Infortrend EonStor DS 3016G 6Gb/s SAS 3,000 mailbox resiliency Exchange Server 2013 storage solution

Technical white paper

Abstract:

EonStor DS 3016G RAID subsystems offer high performance entry-level storage solutions with the reliability and scalability enterprises demand in Microsoft Exchange-based email servers. This technical white paper covers in detail the testing done to Microsoft ESRP standards in establishing the email server capabilities of the EonStor DS 3016G. Extensive test result data is provided to help customers make an informed decision when choosing a new email server and storage solution that is able to handle the needs of thousands of users.

Tested with: ESRP – Storage Version 4.0
Test date: 2013/10/01

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Overview

This document provides information on Infortrend storage solutions for Microsoft Exchange Server, based the Microsoft Exchange Solution Reviewed Program (ESRP)*. For any questions or comments regarding the contents of this document, see Contact for Additional Information.

*The ESRP program was developed by Microsoft and provides a common storage testing framework for vendors to publish information on storage solutions for Microsoft Exchange Server software. For more details on this program, please visit http://technet.microsoft.com/en-us/exchange/ff182054

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Features

The attractively-priced single controller EonStor DS 3016G RAID system offers a 3U 16-bay solution featuring 6Gb/s SAS host connectivity. With its excellent cost to performance ratio, it brings enterprises a fully-featured entry level array for SAN applications, supporting seamless networking and virtualization. Customers can also scale storage up to 316 drives via 6Gb/s SAS enclosures, unlocking large capacities for future growth. Due to its swappable controller, fan module, and dual power supplies, the EonStor DS 3016G is easy to maintain and upgrade with minimal downtime.

Key feature list

- **Host ports**: two 6Gb/s SAS
- **Expansion scalability**: up to 316 HDDs
- **Availability and reliability**: redundant, hot-swappable hardware modules include controller, power supply, and cooling fan, with high availability hardware design preventing single points of failure
- **Capacity efficiency:** thin provisioning ensures the most efficient allocation of pooled capacity
- **Easy deployment and management**: powerful SANWatch management software suite
- **Green design**: high efficiency power supplies and intelligent multi-level drive spin-down technology
- **Data protection**: snapshot and volume copy/mirror

For detailed product information, please check
http://infortrend.com/global/products/models/ESDS%203016G

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Solution description

Total HDDs deployed: 16

- 15 spindles in a RAID 5 disk group
- 6 Exchange databases per disk group
- 1 spare drive

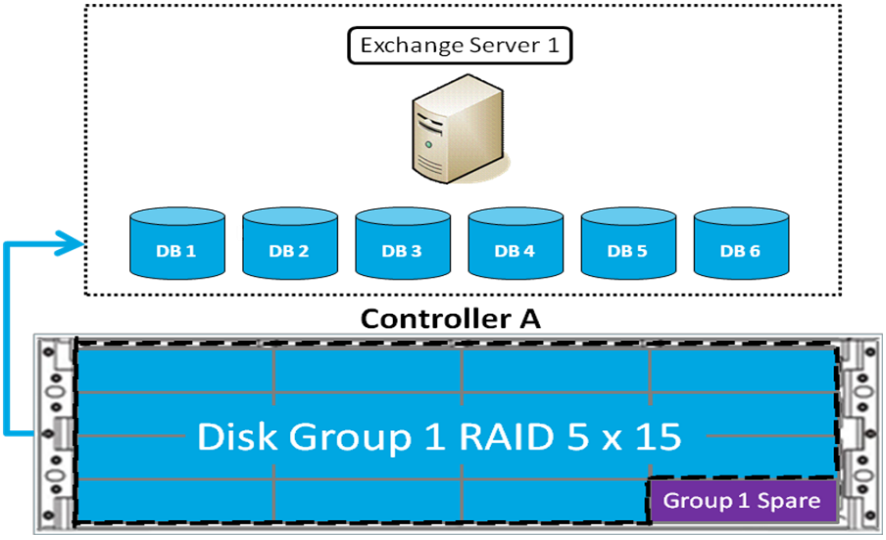

Figure 1: solution configuration

One RAID 5 disk group was created with 15 HDDs in this solution. The disk group was divided to 6 LUNs for a total of 6 databases hosted by 1 active Exchange server. Figure 1 shows the complete architecture of this solution.

A total 6 databases were tested with 1 exchange server in this solution. The server hosts 6 databases and each database has 1 active at the local site and 1 passive at the remote site. The servers were configured in the same DAG for Exchange 2013 built-in database recovery and high availability mailbox resiliency in the event of failure.

