -- Performance logging begins (interval: 15000 ms).

11/11/2008 5:32:24 PM -- Attaining prerequisites:  
11/11/2008 5:38:47 PM -- \MSEExchange Database(Jetstress Win)\Database Cache Size, Last:  
1936523000.0 (lower bound: 1932735000.0, upper bound: none)  
11/11/2008 11:38:48 PM -- Performance logging ends.  
11/12/2008 12:53:49 AM -- JetInterop batch transaction stats: 149608, 149994, 149979, 149978,  
149617, 149814, 150512, and 150170.  
11/12/2008 12:53:49 AM -- Dispatching transactions ends.  
11/12/2008 12:53:49 AM -- Shutting down databases ...  
11/12/2008 12:53:51 AM -- Instance3576.1 (complete), Instance3576.2 (complete), Instance3576.3  
(complete), Instance3576.4 (complete), Instance3576.5 (complete), Instance3576.6 (complete),  
Instance3576.7 (complete), and Instance3576.8 (complete)  
11/12/2008 12:53:52 AM -- Performance logging begins (interval: 30000 ms).  
11/12/2008 12:53:52 AM -- Verifying database checksums ...  
11/12/2008 3:25:10 AM -- R: (100% processed), and S: (100% processed)  
11/12/2008 3:25:10 AM -- Performance logging ends.  
11/12/2008 3:25:10 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_51.blg](#) has 302 samples.  
11/12/2008 3:25:11 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_51.html](#) is saved.  
11/12/2008 3:25:11 AM -- Verifying log checksums ...  
11/12/2008 3:25:13 AM -- L:\log01 (3 logs passed), L:\log02 (2 logs passed), L:\log03 (3 logs  
passed), L:\log04 (3 logs passed), M:\log05 (3 logs passed), M:\log06 (3 logs passed), M:\log07 (2  
logs passed), and M:\log08 (2 logs passed)  
11/12/2008 3:25:13 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_22.blg](#) has 1464 samples.  
11/12/2008 3:25:13 AM -- Creating test report ...  
11/12/2008 3:25:20 AM -- Volume R: has 0.0185 for Avg. Disk sec/Read.  
11/12/2008 3:25:20 AM -- Volume S: has 0.0181 for Avg. Disk sec/Read.  
11/12/2008 3:25:20 AM -- Volume L: has 0.0065 for Avg. Disk sec/Write.  
11/12/2008 3:25:20 AM -- Volume L: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:25:20 AM -- Volume M: has 0.0065 for Avg. Disk sec/Write.  
11/12/2008 3:25:20 AM -- Volume M: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:25:20 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
11/12/2008 3:25:20 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
11/12/2008 3:25:20 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_22.xml](#) has 1438 samples queried.

## Microsoft Exchange Server Jetstress Results for GALE

### Performance Test Result Report

#### Test Summary

Overall Test Result Pass

Machine Name GALE

Test Description 90,000 User ESRP Configuration

Test Start Time 11/11/2008 5:31:07 PM

Test End Time 11/12/2008 12:53:46 AM

Jetstress Version 08.02.0060.000

Ese Version 08.01.0240.005

Operating System Windows Server (R) 2008 Standard Service Pack 1 (6.0.6001.65536)

Performance Log [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_29.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_29.blg)  
[C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_46.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_46.blg)

#### Database Sizing and Throughput

Achieved I/O per Second 3062.177

Target I/O per Second 3000

Initial database size 2359401512960

Final database size 2393845137408

Database files (count) 40

#### Jetstress System Parameters

Thread count 16 (per-storage group)

Log buffers 9000

Minimum database cache 256.0 MB

Maximum database cache 2048.0 MB

Insert operations 40%

Delete operations 30%

Replace operations	5%
Read operations	25%
Lazy commits	55%

#### Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (R:)	0.019	0.007	832.758	704.366	(n/a)
Database (S:)	0.018	0.007	829.826	695.226	(n/a)
Log (L:)	0.000	0.007	0.000	286.984	6727.563
Log (M:)	0.000	0.007	0.000	287.097	6710.868

#### Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	5.386	2.888	8.996
Available MBytes	5150.286	5143.000	5357.000
Free System Page Table Entries	33558457.033	33557869.000	33558717.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	227876317.487	227667968.000	228835328.000
Pool Paged Bytes	105382038.860	105213952.000	105693184.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log 11/11/2008 5:31:07 PM -- Jetstress testing begins ...

11/11/2008 5:31:07 PM -- Prepare testing begins ...

11/11/2008 5:31:48 PM -- Attaching databases ...

11/11/2008 5:31:48 PM -- Prepare testing ends.

11/11/2008 5:31:48 PM -- Dispatching transactions begins ...

11/11/2008 5:31:48 PM -- Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)

11/11/2008 5:31:48 PM -- Database flush thresholds: (start: 20.5 MB, stop: 41.0 MB)

11/11/2008 5:32:29 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

11/11/2008 5:32:29 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

11/11/2008 5:32:30 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.

11/11/2008 5:32:30 PM -- Performance logging begins (interval: 15000 ms).

