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White Paper

**Xiotech Emprise 5000
10,000 Mailbox
Storage Solution for
Microsoft Exchange Server 2007**

Technical Marketing
Xiotech Corporation

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Overview

This document provides information on Xiotech's storage solution for Microsoft Exchange Server, based the *Microsoft Exchange Solution Reviewed Program (ESRP) – Storage program**.

*The *ESRP – Storage* program was developed by Microsoft Corporation to provide a common storage testing framework for vendors to provide information on its storage solutions for Microsoft Exchange Server software.

For more details on the Microsoft ESRP – Storage program, please click <http://www.microsoft.com/technet/prodtechnol/exchange/2007/esrp.mspx>

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

Features

If you are one of the millions of Microsoft® Exchange Server users, or are looking to migrate soon, you know how critical a messaging platform is to your organization's ability to do business in today's 24x7 world. Uninterrupted and responsive access to email and other messaging data is essential—downtime can mean millions of dollars of lost revenue and productivity.

Xiotech's Emprise™ 5000 storage system, built on patented Intelligent Storage Element (ISE™) technology, is a perfect storage solution for your Exchange environment. It delivers high performance, high availability, linear scalability, and lowest total cost of ownership (TCO) on the market.

There have been and continue to be many discussions around whether Exchange should be deployed in a centralized storage environment (SAN) or de-centralized storage environment (DAS). This solution is intended to show a low cost, low-complexity design that simplifies your deployment and management regardless which direction you chose. It also provides unsurpassed performance in a form-factor that occupies less physical space compared to traditional storage solutions. The ability to support 10,000 Exchange users with only two DataPacs (total of 20 disk drives) in under 6 inches of vertical rack space is unheard of in today's industry.

Emprise 5000 Exchange (DAS) Solution

The Emprise 5000 is a flexible storage building block. Attach an ISE directly to an Exchange Server or many Exchange servers via a network. The beauty of a dedicated DAS (Direct Attached Storage) system for Exchange data is that it enables faster response to requests because it eliminates potential I/O contention with other applications.

Emprise 5000 is architected to maximize performance. Unlike traditional SAN (Storage Area Network) systems, Emprise 5000 eliminates storage controllers on the front-end and switches on the back-end. Resulting in a purebred performance solution without bottlenecks found in other storage architectures.

Because Emprise 5000 utilizes sealed DataPacs rather than individual disk drives, each system provides the processing power of 20 to 40 disk drives in just 5.25 inches of vertical rack space (3 rack units). These DataPacs are available in a variety of configurations to meet the specific needs of your Exchange Server environment.

As your storage requirements grow, know that ISE performance grows with you. Performance scales linearly along with capacity. As you add Emprise 5000 systems you increase performance (IOPS, MBps, Gbps) by 2x, 5x, 10x, and beyond.

Simplified Design supports High Availability

With a simpler design than a SAN, DAS has fewer components that can potentially fail. When combined with the high-availability and native replication capabilities of Exchange Server 2007, ISE can actually provide better availability than a traditional feature burdened SAN at a much reduced cost. However, DAS solutions are not all created equal.

The ISE technology on which Emprise 5000 is built delivers unmatched reliability—from its dual Managed Reliability Controllers to improved vibration and cooling. Its sealed DataPacs also eliminate the need for you to ever touch another disk drive. Preventive capabilities eliminate most disk failures, and the industry's only true self-healing technology fixes disks, in place, with no downtime or end user interaction. This is a patented feature and only offered by Xiotech and ISE.

Thanks to this tremendous reliability, Xiotech provides an **industry-exclusive five-year hardware warranty** with each Emprise 5000 system.

To enhance maximum availability, Xiotech supports Microsoft's Multi-Path IO (MPIO) for added path failover. Multipathing solutions use redundant components—adapters and cables to create logical "paths" between the server and the storage device. In the event one or more of these components fails, MPIO uses an alternate path for I/O so applications can still access their data.