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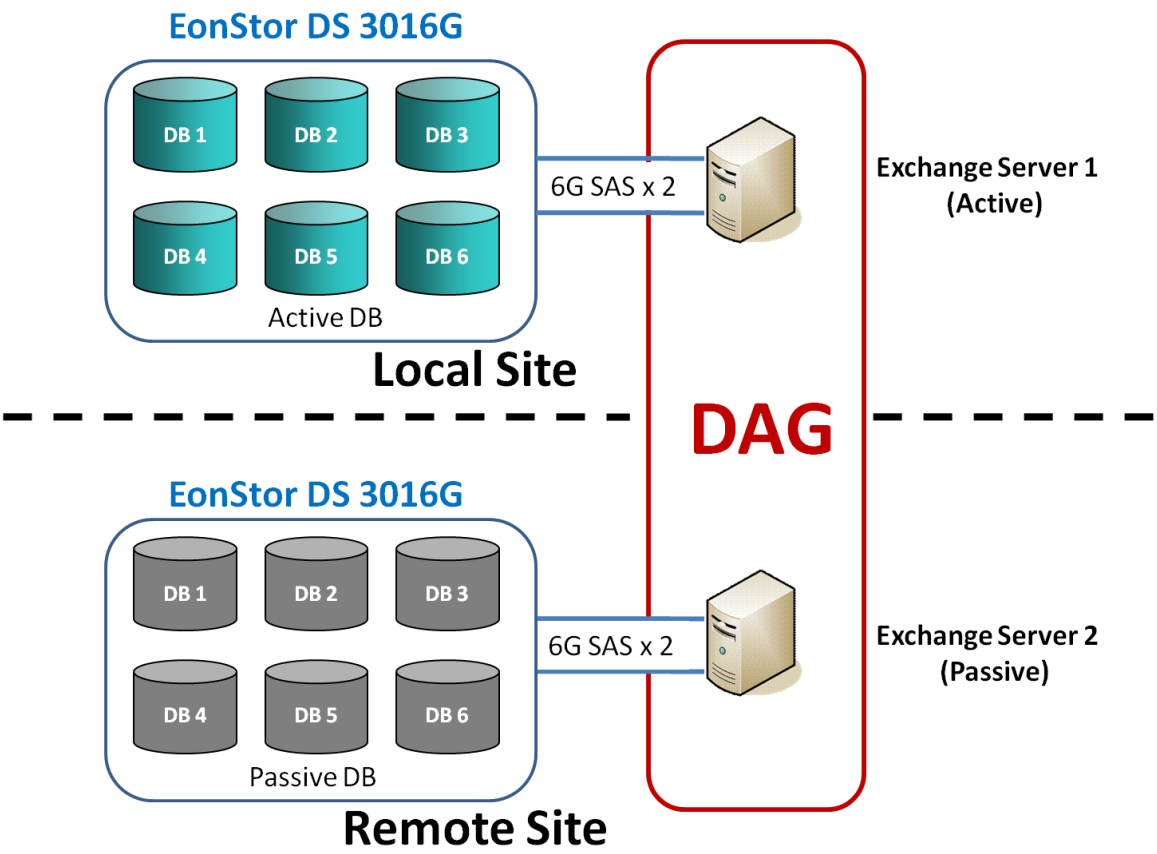

Figure 2: database architecture

One server was deployed in this solution with multipath I/O configured. Figure 3 shows the complete diagram.

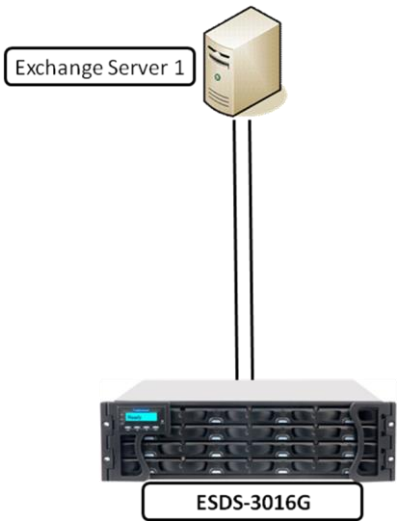

Figure 3: solution connection topology

The ESRP 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 server scalability are server processor utilization, server physical and virtual memory limitations, resource requirements for applications, directory and network service latencies, network infrastructure limitations, replication and recovery

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requirements, and client usage profiles. All these factors are beyond the scope of ESRP. Therefore, the number of mailboxes hosted per server as part of the tested configuration may not necessarily be viable for some customer deployments.

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

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Targeted customer profile

This solution targets a 3,000-user Exchange environment, found in medium and large enterprises. The EonStor DS (SAS) provides an excellent price point and performance through replication, backup, and disaster recovery features. It was also designed for easy deployment and maintenance without IT professionals involved.

The solution was tested with the following parameters:

- 3,000 mailboxes
- 3GB capacity per mailbox
- 0.2 user profile (including 20% headroom)
- Tested with 1 server
- 24x7 background database maintenance enabled
- Mailbox resiliency
- 10% of capacity reserved for EonStor DS snapshot technology for data protection

Tested deployment

The following tables summarize the test environment

Simulated Exchange configuration

Number of Exchange mailboxes simulated	3,000
Number of database availability groups (DAGs)	1
Number of servers/DAGs	2 (1 active/1 passive)
Number of active mailboxes/server	3,000
Number of databases/host	6
Number of copies/database	2
Number of mailboxes/database	500
Simulated profile: I/O per second per mailbox (IOPS, include 20% headroom)	0.2
Database/log LUN size	2TB
Total database size for performance testing	9TB
Storage capacity used by Exchange database**	75%

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

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Storage hardware

Storage connectivity (Fibre Channel, SAS, SATA, iSCSI)	SAS
Storage model and OS/firmware revision	ESDS-3016G Firmware version: FA511G19
Storage cache	8GB per controller
Number of storage controllers	1
Number of storage ports	2
Maximum bandwidth of storage connectivity to host	12Gb/s (2 x 6Gb/s SAS)
Switch type/model/firmware revision	N/A
HBA model and firmware	LSI SAS9200-8e
Number of HBAs/host	2 x quad-port 6Gb/s SAS adapter
Host server type	Intel Xeon L5410 2.33GHz x 8GB RAM
Total number of disks tested in solution	16 (15 + 1 spare)
Maximum number of spindles hosted	316