11/11/2008 5:32:30 PM -- Attaining prerequisites:  
11/11/2008 5:50:56 PM -- \MSEExchange Database(Jetstress Win)\Database Cache Size, Last:  
1934385000.0 (lower bound: 1932735000.0, upper bound: none)  
11/11/2008 11:50:57 PM -- Performance logging ends.  
11/12/2008 12:53:43 AM -- JetInterop batch transaction stats: 144494, 145072, 145704, 144893,  
144467, 144922, 144636, and 144111.  
11/12/2008 12:53:44 AM -- Dispatching transactions ends.  
11/12/2008 12:53:44 AM -- Shutting down databases ...  
11/12/2008 12:53:46 AM -- Instance2068.1 (complete), Instance2068.2 (complete), Instance2068.3  
(complete), Instance2068.4 (complete), Instance2068.5 (complete), Instance2068.6 (complete),  
Instance2068.7 (complete), and Instance2068.8 (complete)  
11/12/2008 12:53:46 AM -- Performance logging begins (interval: 30000 ms).  
11/12/2008 12:53:46 AM -- Verifying database checksums ...  
11/12/2008 3:27:39 AM -- R: (100% processed), and S: (100% processed)  
11/12/2008 3:27:39 AM -- Performance logging ends.  
11/12/2008 3:27:39 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBCchecksum\\_2008\\_11\\_12\\_0\\_53\\_46.blg](#) has 307 samples.  
11/12/2008 3:27:41 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBCchecksum\\_2008\\_11\\_12\\_0\\_53\\_46.html](#) is saved.  
11/12/2008 3:27:41 AM -- Verifying log checksums ...  
11/12/2008 3:27:43 AM -- L:\log01 (2 logs passed), L:\log02 (3 logs passed), L:\log03 (2 logs  
passed), L:\log04 (2 logs passed), M:\log05 (2 logs passed), M:\log06 (3 logs passed), M:\log07 (2  
logs passed), and M:\log08 (2 logs passed)  
11/12/2008 3:27:43 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_29.blg](#) has 1512 samples.  
11/12/2008 3:27:43 AM -- Creating test report ...  
11/12/2008 3:27:50 AM -- Volume R: has 0.0186 for Avg. Disk sec/Read.  
11/12/2008 3:27:50 AM -- Volume S: has 0.0182 for Avg. Disk sec/Read.  
11/12/2008 3:27:50 AM -- Volume L: has 0.0067 for Avg. Disk sec/Write.  
11/12/2008 3:27:50 AM -- Volume L: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:27:50 AM -- Volume M: has 0.0066 for Avg. Disk sec/Write.  
11/12/2008 3:27:50 AM -- Volume M: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:27:50 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
11/12/2008 3:27:50 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
11/12/2008 3:27:50 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_29.xml](#) has 1438 samples queried.

## Microsoft Exchange Server Jetstress Results for HAIL

### Performance Test Result Report

#### Test Summary

Overall Test Result      Pass

Machine Name      HAIL

Test Description      90,000 User ESRP Configuration

Test Start Time      11/11/2008 5:31:10 PM

Test End Time      11/12/2008 12:53:42 AM

Jetstress Version      08.02.0060.000

Ese Version      08.01.0240.005

Operating System      Windows Server (R) 2008 Enterprise Service Pack 1 (6.0.6001.65536)

Performance Log      [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_33.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_33.blg)  
[C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_42.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_42.blg)

#### Database Sizing and Throughput

Achieved I/O per Second 3025.978

Target I/O per Second      3000

Initial database size      2359317626880

Final database size      2396560949248

Database files (count)      40

#### Jetstress System Parameters

Thread count      16 (per-storage group)

Log buffers      9000

Minimum database cache 256.0 MB

Maximum database cache 2048.0 MB

Insert operations      40%

Delete operations      30%

Replace operations	5%
Read operations	25%
Lazy commits	55%

#### Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (R:)	0.019	0.007	792.902	721.749	(n/a)
Database (S:)	0.018	0.007	793.055	718.271	(n/a)
Log (L:)	0.000	0.007	0.000	296.946	6695.287
Log (M:)	0.000	0.007	0.000	297.285	6703.730

#### Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	8.578	5.043	13.671
Available MBytes	1325.148	1319.000	1483.000
Free System Page Table Entries	33558246.993	33558006.000	33558709.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	72752269.609	72671232.000	72826880.000
Pool Paged Bytes	100907806.421	100839424.000	101650432.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log 11/11/2008 5:31:10 PM -- Jetstress testing begins ...

11/11/2008 5:31:10 PM -- Prepare testing begins ...

11/11/2008 5:31:52 PM -- Attaching databases ...

11/11/2008 5:31:52 PM -- Prepare testing ends.

11/11/2008 5:31:52 PM -- Dispatching transactions begins ...

11/11/2008 5:31:52 PM -- Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)

11/11/2008 5:31:52 PM -- Database flush thresholds: (start: 20.5 MB, stop: 41.0 MB)

11/11/2008 5:32:33 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

11/11/2008 5:32:33 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

11/11/2008 5:32:34 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.

11/11/2008 5:32:34 PM -- Performance logging begins (interval: 15000 ms).