Solution Description

The Exchange 2007 solution discussed in this ESRP solution guide is designed to host a medium to large Exchange environment with up to 10,000 mailboxes and is capable of supporting heavy user profiles of 0.32 IOPs.

For this solution, Xiotech tested the Emprise 5000 with two active/active internal Managed Reliability Controllers (MRCs) and two ISE 4.8TB/15.1 DataPacs. The Exchange 2007 server used was an HP ProLiant DL380 G5 with 4GB RAM and a QLogic QLE2462 FC HBA. The RAID 10 database and log LUNs were evenly striped across both DataPacs where one database was on one DataPac while its corresponding logs were on the other. See figure 2. For more information on the Emprise 5000 ISE see: http://xiotech.com/Products-and-Services_ISE_Emprise-5000.aspx

Solution Diagram

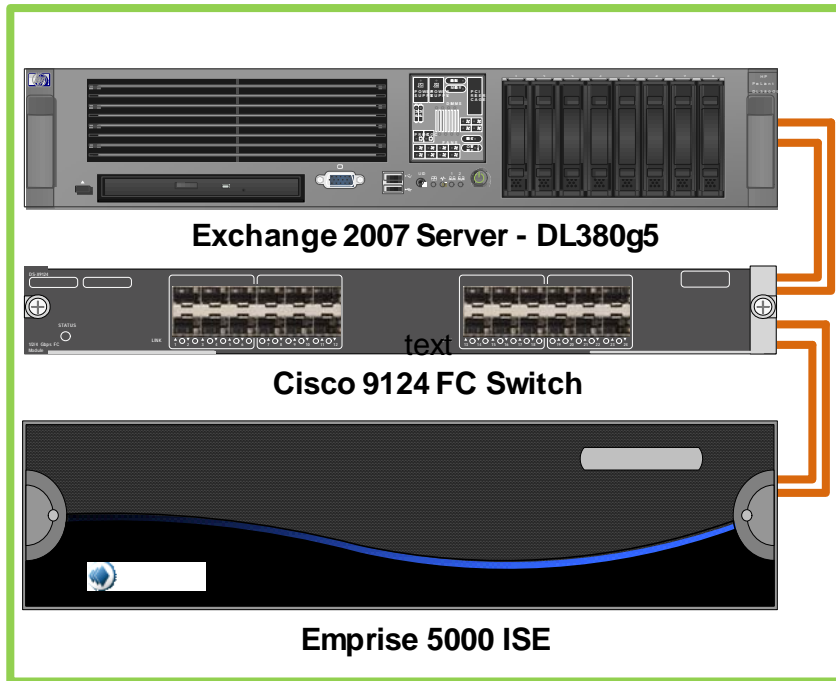


Fig. 1 – Exchange 2007 Solution Diagram

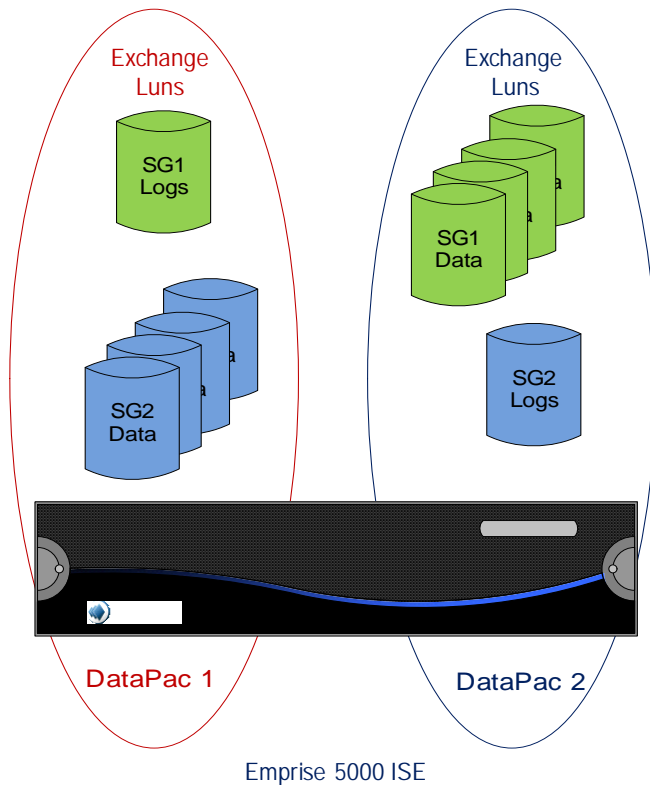


Fig. 2 – Distribution of LUNs over the DataPacs

Figure 2 diagram depicts how the Exchange R10 LUNs are evenly distributed across DataPacs so that the storage group database and the corresponding LUN are on separate DataPacs. i.e. SG1 database on DataPac 2 and SG1 transaction logs on DataPac 1.

Windows Qualifications

Emprise 5000

<http://www.windowsservercatalog.com/item.aspx?idItem=7c961b44-a6ab-bbe0-db5e-aaaae6e9d8db&bCatID=1282>

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

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

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

For more information on identifying and addressing performance bottlenecks in an Exchange system, please refer to Microsoft's Troubleshooting Microsoft Exchange Server Performance, available at <http://go.microsoft.com/fwlink/?LinkId=23454>.

Targeted Customer Profile