Storage software

HBA driver	Version: 9.15.17.0
HBA queue target setting	N/A
HBA queue depth setting	N/A
Multi-pathing	EonPath v1.23.2.50
Host OS	Windows Server 2008 R2 64-bit
ESE.dll file version	15.00.0516.026
Replication solution name/version	N/A

Storage disk configuration (mailbox store disks)

Disk type, speed, and firmware revision	7.2k RPM NL-SAS HDD
Raw capacity per disk (GB)	3,000GB
Number of physical disks in test	15 + 1 spare
Total raw storage capacity (GB)	48,000GB
Disk slice size (GB)	N/A
Number of slices per LUN or number of disks per LUN	15 disks per 6 LUNs

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RAID level	RAID 5
Total formatted capacity	12,000GB
Storage capacity utilization	25%
Database capacity utilization	18.75%

Storage disk configuration (transactional log disks)

Disk type, speed, and firmware revision	7.2k RPM NL-SAS HDD
Raw capacity per disk (GB)	3,000GB
Number of spindles in test	15 + 1 spare
Total raw storage capacity (GB)	48,000GB
Disk slice size (GB)	N/A
Number of slices per LUN or number of disks per LUN	15 disks per 6 LUNs
RAID level	RAID 5
Total formatted capacity	12,000GB

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Best practices

Exchange Server is a disk-intensive application. Based on testing run using the ESRP framework, Infortrend recommends the following to improve storage performance:

EonStor DS

- Capacity and performance
  - Mailbox capacity
  - Performance requirements
  - Future growth

This solution includes best practices for initial deployment of EonStor DS for Microsoft Exchange 2013, considering both mailbox capacity and performance requirements. The type and amount of hard disk drives is the key factor in this solution when thinking of future growth in data size and usage. Please refer to the official Microsoft Exchange 2013 best practices for storage design: http://technet.microsoft.com/en-us/library/dd346703.aspx.

- Layout
  - Number of databases
  - Database size

Since larger *and* more numerous databases may cause higher performance impact, it is recommended to follow this white paper for best practice when configuring the number of databases and database size while using EonStor DS for Exchange 2013 deployment. It has been shown that with the same total available capacity, deploying smaller but more numerous databases causes a higher impact than deploying fewer databases that are larger in individual size.

- Windows Server 2008 R2 no longer requires diskpart for partitioning and aligning sector boundaries. For Windows Server 2003, use diskpart to align sectors to 64k
- It is not recommended to share Exchange 2013 disks with other I/O-intensive applications as this may cause performance impact
- Database and log I/O no longer need to be isolated in Exchange 2013
- Format database and log LUN using 64k allocation size
- Minimize the number of databases but increase individual database size
- Minimize the number of disk groups as multiple disk groups hosted by a single server may cause lower performance than single disk groups
- Use identical drives for better performance optimization and capacity utilization
- Optimize performance by balancing the load of both controllers with even disk groups

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Backup strategy

This solution includes Infortrend snapshot technology for Exchange Server data protection. For database backup, deployment of capacity expansion will be required in addition to this solution.

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Contact for additional information

For more information about the EonStor DS 3016G, please visit the product page: http://infortrend.com/global/products/models/ESDS%203016G

For more information about Infortrend storage solutions, we recommend you consult with Infortrend directly to assist with related product and service information. You can also visit the Infortrend website: http://www.infortrend.com

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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 the ESRP testing framework. Please check the Appendix for detailed information about test results.

Reliability

A number of tests in the framework check reliability over a 24hr period. The goal is to verify whether 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/log corruption. Please check Appendix A: Stress Test for detailed results.

The following list provides an overview (clicking on underlined words shows the post-reliability test HTML report)

- No errors reported in the saved event log file
- No errors reported during the database and log checksum process

Storage performance results

Primary storage performance testing is designed to exercise storage with maximum sustainable Exchange-type I/O for 2 hours. The test shows how long it takes for storage to respond to an I/O under load. The data below is the sum of all of the logical disk I/Os and average of all the logical disk I/O latency in the 2 hour test duration. Each server is listed separately, and the aggregate numbers across all servers are listed as well. Please check Appendix B: Performance Test for detailed results.

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

Server 1

Database I/O	
Database disk transfers/sec	791.907
Database disk reads/sec	555.57
Database disk writes/sec	236.37
Average database disk read latency (ms)	15.96
Average database disk write latency (ms)	0.81

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Transaction log I/O	
Log disk writes/sec	186.127
Average log disk write latency (ms)	0.172167

Aggregate performance across all server metrics:
The sum of I/Os and average latency across all servers in the solution

Database I/O	
Database disk transfers/sec	791.907
Database disk reads/sec	555.57
Database disk writes/sec	236.37
Average database disk read latency (ms)	15.96
Average database disk write latency (ms)	0.81
Transaction log I/O	
Log disk writes/sec	186.127
Average log disk write latency (ms)	0.172167

Database backup/recovery performance

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

Database read-only performance

The test measures the maximum rate at which databases can be backed up via VSS. The following table shows the average rate for a single database file. Please check Appendix C: Database Backup Test for detailed results.