11/11/2008 5:32:34 PM -- Attaining prerequisites:  
11/11/2008 5:39:51 PM -- \MSEExchange Database(Jetstress Win)\Database Cache Size, Last:  
1936245000.0 (lower bound: 1932735000.0, upper bound: none)  
11/11/2008 11:39:52 PM -- Performance logging ends.  
11/12/2008 12:53:38 AM -- JetInterop batch transaction stats: 153797, 153338, 154374, 153888,  
153897, 153974, 154197, and 154043.  
11/12/2008 12:53:38 AM -- Dispatching transactions ends.  
11/12/2008 12:53:38 AM -- Shutting down databases ...  
11/12/2008 12:53:42 AM -- Instance3888.1 (complete), Instance3888.2 (complete), Instance3888.3  
(complete), Instance3888.4 (complete), Instance3888.5 (complete), Instance3888.6 (complete),  
Instance3888.7 (complete), and Instance3888.8 (complete)  
11/12/2008 12:53:42 AM -- Performance logging begins (interval: 30000 ms).  
11/12/2008 12:53:42 AM -- Verifying database checksums ...  
11/12/2008 3:34:42 AM -- R: (100% processed), and S: (100% processed)  
11/12/2008 3:34:42 AM -- Performance logging ends.  
11/12/2008 3:34:42 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_42.blg](#) has 321 samples.  
11/12/2008 3:34:44 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_42.html](#) is saved.  
11/12/2008 3:34:44 AM -- Verifying log checksums ...  
11/12/2008 3:34:49 AM -- L:\log01 (2 logs passed), L:\log02 (2 logs passed), L:\log03 (2 logs  
passed), L:\log04 (3 logs passed), M:\log05 (2 logs passed), M:\log06 (2 logs passed), M:\log07 (2  
logs passed), and M:\log08 (2 logs passed)  
11/12/2008 3:34:49 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_33.blg](#) has 1468 samples.  
11/12/2008 3:34:49 AM -- Creating test report ...  
11/12/2008 3:34:54 AM -- Volume R: has 0.0189 for Avg. Disk sec/Read.  
11/12/2008 3:34:54 AM -- Volume S: has 0.0181 for Avg. Disk sec/Read.  
11/12/2008 3:34:54 AM -- Volume L: has 0.0066 for Avg. Disk sec/Write.  
11/12/2008 3:34:54 AM -- Volume L: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:34:54 AM -- Volume M: has 0.0065 for Avg. Disk sec/Write.  
11/12/2008 3:34:54 AM -- Volume M: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:34:54 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
11/12/2008 3:34:54 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
11/12/2008 3:34:54 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_33.xml](#) has 1438 samples queried.



## Microsoft Exchange Server Jetstress Results for HURRICANE

### Performance Test Result Report

#### Test Summary

Overall Test Result      Pass

Machine Name      HURRICANE

Test Description      90,000 Users

Test Start Time      11/11/2008 5:31:14 PM

Test End Time      11/12/2008 12:53:38 AM

Jetstress Version      08.02.0060.000

Ese Version      08.01.0240.005

Operating System      Windows Server (R) 2008 Standard Service Pack 1 (6.0.6001.65536)

Performance Log      [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_38.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_38.blg)  
[C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_38.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_38.blg)

#### Database Sizing and Throughput

Achieved I/O per Second 2915.735

Target I/O per Second      3000

Initial database size      2359569285120

Final database size      2394256179200

Database files (count)      40

#### Jetstress System Parameters

Thread count      16 (per-storage group)

Log buffers      9000

Minimum database cache 256.0 MB

Maximum database cache 2048.0 MB

Insert operations      40%

Delete operations      30%

Replace operations	5%
Read operations	25%
Lazy commits	55%

#### Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (R:)	0.019	0.007	765.139	697.182	(n/a)
Database (S:)	0.018	0.007	762.813	690.601	(n/a)
Log (L:)	0.000	0.007	0.000	285.990	6681.304
Log (M:)	0.000	0.007	0.000	285.729	6656.220

#### Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	8.121	1.974	15.377
Available MBytes	1320.959	1314.000	1538.000
Free System Page Table Entries	33557657.544	33557392.000	33558326.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	127889416.539	127721472.000	128884736.000
Pool Paged Bytes	98058971.530	98058240.000	98066432.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log 11/11/2008 5:31:14 PM -- Jetstress testing begins ...

11/11/2008 5:31:14 PM -- Prepare testing begins ...

11/11/2008 5:31:56 PM -- Attaching databases ...

11/11/2008 5:31:56 PM -- Prepare testing ends.

11/11/2008 5:31:56 PM -- Dispatching transactions begins ...

11/11/2008 5:31:57 PM -- Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)

11/11/2008 5:31:57 PM -- Database flush thresholds: (start: 20.5 MB, stop: 41.0 MB)

11/11/2008 5:32:38 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

11/11/2008 5:32:38 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

11/11/2008 5:32:39 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.

11/11/2008 5:32:39 PM -- Performance logging begins (interval: 15000 ms).