The Emprise 5000 is designed to meet the performance, scalability and reliability requirements of small, medium and enterprise Exchange 2007 deployments. This solution fits all three classifications customer size categories but more closely simulates a medium to large sized customer. This ESRP solution is capable of sustaining 10,000 mailbox users on a single Microsoft Exchange 2007 Server with an IO profile of 0.32 IOPs/mailbox, which is classified as a heavy Exchange user.

Tested Deployment

The following tables summarize the testing environment:

Simulated Exchange Configuration:

Number of Exchange mailboxes simulated	10,000
Number of hosts	1
Number of mailboxes/host	10,000
Number of storage groups/host	8
Number of mailbox stores/storage group	5
Number of mailboxes/mailbox store	250
Number of mailbox store LUNs/storage group	3
Simulated profile: I/O's per second per mailbox (IOPS, include 20% headroom)	0.32 IOPS/Mailbox
Database LUN size	100 GB
Log LUN size	20 GB
Backup LUN size/storage group	N/A
Total database size for performance testing	3,720.7 GB
% storage capacity used by Exchange database**	93.0 % Utilized [3,720.7 / 4000]

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

Primary Storage Hardware

Storage Connectivity (Fiber Channel, SAS, SATA, iSCSI)	Fibre Channel
Storage model and OS/firmware revision	Emprise 5000 FW 1.5.1
Storage cache	1 GB
Number of storage controllers	2
Number of storage ports	2
Maximum bandwidth of storage connectivity to host	8 GB, 2x4 GB
Switch type/model/firmware revision	Cisco 9124 FC Switch (4.1.3a)
HBA model and firmware	QLogic QLE2462 (StorPort 9.1.8.16)
Number of HBA's/host	1 Dual-Port QLogic HBA
Host server type	Dual Intel Xeon E5410 (2.33Ghz Quad Core Processors) 4 GB RAM
Total number of disks tested in solution	2 x 4.8TB/15.1 DataPacs (Containing 20 disks in total)
Maximum number of spindles can be hosted in the storage	2 x DataPacs (Containing 40 spindles in total)