MB read/sec per database	128.72
MB read/sec total per server	772.31

Transaction log recovery/replay performance

The test measures the maximum rate at which log files can be played against databases. The following table shows the average rate for 500 log files played in a single storage group. Each log file is 1MB. Please check Appendix D: Soft Recovery Test for detailed results.

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Average time to play one log file (sec)	2.0938

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Conclusions

The information discussed in this report describes the best practices and test reports for EonStor DS 3016G supporting 3,000 users. Tests were conducted under the environment listed in the Tested Deployment section. Test results show that the EonStor DS 3016G is capable of handling the specified number of users without using up its performance resources.

This document developed by storage solution providers and reviewed by the Microsoft Exchange Product team. Test results/data presented in this document based on tests introduced in the ESRP test framework. Customers should not quote data directly for their pre-deployment verification. It is still necessary to validate storage design for every specific customer environment.

ESRP is not designed to be a benchmark. Tests are not designed to get maximum throughput for a given solution. Rather, it is focused on producing recommendations from vendors for Exchange applications. Data presented in this document should not be used for direct comparisons among solutions.

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Appendix: test reports

This appendix contains Microsoft Exchange Jetstress 2013 test results for one of the servers used in testing the storage solution. Results are representative of those obtained for all servers tested.

Appendix A: stress test

Microsoft Exchange Jetstress 2013

24hr stress test (server 1)

Test summary

Overall Test Result	**Pass**
Machine Name	WIN-2IPTC89B5DU
Test Description	
Test Start Time	10/1/2013 4:03:12 PM
Test End Time	10/2/2013 5:15:51 PM
Collection Start Time	10/1/2013 4:11:22 PM
Collection End Time	10/2/2013 4:11:03 PM
Jetstress Version	15.00.0658.004
ESE Version	15.00.0516.026
Operating System	Windows Server 2008 R2 Enterprise (6.1.7600.0)
Performance Log	C:\Users\Administrator\Desktop\3016G SAS\Stress\Tuning_2013_10_1_16_5_12.blg C:\Users\Administrator\Desktop\3016G SAS\Stress\Stress_2013_10_1_16_10_57.blg

Database sizing and throughput

Achieved Transactional I/O per Second	801.851
Target Transactional I/O per Second	600
Initial Database Size (bytes)	9441355628544
Final Database Size (bytes)	9465036668928
Database Files (Count)	6

Jetstress system parameters

Thread Count	16
Minimum Database Cache	192.0 MB
Maximum Database Cache	1536.0 MB
Insert Operations	40%
Delete Operations	20%
Replace Operations	5%

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Read Operations	35%
Lazy Commits	70%
Run Background Database Maintenance	True
Number of Copies per Database	2

Database configuration

Instance1988.1	Log path: F:\log1 Database: F:\db1\Jetstress001001.edb
Instance1988.2	Log path: G:\log2 Database: G:\db2\Jetstress002001.edb
Instance1988.3	Log path: H:\log3 Database: H:\db3\Jetstress003001.edb
Instance1988.4	Log path: I:\log4 Database: I:\db4\Jetstress004001.edb
Instance1988.5	Log path: J:\log5 Database: J:\db5\Jetstress005001.edb
Instance1988.6	Log path: K:\log6 Database: K:\db6\Jetstress006001.edb

Transactional I/O performance

MS Exchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance1988.1	16.792	0.731	93.517	40.182	32924.955	35965.651	0.000	0.168	0.000	29.044	0.000	7783.007
Instance1988.2	15.586	0.760	93.418	40.183	32936.908	35952.327	0.000	0.168	0.000	29.003	0.000	7808.013
Instance1988.3	15.038	0.780	93.482	40.209	32942.815	35943.165	0.000	0.168	0.000	28.956	0.000	7816.934
Instance1988.4	14.936	0.785	93.316	40.161	32942.544	35946.657	0.000	0.168	0.000	29.045	0.000	7818.257
Instance1988.5	15.421	0.837	93.462	40.147	32942.271	35942.424	0.000	0.168	0.000	29.008	0.000	7802.487
Instance1988.6	16.710	0.916	93.527	40.247	32939.955	35956.729	0.000	0.168	0.000	29.038	0.000	7795.439

Background database maintenance I/O performance

MS Exchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance1988.1	8.680	261875.780

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Instance1988.2	8.758	261879.196
Instance1988.3	8.813	261877.045
Instance1988.4	8.843	261900.593
Instance1988.5	8.820	261859.048
Instance1988.6	8.767	261882.347

Log replication I/O performance

MS Exchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance1988.1	0.652	223259.307
Instance1988.2	0.654	223825.544
Instance1988.3	0.654	223622.101
Instance1988.4	0.657	223299.752
Instance1988.5	0.653	222694.172
Instance1988.6	0.653	222652.624

Total I/O performance

MS Exchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance1988.1	16.792	0.731	102.197	40.182	52370.968	35965.651	0.504	0.168	0.652	29.044	223259.307	7783.007
Instance1988.2	15.586	0.760	102.177	40.183	52560.815	35952.327	0.506	0.168	0.654	29.003	223825.544	7808.013
Instance1988.3	15.038	0.780	102.295	40.209	52666.236	35943.165	0.505	0.168	0.654	28.956	223622.101	7816.934
Instance1988.4	14.936	0.785	102.158	40.161	52760.913	35946.657	0.504	0.168	0.657	29.045	223299.752	7818.257
Instance1988.5	15.421	0.837	102.282	40.147	52682.410	35942.424	0.503	0.168	0.653	29.008	222694.172	7802.487
Instance1988.6	16.710	0.916	102.294	40.247	52560.991	35956.729	0.502	0.168	0.653	29.038	222652.624	7795.439

Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	0.618	0.000	2.446
Available MB	44683.345	44630.000	44794.000
Free System Page Table Entries	33555529.998	33555498.000	33555532.000
Transition Pages Repurposed/sec	0.000	0.000	0.000
Pool Non-Paged Bytes	37719552.623	37597184.000	37982208.000
Pool Paged Bytes	123065453.148	122507264.000	123703296.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

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Test log

10/1/2013 4:03:12 PM -- Preparing for testing ...

10/1/2013 4:03:18 PM -- Attaching databases ...

10/1/2013 4:03:18 PM -- Preparations for testing are complete.

10/1/2013 4:03:18 PM -- Starting transaction dispatch ..

10/1/2013 4:03:18 PM -- Database cache settings: (minimum: 192.0 MB, maximum: 1.5 GB)

10/1/2013 4:03:18 PM -- Database flush thresholds: (start: 15.3 MB, stop: 30.7 MB)

10/1/2013 4:03:25 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 200 msec/read).

10/1/2013 4:03:25 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 200 msec/write).

10/1/2013 4:03:25 PM -- Attaining prerequisites:

10/1/2013 4:05:12 PM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last: 1468166000.0 (lower bound: 1449551000.0, upper bound: none)

10/1/2013 4:05:24 PM -- Performance logging started (interval: 5000 ms).

10/1/2013 4:05:24 PM -- Automatic tuning is starting ...

10/1/2013 4:05:58 PM -- Instance1988.1 has 0.25 for read latency slope.

10/1/2013 4:05:58 PM -- Instance1988.2 has 0.05 for read latency slope.

10/1/2013 4:05:58 PM -- Instance1988.3 has 0.18 for read latency slope.

10/1/2013 4:05:58 PM -- Instance1988.4 has 0.10 for read latency slope.

10/1/2013 4:05:58 PM -- Instance1988.5 has 0.08 for read latency slope.

10/1/2013 4:05:58 PM -- Instance1988.6 has 0.01 for read latency slope.

10/1/2013 4:08:11 PM -- 412 batch transactions/sec and 32 sessions have 1028 IOPS.

10/1/2013 4:08:11 PM -- 32 sessions have actual 1028 IOPS (target IOPS: 600)

10/1/2013 4:08:11 PM -- Instance1988.1 has 23.3 for I/O Database Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.2 has 21.8 for I/O Database Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.3 has 20.4 for I/O Database Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.4 has 19.5 for I/O Database Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.5 has 19.1 for I/O Database Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.6 has 21.0 for I/O Database Reads Average Latency.

10/1/2013 4:08:11 PM -- The process has average database read latencies higher than 20.000 msec.

10/1/2013 4:08:11 PM -- Instance1988.1 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.1 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.2 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.3 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.4 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.5 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.6 has 0.0 for I/O Log Reads Average Latency.

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10/1/2013 4:08:11 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.

10/1/2013 4:08:44 PM -- Instance1988.1 has 0.07 for read latency slope.

10/1/2013 4:08:44 PM -- Instance1988.2 has 0.08 for read latency slope.

10/1/2013 4:08:44 PM -- Instance1988.3 has 0.07 for read latency slope.

10/1/2013 4:08:44 PM -- Instance1988.4 has 0.01 for read latency slope.

10/1/2013 4:08:44 PM -- Instance1988.5 has 0.06 for read latency slope.

10/1/2013 4:08:44 PM -- Instance1988.6 has 0.02 for read latency slope.

10/1/2013 4:10:57 PM -- 319 batch transactions/sec and 16 sessions have 819 IOPS.

10/1/2013 4:10:57 PM -- 16 sessions have actual 819 IOPS (target IOPS: 600)

10/1/2013 4:10:57 PM -- Instance1988.1 has 18.2 for I/O Database Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.2 has 16.0 for I/O Database Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.3 has 14.6 for I/O Database Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.4 has 14.1 for I/O Database Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.5 has 15.0 for I/O Database Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.6 has 16.9 for I/O Database Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.1 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.1 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.2 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.3 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.4 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.5 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.6 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:10:57 PM -- Performance logging has ended.

10/1/2013 4:10:57 PM -- Automatic tuning succeeded.

10/1/2013 4:11:07 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.

10/1/2013 4:11:07 PM -- Performance logging started (interval: 15000 ms).

10/1/2013 4:11:07 PM -- Attaining prerequisites:

10/1/2013 4:11:07 PM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last: 1587397000.0 (lower bound: 1449551000.0, upper bound: none)

10/2/2013 4:11:07 PM -- Performance logging has ended.

10/2/2013 5:15:47 PM -- JetInterop batch transaction stats: 283424, 283424, 283423, 283423, 283423 and 283423.

10/2/2013 5:15:47 PM -- Dispatching transactions ends.

10/2/2013 5:15:47 PM -- Shutting down databases ...