11/11/2008 5:32:39 PM -- Attaining prerequisites:  
11/11/2008 5:57:52 PM -- \MSEExchange Database(Jetstress Win)\Database Cache Size, Last:  
1933312000.0 (lower bound: 1932735000.0, upper bound: none)  
11/11/2008 11:57:52 PM -- Performance logging ends.  
11/12/2008 12:53:34 AM -- JetInterop batch transaction stats: 144191, 143283, 143740, 143752,  
143692, 143095, 143897, and 143255.  
11/12/2008 12:53:35 AM -- Dispatching transactions ends.  
11/12/2008 12:53:35 AM -- Shutting down databases ...  
11/12/2008 12:53:38 AM -- Instance2748.1 (complete), Instance2748.2 (complete), Instance2748.3  
(complete), Instance2748.4 (complete), Instance2748.5 (complete), Instance2748.6 (complete),  
Instance2748.7 (complete), and Instance2748.8 (complete)  
11/12/2008 12:53:38 AM -- Performance logging begins (interval: 30000 ms).  
11/12/2008 12:53:38 AM -- Verifying database checksums ...  
11/12/2008 3:35:20 AM -- R: (100% processed), and S: (100% processed)  
11/12/2008 3:35:20 AM -- Performance logging ends.  
11/12/2008 3:35:20 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_38.blg](#) has 323 samples.  
11/12/2008 3:35:22 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_38.html](#) is saved.  
11/12/2008 3:35:22 AM -- Verifying log checksums ...  
11/12/2008 3:35:24 AM -- L:\log01 (3 logs passed), L:\log02 (2 logs passed), L:\log03 (2 logs  
passed), L:\log04 (2 logs passed), M:\log05 (3 logs passed), M:\log06 (2 logs passed), M:\log07 (3  
logs passed), and M:\log08 (2 logs passed)  
11/12/2008 3:35:24 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_38.blg](#) has 1539 samples.  
11/12/2008 3:35:24 AM -- Creating test report ...  
11/12/2008 3:35:30 AM -- Volume R: has 0.0185 for Avg. Disk sec/Read.  
11/12/2008 3:35:30 AM -- Volume S: has 0.0180 for Avg. Disk sec/Read.  
11/12/2008 3:35:30 AM -- Volume L: has 0.0067 for Avg. Disk sec/Write.  
11/12/2008 3:35:30 AM -- Volume L: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:35:30 AM -- Volume M: has 0.0067 for Avg. Disk sec/Write.  
11/12/2008 3:35:30 AM -- Volume M: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:35:30 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
11/12/2008 3:35:30 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
11/12/2008 3:35:30 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_38.xml](#) has 1438 samples queried.

## Microsoft Exchange Server Jetstress Results for ICE

### Performance Test Result Report

#### Test Summary

Overall Test Result Pass

Machine Name ICE

Test Description 90,000 Users

Test Start Time 11/11/2008 5:31:09 PM

Test End Time 11/12/2008 12:53:34 AM

Jetstress Version 08.02.0060.000

Ese Version 08.01.0240.005

Operating System Windows Server (R) 2008 Standard Service Pack 1 (6.0.6001.65536)

Performance Log [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_33.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_33.blg)  
[C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_34.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_34.blg)

#### Database Sizing and Throughput

Achieved I/O per Second 2926.254

Target I/O per Second 3000

Initial database size 2359401512960

Final database size 2394128252928

Database files (count) 40

#### Jetstress System Parameters

Thread count 16 (per-storage group)

Log buffers 9000

Minimum database cache 256.0 MB

Maximum database cache 2048.0 MB

Insert operations 40%

Delete operations 30%

Replace operations	5%
Read operations	25%
Lazy commits	55%

#### Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (R:)	0.019	0.007	767.986	697.669	(n/a)
Database (S:)	0.018	0.007	767.821	692.778	(n/a)
Log (L:)	0.000	0.007	0.000	287.099	6668.401
Log (M:)	0.000	0.007	0.000	287.792	6638.786

#### Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	8.168	1.179	15.171
Available MBytes	1335.665	1329.000	1545.000
Free System Page Table Entries	33557640.959	33557418.000	33558484.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	127563979.519	127332352.000	128536576.000
Pool Paged Bytes	97812633.707	97808384.000	97849344.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log 11/11/2008 5:31:09 PM -- Jetstress testing begins ...

11/11/2008 5:31:10 PM -- Prepare testing begins ...

11/11/2008 5:31:52 PM -- Attaching databases ...

11/11/2008 5:31:52 PM -- Prepare testing ends.

11/11/2008 5:31:52 PM -- Dispatching transactions begins ...

11/11/2008 5:31:52 PM -- Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)

11/11/2008 5:31:52 PM -- Database flush thresholds: (start: 20.5 MB, stop: 41.0 MB)

11/11/2008 5:32:33 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

11/11/2008 5:32:33 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

11/11/2008 5:32:34 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.

11/11/2008 5:32:34 PM -- Performance logging begins (interval: 15000 ms).

11/11/2008 5:32:34 PM -- Attaining prerequisites:  
11/11/2008 5:58:51 PM -- \MSEExchange Database(Jetstress Win)\Database Cache Size, Last:  
1932861000.0 (lower bound: 1932735000.0, upper bound: none)  
11/11/2008 11:58:52 PM -- Performance logging ends.  
11/12/2008 12:53:30 AM -- JetInterop batch transaction stats: 144221, 144238, 143866, 142931,  
144053, 143327, 143790, and 143821.  
11/12/2008 12:53:30 AM -- Dispatching transactions ends.  
11/12/2008 12:53:30 AM -- Shutting down databases ...  
11/12/2008 12:53:34 AM -- Instance2936.1 (complete), Instance2936.2 (complete), Instance2936.3  
(complete), Instance2936.4 (complete), Instance2936.5 (complete), Instance2936.6 (complete),  
Instance2936.7 (complete), and Instance2936.8 (complete)  
11/12/2008 12:53:34 AM -- Performance logging begins (interval: 30000 ms).  
11/12/2008 12:53:34 AM -- Verifying database checksums ...  
11/12/2008 3:40:07 AM -- R: (100% processed), and S: (100% processed)  
11/12/2008 3:40:07 AM -- Performance logging ends.  
11/12/2008 3:40:07 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_34.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_34.blg) has 332 samples.  
11/12/2008 3:40:09 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_34.html](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_34.html) is saved.  
11/12/2008 3:40:09 AM -- Verifying log checksums ...  
11/12/2008 3:40:12 AM -- L:\log01 (2 logs passed), L:\log02 (2 logs passed), L:\log03 (3 logs  
passed), L:\log04 (2 logs passed), M:\log05 (2 logs passed), M:\log06 (2 logs passed), M:\log07 (3  
logs passed), and M:\log08 (2 logs passed)  
11/12/2008 3:40:12 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_33.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_33.blg) has 1544 samples.  
11/12/2008 3:40:12 AM -- Creating test report ...  
11/12/2008 3:40:18 AM -- Volume R: has 0.0187 for Avg. Disk sec/Read.  
11/12/2008 3:40:18 AM -- Volume S: has 0.0179 for Avg. Disk sec/Read.  
11/12/2008 3:40:18 AM -- Volume L: has 0.0067 for Avg. Disk sec/Write.  
11/12/2008 3:40:18 AM -- Volume L: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:40:18 AM -- Volume M: has 0.0067 for Avg. Disk sec/Write.  
11/12/2008 3:40:18 AM -- Volume M: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:40:18 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
11/12/2008 3:40:18 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
11/12/2008 3:40:18 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_33.xml](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_33.xml) has 1438 samples queried.