Primary Storage Software

HBA driver	StorPort FC HBA Driver 9.1.8.6
HBA QueueTarget Setting	256
HBA QueueDepth Setting	256
Multi-Pathing	Yes – Windows 2008 R2 native multipathing
Host OS	Microsoft Windows Server 2008 R2, Enterprise 64-bit x64
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	Fibre Channel 15K RPM, FW Rev. 100 (10 disks per DataPac)
Raw capacity per disk (GB)	4,352 GB per DataPac
Number of physical disks in test	2 x ISE 4.8TB/15.1 DataPacs (Containing 20 disks in total)
Total raw storage capacity (GB)	8,704 GB (excludes spare disk space)
Disk slice size (GB)	N/A
Number of slices per LUN or number of disks per LUN	N/A
Raid level	RAID 1 (Storage Level)
Total formatted capacity	4,000 GB
Storage capacity utilization	91.9% -- [8,000 Raid 10 / 8,704 Raw]
Database capacity utilization	85.5% -- [7,441.4 Raid 10 / 8,704 Raw]

Primary Storage Disk Configuration (Transactional Log Disks)

Disk type, speed and firmware revision	ISE 4.8TB/15.1 DataPac [contains 10 Fibre Channel 15K RPM, FW Rev. 100 disks]
Raw capacity per disk (GB)	4,352 GB per DataPac
Number of Spindles in test	2 x ISE 4.8TB/15.1 DataPacs (Containing 20 disks in total)
total raw storage capacity (GB)	8,704 GB (excludes spare disk space)
Disk slice size (GB)	N/A
Number of slices per LUN or number of disks per LUN	N/A
Raid level	RAID 10 (Storage Level)
Total formatted capacity	160 GB [8 x 20 GB LUNs]

Best Practices

Xiotech recommends that organizations run extensive performance monitoring of their Exchange environments in order to determine the optimal number of servers, storage groups, and message stores.

Microsoft publishes comprehensive material on sizing Exchange environments. Click <http://technet.microsoft.com/en-us/exchange/bb330841.aspx> to access the site on planning, installation and best practices for Exchange 2007. The articles contain very good information that will assist with the Exchange Server deployment.

When designing your organization's Exchange storage environment, it is important to determine the number of Storage Groups and Mailbox Stores that best fit your messaging needs. Factors that weigh into this decision include the number of email users in the organization, organizational design/office locations, maximum size of user mailboxes, and backup and restore requirements/service level agreements (SLAs).

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

As a best practice, Xiotech recommends following Microsoft's Exchange 2007 best practices on storage design.

Please visit [http://technet.microsoft.com/en-us/library/bb124558\(EXCHG.80\).aspx](http://technet.microsoft.com/en-us/library/bb124558(EXCHG.80).aspx)

For Exchange 2007, it is a best practice to have the databases and transactional logs separated from each other on separate spindles. With traditional storage vendors, this still holds true today. However, with the Emprise 5000 ISE technology, the Exchange LUNs are virtualized across DataPacs and not individual spindles. The ISE DataPacs consists of transaction logs and databases that can coexist on the same DataPac but as a Xiotech best practice, we recommend the database and logs be placed on separate DataPacs within a Storage Group.

When deploying an Exchange environment it is always a best practice to deploy an environment that is resilient and redundant. The foundation of any environment starts with the storage. With the Emprise 5000 being fully redundant, and having linear scalability and performance, the next layer to address is the network. It is recommended to have redundant fibre channel and Ethernet switches to ensure maximum uptime for the Exchange clients. While this solution focused on the raw performance of Exchange 2007 with the Emprise 5000, having two Exchange servers with 4,000 users each will add a layer of resiliency at the server level as well.

Xiotech's Emprise 5000 patented technology allows the DataPacs to be filled beyond traditional storage arrays. Running Exchange 2007 on DataPacs that are 90% full will perform as efficiently as if they were only 25% full.

The transaction logs are critical to the performance of Exchange. With Exchange, the writes are written to the transaction logs first and then committed to the message store database. It is important that the transaction log LUNs are created with RAID 1 +0 and placed on faster DataPacs with the least write latency and higher rotational speeds.