10/2/2013 5:15:51 PM -- Instance1988.1 (complete), Instance1988.2 (complete), Instance1988.3 (complete), Instance1988.4 (complete), Instance1988.5 (complete) and Instance1988.6 (complete)

10/2/2013 5:15:51 PM -- C:\Users\Administrator\Desktop\3016G SAS\Stress\Stress_2013_10_1_16_10_57.blg has 5751 samples.

10/2/2013 5:15:51 PM -- Creating test report ...

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10/2/2013 5:16:30 PM -- Instance1988.1 has 16.8 for I/O Database Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.1 has 0.2 for I/O Log Writes Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.1 has 0.2 for I/O Log Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.2 has 15.6 for I/O Database Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.2 has 0.2 for I/O Log Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.3 has 15.0 for I/O Database Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.3 has 0.2 for I/O Log Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.4 has 14.9 for I/O Database Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.4 has 0.2 for I/O Log Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.5 has 15.4 for I/O Database Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.5 has 0.2 for I/O Log Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.6 has 16.7 for I/O Database Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.6 has 0.2 for I/O Log Reads Average Latency.

10/2/2013 5:16:30 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.

10/2/2013 5:16:30 PM -- The test has 0 Database Page Fault Stalls/sec samples higher than 0.

10/2/2013 5:16:30 PM -- C:\Users\Administrator\Desktop\3016G SAS\Stress\Stress_2013_10_1_16_10_57.xml has 5750 samples queried.

Stress test database checksum (server 1)

Checksum statistics - all

Database	Seen pages	Bad pages	Correctable pages	Wrong page-number pages	File length / seconds taken
F:\db1\Jetstress001001.edb	48141154	0	0	0	1504411 MB/9530 sec
G:\db2\Jetstress002001.edb	48141666	0	0	0	1504427 MB/9077 sec
H:\db3\Jetstress003001.edb	48141922	0	0	0	1504435 MB/8455 sec
I:\db4\Jetstress004001.edb	48142178	0	0	0	1504443 MB/8477 sec
J:\db5\Jetstress005001.edb	48141410	0	0	0	1504419 MB/9026 sec
K:\db6\Jetstress006001.edb	48141666	0	0	0	1504427 MB/9558 sec
(Sum)	288849996	0	0	0	9026562 MB/9558 sec

Disk subsystem performance (of checksum)

Logical Disk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Read
F:	0.023	0.000	2518.366	0.000	65536.000
G:	0.019	0.000	2646.598	0.000	65536.000
H:	0.017	0.000	2846.498	0.000	65536.000
I:	0.017	0.000	2837.980	0.000	65536.000

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J:	0.019	0.000	2662.580	0.000	65536.000
K:	0.021	0.000	2486.700	0.000	65329.262

Memory system performance (of checksum)

Counter	Average	Minimum	Maximum
% Processor Time	4.920	3.781	9.163
Available MB	46263.201	46249.000	46279.000
Free System Page Table Entries	33555530.000	33555530.000	33555530.000
Transition Pages Repurposed/sec	0.000	0.000	0.000
Pool Non-Paged Bytes	38607607.950	38486016.000	38723584.000
Pool Paged Bytes	126926912.403	126853120.000	127119360.000

Test log

10/1/2013 4:03:12 PM -- Preparing for testing ...

10/1/2013 4:03:18 PM -- Attaching databases ...

10/1/2013 4:03:18 PM -- Preparations for testing are complete.

10/1/2013 4:03:18 PM -- Starting transaction dispatch ..

10/1/2013 4:03:18 PM -- Database cache settings: (minimum: 192.0 MB, maximum: 1.5 GB)

10/1/2013 4:03:18 PM -- Database flush thresholds: (start: 15.3 MB, stop: 30.7 MB)

10/1/2013 4:03:25 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 200 msec/read).

10/1/2013 4:03:25 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 200 msec/write).

10/1/2013 4:03:25 PM -- Attaining prerequisites:

10/1/2013 4:05:12 PM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last: 1468166000.0 (lower bound: 1449551000.0, upper bound: none)

10/1/2013 4:05:24 PM -- Performance logging started (interval: 5000 ms).

10/1/2013 4:05:24 PM -- Automatic tuning is starting ...

10/1/2013 4:05:58 PM -- Instance1988.1 has 0.25 for read latency slope.

10/1/2013 4:05:58 PM -- Instance1988.2 has 0.05 for read latency slope.

10/1/2013 4:05:58 PM -- Instance1988.3 has 0.18 for read latency slope.

10/1/2013 4:05:58 PM -- Instance1988.4 has 0.10 for read latency slope.

10/1/2013 4:05:58 PM -- Instance1988.5 has 0.08 for read latency slope.

10/1/2013 4:05:58 PM -- Instance1988.6 has 0.01 for read latency slope.

10/1/2013 4:08:11 PM -- 412 batch transactions/sec and 32 sessions have 1028 IOPS.

10/1/2013 4:08:11 PM -- 32 sessions have actual 1028 IOPS (target IOPS: 600)

10/1/2013 4:08:11 PM -- Instance1988.1 has 23.3 for I/O Database Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.2 has 21.8 for I/O Database Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.3 has 20.4 for I/O Database Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.4 has 19.5 for I/O Database Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.5 has 19.1 for I/O Database Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.6 has 21.0 for I/O Database Reads Average Latency.

10/1/2013 4:08:11 PM -- The process has average database read latencies higher than 20.000 msec.