## Microsoft Exchange Server Jetstress Results for MIST

### Performance Test Result Report

#### Test Summary

Overall Test Result Pass

Machine Name MIST

Test Description 90,000 User

Test Start Time 11/11/2008 5:31:04 PM

Test End Time 11/12/2008 12:53:28 AM

Jetstress Version 08.02.0060.000

Ese Version 08.01.0240.005

Operating System Windows Server (R) 2008 Standard Service Pack 1 (6.0.6001.65536)

Performance Log [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_27.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_27.blg)  
[C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_28.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_28.blg)

#### Database Sizing and Throughput

Achieved I/O per Second 3256.167

Target I/O per Second 3000

Initial database size 2359401512960

Final database size 2396550463488

Database files (count) 40

#### Jetstress System Parameters

Thread count 16 (per-storage group)

Log buffers 9000

Minimum database cache 256.0 MB

Maximum database cache 2048.0 MB

Insert operations 40%

Delete operations 30%

Replace operations	5%
Read operations	25%
Lazy commits	55%

#### Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (R:)	0.018	0.007	883.824	748.658	(n/a)
Database (S:)	0.018	0.007	882.061	741.623	(n/a)
Log (L:)	0.000	0.007	0.000	302.078	6784.649
Log (M:)	0.000	0.007	0.000	302.257	6748.228

#### Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	5.594	3.282	9.987
Available MBytes	5152.987	5127.000	5323.000
Free System Page Table Entries	33557919.943	33557336.000	33558206.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	228057033.918	227885056.000	229011456.000
Pool Paged Bytes	104261044.214	103940096.000	133296128.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log 11/11/2008 5:31:04 PM -- Jetstress testing begins ...

11/11/2008 5:31:04 PM -- Prepare testing begins ...

11/11/2008 5:31:46 PM -- Attaching databases ...

11/11/2008 5:31:46 PM -- Prepare testing ends.

11/11/2008 5:31:46 PM -- Dispatching transactions begins ...

11/11/2008 5:31:46 PM -- Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)

11/11/2008 5:31:46 PM -- Database flush thresholds: (start: 20.5 MB, stop: 41.0 MB)

11/11/2008 5:32:27 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

11/11/2008 5:32:27 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

11/11/2008 5:32:29 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.

11/11/2008 5:32:29 PM -- Performance logging begins (interval: 15000 ms).



11/11/2008 5:32:29 PM -- Attaining prerequisites:  
11/11/2008 5:38:37 PM -- \MSEExchange Database(Jetstress Win)\Database Cache Size, Last:  
1938645000.0 (lower bound: 1932735000.0, upper bound: none)  
11/11/2008 11:38:38 PM -- Performance logging ends.  
11/12/2008 12:53:26 AM -- JetInterop batch transaction stats: 156202, 156498, 156839, 157030,  
156149, 156712, 156865, and 156113.  
11/12/2008 12:53:26 AM -- Dispatching transactions ends.  
11/12/2008 12:53:26 AM -- Shutting down databases ...  
11/12/2008 12:53:28 AM -- Instance1296.1 (complete), Instance1296.2 (complete), Instance1296.3  
(complete), Instance1296.4 (complete), Instance1296.5 (complete), Instance1296.6 (complete),  
Instance1296.7 (complete), and Instance1296.8 (complete)  
11/12/2008 12:53:28 AM -- Performance logging begins (interval: 30000 ms).  
11/12/2008 12:53:28 AM -- Verifying database checksums ...  
11/12/2008 3:28:12 AM -- R: (100% processed), and S: (100% processed)  
11/12/2008 3:28:13 AM -- Performance logging ends.  
11/12/2008 3:28:13 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_28.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_28.blg) has 309 samples.  
11/12/2008 3:28:14 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_28.html](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_28.html) is saved.  
11/12/2008 3:28:14 AM -- Verifying log checksums ...  
11/12/2008 3:28:16 AM -- L:\log01 (2 logs passed), L:\log02 (2 logs passed), L:\log03 (2 logs  
passed), L:\log04 (3 logs passed), M:\log05 (2 logs passed), M:\log06 (3 logs passed), M:\log07 (3  
logs passed), and M:\log08 (2 logs passed)  
11/12/2008 3:28:16 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_27.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_27.blg) has 1463 samples.  
11/12/2008 3:28:16 AM -- Creating test report ...  
11/12/2008 3:28:23 AM -- Volume R: has 0.0179 for Avg. Disk sec/Read.  
11/12/2008 3:28:23 AM -- Volume S: has 0.0175 for Avg. Disk sec/Read.  
11/12/2008 3:28:23 AM -- Volume L: has 0.0065 for Avg. Disk sec/Write.  
11/12/2008 3:28:23 AM -- Volume L: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:28:23 AM -- Volume M: has 0.0065 for Avg. Disk sec/Write.  
11/12/2008 3:28:23 AM -- Volume M: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:28:23 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
11/12/2008 3:28:23 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
11/12/2008 3:28:23 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_27.xml](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_27.xml) has 1438 samples queried.