Sizing Exchange implementations is important to the overall success of deployment. The Microsoft Exchange team created a storage calculator to help facilitate the storage layout. The Exchange 2007 Storage Calculator guides Exchange administrators through the steps of determining optimal LUN layout by walking them through several section sections where they input their business profile. The outcome of the calculator will help layout the optimal LUN requirements for the storage, backups and replication.

The Microsoft Storage Calculator can be found on The Microsoft Exchange Team's Blog at <http://msexchangeteam.com/archive/2007/01/15/432207.aspx>

Microsoft also created a Microsoft Exchange Best Practices Analyzer for administrators who want to determine the overall health of their Exchange Servers and topology. The Exchange Best Practices Analyzer programmatically collects settings and values from data repositories such as Active Directory, registry, metabase and performance monitor. Once collected, a set of comprehensive 'best practice' rules are applied to the topology.

Administrators running this tool will get a detailed report listing the recommendations that can be made to the environment to achieve greater performance, scalability and uptime.

The Microsoft Exchange Best Practice Analyzer is located at the following download: <http://www.microsoft.com/downloads/details.aspx?familyid=dbab201f-4bee-4943-ac22-e2ddb258df3&displaylang=en>

Backup strategy

This section is not applicable to this ESRP solution.

Contact for Additional Information

For more information regarding XioTech storage solutions for Microsoft Exchange, please visit: <http://xioTech.com/ms-exchange.php>

Test Result Summary

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

Reliability

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

There were no errors reported in the event log for this test.
No errors were reported in the DBChecksum report

Primary Storage Performance Results

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

Individual Server Metrics:

The sum of I/O's across Storage Groups and the average latency across all Storage Groups on a per server basis. This test was run on only one server.

Database I/O	
Database Disks Transfers/sec	3,303.9
Database Disks Reads/sec	1,893.5
Database Disks Writes/sec	1,410.4
Average Database Disk Read Latency (ms)	14 ms
Average Database Disk Write Latency (ms)	1 ms
Transaction Log I/O	
Log Disks Writes/sec	820.2
Average Log Disk Write Latency (ms)	1 ms

Aggregate Performance across all servers Metrics:

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

Database I/O	
Database Disks Transfers/sec	3,303.9
Database Disks Reads/sec	1,893.5
Database Disks Writes/sec	1,410.4
Average Database Disk Read Latency (ms)	14 ms
Average Database Disk Write Latency (ms)	1 ms
Transaction Log I/O	
Log Disks Writes/sec	820.2
Average Log Disk Write Latency (ms)	1 ms

Test Notes

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

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

Conclusion

Emprise 5000 delivers outstanding performance in large Exchange environments. And it provides unmatched reliability, easy operation, and low total cost of ownership (TCO)—making it a compelling alternative to more expensive storage area network (SANs).

To verify Emprise 5000 performance under various environment sizes, Xiotech conducted a series of tests. The results were impressive. Emprise 5000 delivered exceptional performance in sustaining 10,000 mailbox users on a single Microsoft Exchange 2007 Server with very heavy Exchange users.

Contact Information

Contact Xiotech today to learn how Emprise 5000 DAS with Microsoft Exchange Server 2007 can give you the best performance and reliability—with the lowest TCO.

United States: 1-866-472-6764

www.xiootech.com

Appendix A: Test Reports

Stress Test Result Report

Test Summary

Overall Test Result	Pass
Machine Name	SHORT
Test Description	10k users, 8 storage groups, 5 db per group, 4.8 TB / 15.1 datapacs 360 MB @ .32 IOPS 24 hour test, Raid 1 for Data and Logs
Test Start Time	3/10/2010 9:58:58 PM
Test End Time	3/11/2010 10:18:13 PM
Jetstress Version	08.02.0060.000
Ese Version	08.01.0240.005
Operating System	Windows Server 2008 R2 Enterprise (6.1.7600.0)
Performance Log	\\ducati\edrive\James\PerfWork\PerfRuns\Jetstress\WorkFolder\Results\short\Stress_2010_3_10_22_0_32.blg \\ducati\edrive\James\PerfWork\PerfRuns\Jetstress\WorkFolder\Results\short\DBChecksum_2010_3_11_22_18_13.blg