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10/1/2013 4:08:11 PM -- Instance1988.1 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.1 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.2 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.3 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.4 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.5 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:08:11 PM -- Instance1988.6 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:08:11 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.

10/1/2013 4:08:44 PM -- Instance1988.1 has 0.07 for read latency slope.

10/1/2013 4:08:44 PM -- Instance1988.2 has 0.08 for read latency slope.

10/1/2013 4:08:44 PM -- Instance1988.3 has 0.07 for read latency slope.

10/1/2013 4:08:44 PM -- Instance1988.4 has 0.01 for read latency slope.

10/1/2013 4:08:44 PM -- Instance1988.5 has 0.06 for read latency slope.

10/1/2013 4:08:44 PM -- Instance1988.6 has 0.02 for read latency slope.

10/1/2013 4:10:57 PM -- 319 batch transactions/sec and 16 sessions have 819 IOPS.

10/1/2013 4:10:57 PM -- 16 sessions have actual 819 IOPS (target IOPS: 600)

10/1/2013 4:10:57 PM -- Instance1988.1 has 18.2 for I/O Database Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.2 has 16.0 for I/O Database Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.3 has 14.6 for I/O Database Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.4 has 14.1 for I/O Database Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.5 has 15.0 for I/O Database Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.6 has 16.9 for I/O Database Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.1 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.1 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.2 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.3 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.4 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.5 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 4:10:57 PM -- Instance1988.6 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 4:10:57 PM -- Performance logging has ended.

10/1/2013 4:10:57 PM -- Automatic tuning succeeded.

10/1/2013 4:11:07 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.

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10/1/2013 4:11:07 PM -- Performance logging started (interval: 15000 ms).

10/1/2013 4:11:07 PM -- Attaining prerequisites:

10/1/2013 4:11:07 PM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last: 1587397000.0 (lower bound: 1449551000.0, upper bound: none)

10/2/2013 4:11:07 PM -- Performance logging has ended.

10/2/2013 5:15:47 PM -- JetInterop batch transaction stats: 283424, 283424, 283423, 283423, 283423 and 283423.

10/2/2013 5:15:47 PM -- Dispatching transactions ends.

10/2/2013 5:15:47 PM -- Shutting down databases ...

10/2/2013 5:15:51 PM -- Instance1988.1 (complete), Instance1988.2 (complete), Instance1988.3 (complete), Instance1988.4 (complete), Instance1988.5 (complete) and Instance1988.6 (complete)

10/2/2013 5:15:51 PM -- C:\Users\Administrator\Desktop\3016G SAS\Stress\Stress_2013_10_1_16_10_57.blg has 5751 samples.

10/2/2013 5:15:51 PM -- Creating test report ...

10/2/2013 5:16:30 PM -- Instance1988.1 has 16.8 for I/O Database Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.1 has 0.2 for I/O Log Writes Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.1 has 0.2 for I/O Log Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.2 has 15.6 for I/O Database Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.2 has 0.2 for I/O Log Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.3 has 15.0 for I/O Database Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.3 has 0.2 for I/O Log Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.4 has 14.9 for I/O Database Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.4 has 0.2 for I/O Log Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.5 has 15.4 for I/O Database Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.5 has 0.2 for I/O Log Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.6 has 16.7 for I/O Database Reads Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/2/2013 5:16:30 PM -- Instance1988.6 has 0.2 for I/O Log Reads Average Latency.

10/2/2013 5:16:30 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.

10/2/2013 5:16:30 PM -- The test has 0 Database Page Fault Stalls/sec samples higher than 0.

10/2/2013 5:16:30 PM -- C:\Users\Administrator\Desktop\3016G SAS\Stress\Stress_2013_10_1_16_10_57.xml has 5750 samples queried.

10/2/2013 5:16:30 PM -- C:\Users\Administrator\Desktop\3016G SAS\Stress\Stress_2013_10_1_16_10_57.html was saved.

10/2/2013 5:16:31 PM -- Performance logging started (interval: 30000 ms).

10/2/2013 5:16:31 PM -- Verifying database checksums ...

10/2/2013 7:55:50 PM -- F: (100% processed), G: (100% processed), H: (100% processed), I: (100% processed), J: (100% processed) and K: (100% processed)

10/2/2013 7:55:50 PM -- Performance logging has ended.

10/2/2013 7:55:50 PM -- C:\Users\Administrator\Desktop\3016G SAS\Stress\DBChecksum_2013_10_2_17_16_30.blg has 318 samples.

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Appendix B: performance test

Microsoft Exchange Jetstress 2013

2hr performance test (server 1)

Test summary

Overall Test Result	**Pass**
Machine Name	WIN-2IPTC89B5DU
Test Description	
Test Start Time	10/1/2013 9:08:31 AM
Test End Time	10/1/2013 1:18:36 PM
Collection Start Time	10/1/2013 9:16:36 AM
Collection End Time	10/1/2013 11:16:17 AM
Jetstress Version	15.00.0658.004
ESE Version	15.00.0516.026
Operating System	Windows Server 2008 R2 Enterprise (6.1.7600.0)
Performance Log	C:\Users\Administrator\Desktop\3016G SAS\Performance\Tuning_2013_10_1_9_9_55.blg C:\Users\Administrator\Desktop\3016G SAS\Performance\Performance_2013_10_1_9_16_12.blg