## Microsoft Exchange Server Jetstress Results for RAIN

### Performance Test Result Report

#### Test Summary

Overall Test Result Pass  
Machine Name RAIN  
Test Description 90,000 Users  
Test Start Time 11/11/2008 5:31:00 PM  
Test End Time 11/12/2008 12:53:22 AM  
Jetstress Version 08.02.0060.000  
Ese Version 08.01.0240.005  
Operating System Windows Server (R) 2008 Standard Service Pack 1 (6.0.6001.65536)

Performance Log [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_23.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_23.blg)  
[C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_22.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_22.blg)

#### Database Sizing and Throughput

Achieved I/O per Second 3110.631  
Target I/O per Second 3000  
Initial database size 2359401512960  
Final database size 2397448044544  
Database files (count) 40

#### Jetstress System Parameters

Thread count 16 (per-storage group)  
Log buffers 9000  
Minimum database cache 256.0 MB  
Maximum database cache 2048.0 MB  
Insert operations 40%  
Delete operations 30%

Replace operations	5%
Read operations	25%
Lazy commits	55%

#### Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (R:)	0.018	0.007	815.921	741.288	(n/a)
Database (S:)	0.018	0.007	816.142	737.280	(n/a)
Log (L:)	0.000	0.007	0.000	305.241	6691.089
Log (M:)	0.000	0.007	0.000	304.978	6688.138

#### Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	8.624	5.804	15.179
Available MBytes	1304.732	1300.000	1512.000
Free System Page Table Entries	33558664.366	33558365.000	33559077.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	127102116.381	126873600.000	127991808.000
Pool Paged Bytes	97925437.376	97898496.000	97968128.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log 11/11/2008 5:30:59 PM -- Jetstress testing begins ...

11/11/2008 5:31:00 PM -- Prepare testing begins ...

11/11/2008 5:31:42 PM -- Attaching databases ...

11/11/2008 5:31:42 PM -- Prepare testing ends.

11/11/2008 5:31:42 PM -- Dispatching transactions begins ...

11/11/2008 5:31:42 PM -- Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)

11/11/2008 5:31:42 PM -- Database flush thresholds: (start: 20.5 MB, stop: 41.0 MB)

11/11/2008 5:32:23 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

11/11/2008 5:32:23 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

11/11/2008 5:32:24 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.

11/11/2008 5:32:24 PM -- Performance logging begins (interval: 15000 ms).

11/11/2008 5:32:24 PM -- Attaining prerequisites:  
11/11/2008 5:39:21 PM -- \MSEExchange Database(Jetstress Win)\Database Cache Size, Last:  
1935925000.0 (lower bound: 1932735000.0, upper bound: none)  
11/11/2008 11:39:22 PM -- Performance logging ends.  
11/12/2008 12:53:18 AM -- JetInterop batch transaction stats: 157801, 158382, 157991, 157703,  
157873, 158629, 157886, and 158101.  
11/12/2008 12:53:19 AM -- Dispatching transactions ends.  
11/12/2008 12:53:19 AM -- Shutting down databases ...  
11/12/2008 12:53:22 AM -- Instance3904.1 (complete), Instance3904.2 (complete), Instance3904.3  
(complete), Instance3904.4 (complete), Instance3904.5 (complete), Instance3904.6 (complete),  
Instance3904.7 (complete), and Instance3904.8 (complete)  
11/12/2008 12:53:22 AM -- Performance logging begins (interval: 30000 ms).  
11/12/2008 12:53:22 AM -- Verifying database checksums ...  
11/12/2008 3:40:11 AM -- R: (100% processed), and S: (100% processed)  
11/12/2008 3:40:12 AM -- Performance logging ends.  
11/12/2008 3:40:12 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_22.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_22.blg) has 333 samples.  
11/12/2008 3:40:13 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_22.html](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_22.html) is saved.  
11/12/2008 3:40:13 AM -- Verifying log checksums ...  
11/12/2008 3:40:16 AM -- L:\log01 (2 logs passed), L:\log02 (2 logs passed), L:\log03 (3 logs  
passed), L:\log04 (2 logs passed), M:\log05 (3 logs passed), M:\log06 (3 logs passed), M:\log07 (3  
logs passed), and M:\log08 (2 logs passed)  
11/12/2008 3:40:16 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_23.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_23.blg) has 1466 samples.  
11/12/2008 3:40:16 AM -- Creating test report ...  
11/12/2008 3:40:22 AM -- Volume R: has 0.0184 for Avg. Disk sec/Read.  
11/12/2008 3:40:22 AM -- Volume S: has 0.0177 for Avg. Disk sec/Read.  
11/12/2008 3:40:22 AM -- Volume L: has 0.0065 for Avg. Disk sec/Write.  
11/12/2008 3:40:22 AM -- Volume L: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:40:22 AM -- Volume M: has 0.0065 for Avg. Disk sec/Write.  
11/12/2008 3:40:22 AM -- Volume M: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:40:22 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
11/12/2008 3:40:22 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
11/12/2008 3:40:22 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_23.xml](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_23.xml) has 1438 samples queried.