Database Sizing and Throughput

Achieved I/O per Second	3303.926
Target I/O per Second	3200
Initial database size	3892092469248
Final database size	3995054243840
Database files (count)	40

Jetstress System Parameters

Thread count 12 (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 (C:\MntPts\sg1db1)	0.015	0.001	96.329	73.233	(n/a)
Database (C:\MntPts\sg1db2)	0.014	0.001	93.190	70.727	(n/a)
Database (C:\MntPts\sg1db3)	0.014	0.001	47.002	35.974	(n/a)
Database (C:\MntPts\sg2db1)	0.015	0.001	96.066	72.158	(n/a)
Database (C:\MntPts\sg2db2)	0.014	0.001	93.940	71.168	(n/a)
Database (C:\MntPts\sg2db3)	0.013	0.001	46.903	35.604	(n/a)
Database (C:\MntPts\sg3db1)	0.013	0.001	95.911	71.093	(n/a)
Database (C:\MntPts\sg3db2)	0.013	0.001	93.501	70.296	(n/a)
Database (C:\MntPts\sg3db3)	0.013	0.001	46.863	35.261	(n/a)
Database (C:\MntPts\sg4db1)	0.013	0.001	96.486	71.420	(n/a)
Database (C:\MntPts\sg4db2)	0.013	0.001	93.716	70.007	(n/a)
Database (C:\MntPts\sg4db3)	0.013	0.001	46.888	35.081	(n/a)

Database (C:\MntPts\sg5db1)	0.013	0.001	96.671	71.267	(n/a)
Database (C:\MntPts\sg5db2)	0.013	0.001	94.138	70.049	(n/a)
Database (C:\MntPts\sg5db3)	0.014	0.001	46.888	34.895	(n/a)
Database (C:\MntPts\sg6db1)	0.013	0.001	95.835	70.258	(n/a)
Database (C:\MntPts\sg6db2)	0.013	0.001	93.916	69.556	(n/a)
Database (C:\MntPts\sg6db3)	0.014	0.001	46.815	34.643	(n/a)
Database (C:\MntPts\sg7db1)	0.014	0.001	96.080	70.415	(n/a)
Database (C:\MntPts\sg7db2)	0.016	0.001	93.338	69.271	(n/a)
Database (C:\MntPts\sg7db3)	0.017	0.001	46.780	34.739	(n/a)
Database (C:\MntPts\sg8db1)	0.014	0.001	95.884	69.875	(n/a)
Database (C:\MntPts\sg8db2)	0.016	0.001	93.776	69.062	(n/a)
Database (C:\MntPts\sg8db3)	0.017	0.001	46.622	34.339	(n/a)
Log (C:\MntPts\sg1logs)	0.002	0.001	6.126	102.516	4753.485
Log (C:\MntPts\sg2logs)	0.002	0.001	6.067	102.486	4750.642
Log (C:\MntPts\sg3logs)	0.002	0.001	6.045	102.567	4735.757
Log (C:\MntPts\sg4logs)	0.002	0.001	6.079	102.944	4736.396
Log (C:\MntPts\sg5logs)	0.002	0.001	6.070	103.014	4742.850
Log (C:\MntPts\sg6logs)	0.002	0.001	6.051	102.552	4745.416
Log (C:\MntPts\sg7logs)	0.002	0.001	6.036	102.163	4748.441
Log (C:\MntPts\sg8logs)	0.002	0.001	6.039	102.002	4753.336