## Microsoft Exchange Server Jetstress Results for SNOW

### Performance Test Result Report

#### Test Summary

Overall Test Result Pass

Machine Name SNOW

Test Description 90,000 Users

Test Start Time 11/11/2008 5:30:55 PM

Test End Time 11/12/2008 12:53:15 AM

Jetstress Version 08.02.0060.000

Ese Version 08.01.0240.005

Operating System Windows Server (R) 2008 Standard Service Pack 1 (6.0.6001.65536)

Performance Log [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_19.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_19.blg)  
[C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_15.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_15.blg)

#### Database Sizing and Throughput

Achieved I/O per Second 2925.857

Target I/O per Second 3000

Initial database size 2359401512960

Final database size 2394174390272

Database files (count) 40

#### Jetstress System Parameters

Thread count 16 (per-storage group)

Log buffers 9000

Minimum database cache 256.0 MB

Maximum database cache 2048.0 MB

Insert operations 40%

Delete operations 30%

Replace operations	5%
Read operations	25%
Lazy commits	55%

#### Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (R:)	0.019	0.007	768.616	697.474	(n/a)
Database (S:)	0.018	0.007	766.898	692.869	(n/a)
Log (L:)	0.000	0.007	0.000	285.416	6703.353
Log (M:)	0.000	0.007	0.000	285.922	6671.651

#### Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	8.167	1.197	11.280
Available MBytes	1285.108	1278.000	1502.000
Free System Page Table Entries	33557636.685	33557346.000	33558481.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	127269986.913	127119360.000	127340544.000
Pool Paged Bytes	104469533.176	104001536.000	104931328.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log 11/11/2008 5:30:55 PM -- Jetstress testing begins ...

11/11/2008 5:30:55 PM -- Prepare testing begins ...

11/11/2008 5:31:37 PM -- Attaching databases ...

11/11/2008 5:31:37 PM -- Prepare testing ends.

11/11/2008 5:31:37 PM -- Dispatching transactions begins ...

11/11/2008 5:31:37 PM -- Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)

11/11/2008 5:31:37 PM -- Database flush thresholds: (start: 20.5 MB, stop: 41.0 MB)

11/11/2008 5:32:18 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

11/11/2008 5:32:18 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

11/11/2008 5:32:19 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.

11/11/2008 5:32:19 PM -- Performance logging begins (interval: 15000 ms).

11/11/2008 5:32:19 PM -- Attaining prerequisites:  
11/11/2008 5:59:14 PM -- \MSEExchange Database(Jetstress Win)\Database Cache Size, Last:  
1932788000.0 (lower bound: 1932735000.0, upper bound: none)  
11/11/2008 11:59:14 PM -- Performance logging ends.  
11/12/2008 12:53:12 AM -- JetInterop batch transaction stats: 143226, 143841, 142933, 143065,  
143023, 142691, 142604, and 142993.  
11/12/2008 12:53:12 AM -- Dispatching transactions ends.  
11/12/2008 12:53:12 AM -- Shutting down databases ...  
11/12/2008 12:53:15 AM -- Instance3236.1 (complete), Instance3236.2 (complete), Instance3236.3  
(complete), Instance3236.4 (complete), Instance3236.5 (complete), Instance3236.6 (complete),  
Instance3236.7 (complete), and Instance3236.8 (complete)  
11/12/2008 12:53:16 AM -- Performance logging begins (interval: 30000 ms).  
11/12/2008 12:53:16 AM -- Verifying database checksums ...  
11/12/2008 3:44:23 AM -- R: (100% processed), and S: (100% processed)  
11/12/2008 3:44:23 AM -- Performance logging ends.  
11/12/2008 3:44:23 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_15.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_15.blg) has 342 samples.  
11/12/2008 3:44:25 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_15.html](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_15.html) is saved.  
11/12/2008 3:44:25 AM -- Verifying log checksums ...  
11/12/2008 3:44:27 AM -- L:\log01 (2 logs passed), L:\log02 (2 logs passed), L:\log03 (2 logs  
passed), L:\log04 (3 logs passed), M:\log05 (2 logs passed), M:\log06 (3 logs passed), M:\log07 (2  
logs passed), and M:\log08 (2 logs passed)  
11/12/2008 3:44:27 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_19.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_19.blg) has 1546 samples.  
11/12/2008 3:44:27 AM -- Creating test report ...  
11/12/2008 3:44:33 AM -- Volume R: has 0.0187 for Avg. Disk sec/Read.  
11/12/2008 3:44:33 AM -- Volume S: has 0.0180 for Avg. Disk sec/Read.  
11/12/2008 3:44:33 AM -- Volume L: has 0.0067 for Avg. Disk sec/Write.  
11/12/2008 3:44:33 AM -- Volume L: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:44:33 AM -- Volume M: has 0.0067 for Avg. Disk sec/Write.  
11/12/2008 3:44:33 AM -- Volume M: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:44:33 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
11/12/2008 3:44:33 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
11/12/2008 3:44:33 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_19.xml](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_19.xml) has 1438 samples queried.