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	3.227	1.895	14.745

Available MBytes	99.116	7.000	320.000
Free System Page Table Entries	33555584.188	33555568.000	33555586.000
Transition Pages RePurposed/sec	9.837	0.000	2477.461
Pool Nonpaged Bytes	131144319.933	131092480.000	131379200.000
Pool Paged Bytes	218964786.345	217464832.000	249294848.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Check Sum Report

Checksum Statistics - All

Database	Seen pages	Bad pages	Correctable pages	Wrong page no pages	File length / seconds taken
C:\MntPts\sg1db1\Jetstress1.edb	12190818	0	0	0	95240 MBytes / 3827 seconds
C:\MntPts\sg1db1\Jetstress2.edb	12187234	0	0	0	95212 MBytes / 1949 seconds
C:\MntPts\sg1db2\Jetstress3.edb	12194914	0	0	0	95272 MBytes / 2723 seconds
C:\MntPts\sg1db2\Jetstress4.edb	12192610	0	0	0	95254 MBytes / 1990 seconds
C:\MntPts\sg1db3\Jetstress5.edb	12188002	0	0	0	95218 MBytes / 2914 seconds
C:\MntPts\sg2db1\Jetstress1.edb	12197986	0	0	0	95296 MBytes / 2837 seconds
C:\MntPts\sg2db1\Jetstress2.edb	12191330	0	0	0	95244 MBytes / 2147 seconds
C:\MntPts\sg2db2\Jetstress3.edb	12190562	0	0	0	95238 MBytes / 3658 seconds
C:\MntPts\sg2db2\Jetstress4.edb	12190306	0	0	0	95236 MBytes / 1820 seconds
C:\MntPts\sg2db3\Jetstress5.edb	12193634	0	0	0	95262 MBytes / 2820 seconds
C:\MntPts\sg3db1\Jetstress1.edb	12190050	0	0	0	95234 MBytes / 3705 seconds
C:\MntPts\sg3db1\Jetstress2.edb	12188002	0	0	0	95218 MBytes / 1972 seconds
C:\MntPts\sg3db2\Jetstress3.edb	12194146	0	0	0	95266 MBytes / 2930 seconds
C:\MntPts\sg3db2\Jetstress4.edb	12193378	0	0	0	95260 MBytes / 2448 seconds
C:\MntPts\sg3db3\Jetstress5.edb	12188770	0	0	0	95224 MBytes / 2618 seconds
C:\MntPts\sg4db1\Jetstress1.edb	12196962	0	0	0	95288 MBytes / 3486 seconds
C:\MntPts\sg4db1\Jetstress2.edb	12193634	0	0	0	95262 MBytes / 1872 seconds
C:\MntPts\sg4db2\Jetstress3.edb	12190562	0	0	0	95238 MBytes / 3654 seconds
C:\MntPts\sg4db2\Jetstress4.edb	12192866	0	0	0	95256 MBytes / 2006 seconds
C:\MntPts\sg4db3\Jetstress5.edb	12186722	0	0	0	95208 MBytes / 2668 seconds
C:\MntPts\sg5db1\Jetstress1.edb	12195170	0	0	0	95274 MBytes / 3692 seconds
C:\MntPts\sg5db1\Jetstress2.edb	12195170	0	0	0	95274 MBytes / 2016 seconds
C:\MntPts\sg5db2\Jetstress3.edb	12190818	0	0	0	95240 MBytes / 3503 seconds
C:\MntPts\sg5db2\Jetstress4.edb	12195170	0	0	0	95274 MBytes / 2125 seconds
C:\MntPts\sg5db3\Jetstress5.edb	12191330	0	0	0	95244 MBytes / 2809 seconds
C:\MntPts\sg6db1\Jetstress1.edb	12188514	0	0	0	95222 MBytes / 2808 seconds
C:\MntPts\sg6db1\Jetstress2.edb	12188770	0	0	0	95224 MBytes / 2482 seconds

C:\MntPts\sg6db2\Jetstress3.edb	12195426	0	0	0	95276 MBytes / 3528 seconds
C:\MntPts\sg6db2\Jetstress4.edb	12194658	0	0	0	95270 MBytes / 2107 seconds
C:\MntPts\sg6db3\Jetstress5.edb	12193890	0	0	0	95264 MBytes / 2627 seconds
C:\MntPts\sg7db1\Jetstress1.edb	12187234	0	0	0	95212 MBytes / 3484 seconds
C:\MntPts\sg7db1\Jetstress2.edb	12190818	0	0	0	95240 MBytes / 1880 seconds
C:\MntPts\sg7db2\Jetstress3.edb	12191074	0	0	0	95242 MBytes / 3700 seconds
C:\MntPts\sg7db2\Jetstress4.edb	12195170	0	0	0	95274 MBytes / 2036 seconds
C:\MntPts\sg7db3\Jetstress5.edb	12188258	0	0	0	95220 MBytes / 2676 seconds
C:\MntPts\sg8db1\Jetstress1.edb	12189538	0	0	0	95230 MBytes / 3497 seconds
C:\MntPts\sg8db1\Jetstress2.edb	12198754	0	0	0	95302 MBytes / 1947 seconds
C:\MntPts\sg8db2\Jetstress3.edb	12191074	0	0	0	95242 MBytes / 3789 seconds
C:\MntPts\sg8db2\Jetstress4.edb	12188514	0	0	0	95222 MBytes / 1948 seconds
C:\MntPts\sg8db3\Jetstress5.edb	12195682	0	0	0	95278 MBytes / 2682 seconds
(Sum)	487677520	0	0	0	3809980 MBytes / 5785 seconds

Disk Subsystem Performance (of checksum)

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec
C:\MntPts\sg1db1	0.035	0.000	521.397	0.000
C:\MntPts\sg1db2	0.025	0.000	647.484	0.000
C:\MntPts\sg1db3	0.031	0.000	522.130	0.000
C:\MntPts\sg2db1	0.026	0.000	612.580	0.000
C:\MntPts\sg2db2	0.033	0.000	556.195	0.000
C:\MntPts\sg2db3	0.029	0.000	540.416	0.000
C:\MntPts\sg3db1	0.034	0.000	536.893	0.000
C:\MntPts\sg3db2	0.028	0.000	567.046	0.000
C:\MntPts\sg3db3	0.027	0.000	578.468	0.000
C:\MntPts\sg4db1	0.031	0.000	569.781	0.000
C:\MntPts\sg4db2	0.034	0.000	537.764	0.000
C:\MntPts\sg4db3	0.027	0.000	571.249	0.000
C:\MntPts\sg5db1	0.034	0.000	534.520	0.000
C:\MntPts\sg5db2	0.033	0.000	541.641	0.000
C:\MntPts\sg5db3	0.029	0.000	540.551	0.000
C:\MntPts\sg6db1	0.028	0.000	576.490	0.000
C:\MntPts\sg6db2	0.033	0.000	540.001	0.000
C:\MntPts\sg6db3	0.027	0.000	577.472	0.000
C:\MntPts\sg7db1	0.031	0.000	569.139	0.000
C:\MntPts\sg7db2	0.035	0.000	531.806	0.000
C:\MntPts\sg7db3	0.027	0.000	569.824	0.000
C:\MntPts\sg8db1	0.031	0.000	560.598	0.000
C:\MntPts\sg8db2	0.035	0.000	530.144	0.000
C:\MntPts\sg8db3	0.027	0.000	567.972	0.000

Memory System Performance (of checksum)

Counter	Average	Minimum	Maximum
% Processor Time	17.900	6.493	19.526
Available MBytes	2259.578	2237.000	2285.000
Free System Page Table Entries	33555584.036	33555584.000	33555586.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	131135488.000	131125248.000	131268608.000
Pool Paged Bytes	218034517.333	217993216.000	218193920.000