## Microsoft Exchange Server Jetstress Results for Typhoon

### Performance Test Result Report

#### Test Summary

Overall Test Result      Pass

Machine Name      TYPHOON

Test Description      90,000 Users

Test Start Time      11/11/2008 5:30:52 PM

Test End Time      11/12/2008 12:53:05 AM

Jetstress Version      08.02.0060.000

Ese Version      08.01.0240.005

Operating System      Windows Server (R) 2008 Standard Service Pack 1 (6.0.6001.65536)

Performance Log      [C:\Program Files\Exchange Jetstress\ESRP Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_15.blg](C:\Program Files\Exchange Jetstress\ESRP Results\Performance_2008_11_11_17_32_15.blg)  
[C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_5.blg](C:\Program Files\Exchange Jetstress\ESRP Results\DBChecksum_2008_11_12_0_53_5.blg)

#### Database Sizing and Throughput

Achieved I/O per Second      3100.362

Target I/O per Second      3000

Initial database size      2359401512960

Final database size      2394463797248

Database files (count)      40

#### Jetstress System Parameters

Thread count      16 (per-storage group)

Log buffers      9000

Minimum database cache      256.0 MB

Maximum database cache      2048.0 MB

Insert operations      40%

Delete operations      30%



Replace operations	5%
Read operations	25%
Lazy commits	55%

#### Disk Subsystem Performance

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Write
Database (R:)	0.018	0.007	840.856	708.448	(n/a)
Database (S:)	0.018	0.007	844.320	706.738	(n/a)
Log (L:)	0.000	0.007	0.000	289.055	6752.691
Log (M:)	0.000	0.007	0.000	289.846	6757.928

#### Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	5.338	2.376	8.907
Available MBytes	5142.366	5137.000	5356.000
Free System Page Table Entries	33558058.474	33557793.000	33558744.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	228182418.769	227909632.000	229097472.000
Pool Paged Bytes	106037714.813	105893888.000	116940800.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log 11/11/2008 5:30:52 PM -- Jetstress testing begins ...

11/11/2008 5:30:52 PM -- Prepare testing begins ...

11/11/2008 5:31:34 PM -- Attaching databases ...

11/11/2008 5:31:34 PM -- Prepare testing ends.

11/11/2008 5:31:34 PM -- Dispatching transactions begins ...

11/11/2008 5:31:34 PM -- Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)

11/11/2008 5:31:34 PM -- Database flush thresholds: (start: 20.5 MB, stop: 41.0 MB)

11/11/2008 5:32:15 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).

11/11/2008 5:32:15 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).

11/11/2008 5:32:17 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 30%, Replaces 5%, Reads 25%, Lazy Commits 55%.

11/11/2008 5:32:17 PM -- Performance logging begins (interval: 15000 ms).

11/11/2008 5:32:17 PM -- Attaining prerequisites:  
11/11/2008 5:49:45 PM -- \MSEExchange Database(Jetstress Win)\Database Cache Size, Last:  
1935032000.0 (lower bound: 1932735000.0, upper bound: none)  
11/11/2008 11:49:46 PM -- Performance logging ends.  
11/12/2008 12:53:02 AM -- JetInterop batch transaction stats: 145929, 146365, 145861, 146216,  
145855, 146755, 146845, and 146499.  
11/12/2008 12:53:03 AM -- Dispatching transactions ends.  
11/12/2008 12:53:03 AM -- Shutting down databases ...  
11/12/2008 12:53:05 AM -- Instance4004.1 (complete), Instance4004.2 (complete), Instance4004.3  
(complete), Instance4004.4 (complete), Instance4004.5 (complete), Instance4004.6 (complete),  
Instance4004.7 (complete), and Instance4004.8 (complete)  
11/12/2008 12:53:05 AM -- Performance logging begins (interval: 30000 ms).  
11/12/2008 12:53:05 AM -- Verifying database checksums ...  
11/12/2008 3:25:43 AM -- R: (100% processed), and S: (100% processed)  
11/12/2008 3:25:43 AM -- Performance logging ends.  
11/12/2008 3:25:43 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_5.blg](#) has 305 samples.  
11/12/2008 3:25:45 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\DBChecksum\\_2008\\_11\\_12\\_0\\_53\\_5.html](#) is saved.  
11/12/2008 3:25:45 AM -- Verifying log checksums ...  
11/12/2008 3:25:47 AM -- L:\log01 (2 logs passed), L:\log02 (2 logs passed), L:\log03 (3 logs  
passed), L:\log04 (3 logs passed), M:\log05 (2 logs passed), M:\log06 (2 logs passed), M:\log07 (2  
logs passed), and M:\log08 (2 logs passed)  
11/12/2008 3:25:47 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_15.blg](#) has 1508 samples.  
11/12/2008 3:25:47 AM -- Creating test report ...  
11/12/2008 3:25:53 AM -- Volume R: has 0.0183 for Avg. Disk sec/Read.  
11/12/2008 3:25:53 AM -- Volume S: has 0.0179 for Avg. Disk sec/Read.  
11/12/2008 3:25:53 AM -- Volume L: has 0.0066 for Avg. Disk sec/Write.  
11/12/2008 3:25:53 AM -- Volume L: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:25:53 AM -- Volume M: has 0.0066 for Avg. Disk sec/Write.  
11/12/2008 3:25:53 AM -- Volume M: has 0.0000 for Avg. Disk sec/Read.  
11/12/2008 3:25:53 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.  
11/12/2008 3:25:53 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.  
11/12/2008 3:25:53 AM -- [C:\Program Files\Exchange Jetstress\ESRP  
Results\Performance\\_2008\\_11\\_11\\_17\\_32\\_15.xml](#) has 1438 samples queried.