Database sizing and throughput

Achieved Transactional I/O per Second	791.907
Target Transactional I/O per Second	600
Initial Database Size (bytes)	9437203267584
Final Database Size (bytes)	9441355628544
Database Files (Count)	6

Jetstress system parameters

Thread Count	16
Minimum Database Cache	192.0 MB
Maximum Database Cache	1536.0 MB
Insert Operations	40%
Delete Operations	20%
Replace Operations	5%
Read Operations	35%
Lazy Commits	70%
Run Background Database Maintenance	True
Number of Copies per Database	2

Database configuration

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Instance1988.1	Log path: F:\log1 Database: F:\db1\Jetstress001001.edb
Instance1988.2	Log path: G:\log2 Database: G:\db2\Jetstress002001.edb
Instance1988.3	Log path: H:\log3 Database: H:\db3\Jetstress003001.edb
Instance1988.4	Log path: I:\log4 Database: I:\db4\Jetstress004001.edb
Instance1988.5	Log path: J:\log5 Database: J:\db5\Jetstress005001.edb
Instance1988.6	Log path: K:\log6 Database: K:\db6\Jetstress006001.edb

Transactional I/O performance

MS Exchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance1988.1	17.009	0.715	92.507	39.157	32955.682	37200.928	0.000	0.182	0.000	30.910	0.000	7810.917
Instance1988.2	15.797	0.748	92.428	39.317	32958.885	37212.685	0.000	0.172	0.000	31.023	0.000	7817.922
Instance1988.3	15.264	0.779	92.661	39.614	32957.729	37126.919	0.000	0.168	0.000	31.383	0.000	7811.484
Instance1988.4	15.170	0.824	93.128	39.880	32954.680	37108.029	0.000	0.168	0.000	31.110	0.000	7802.038
Instance1988.5	15.595	0.831	92.528	39.300	32956.772	37106.737	0.000	0.168	0.000	30.954	0.000	7839.561
Instance1988.6	16.904	0.972	92.318	39.068	32962.670	37027.448	0.000	0.175	0.000	30.747	0.000	7825.769

Background database maintenance I/O performance

MS Exchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance1988.1	8.670	261856.176
Instance1988.2	8.737	261720.661
Instance1988.3	8.810	261873.469
Instance1988.4	8.841	261862.963
Instance1988.5	8.827	261843.700
Instance1988.6	8.757	261859.885

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Log replication I/O performance

MS Exchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance1988.1	0.699	228183.000
Instance1988.2	0.702	227696.469
Instance1988.3	0.708	228669.530
Instance1988.4	0.701	226735.356
Instance1988.5	0.702	227746.871
Instance1988.6	0.696	223804.221

Total I/O performance

MS Exchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance1988.1	17.009	0.715	101.177	39.157	52571.411	37200.928	0.514	0.182	0.699	30.910	228183.000	7810.917
Instance1988.2	15.797	0.748	101.165	39.317	52715.994	37212.685	0.512	0.172	0.702	31.023	227696.469	7817.922
Instance1988.3	15.264	0.779	101.471	39.614	52831.896	37126.919	0.517	0.168	0.708	31.383	228669.530	7811.484
Instance1988.4	15.170	0.824	101.969	39.880	52802.396	37108.029	0.513	0.168	0.701	31.110	226735.356	7802.038
Instance1988.5	15.595	0.831	101.356	39.300	52891.265	37106.737	0.512	0.168	0.702	30.954	227746.871	7839.561
Instance1988.6	16.904	0.972	101.075	39.068	52794.484	37027.448	0.510	0.175	0.696	30.747	223804.221	7825.769

Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	0.651	0.000	2.946
Available MB	44812.180	44802.000	44824.000
Free System Page Table Entries	33555534.025	33555534.000	33555536.000
Transition Pages Repurposed/sec	0.000	0.000	0.000
Pool Non-Paged Bytes	36198960.100	35921920.000	36474880.000
Pool Paged Bytes	120501532.326	120475648.000	120541184.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test log

10/1/2013 9:08:31 AM -- Preparing for testing ...

10/1/2013 9:08:37 AM -- Attaching databases ...

10/1/2013 9:08:37 AM -- Preparations for testing are complete.

10/1/2013 9:08:37 AM -- Starting transaction dispatch ..

10/1/2013 9:08:37 AM -- Database cache settings: (minimum: 192.0 MB, maximum: 1.5 GB)

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10/1/2013 9:08:37 AM -- Database flush thresholds: (start: 15.3 MB, stop: 30.7 MB)

10/1/2013 9:08:44 AM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).

10/1/2013 9:08:44 AM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).

10/1/2013 9:08:44 AM -- Attaining prerequisites:

10/1/2013 9:09:55 AM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last: 1450193000.0 (lower bound: 1449551000.0, upper bound: none)

10/1/2013 9:10:06 AM -- Performance logging started (interval: 5000 ms).

10/1/2013 9:10:06 AM -- Automatic tuning is starting ...

10/1/2013 9:10:40 AM -- Instance1988.1 has 0.57 for read latency slope.

10/1/2013 9:10:40 AM -- Instance1988.2 has 0.22 for read latency slope.

10/1/2013 9:10:40 AM -- Instance1988.3 has 0.05 for read latency slope.

10/1/2013 9:10:40 AM -- Instance1988.4 has 0.04 for read latency slope.

10/1/2013 9:10:40 AM -- Instance1988.5 has 0.25 for read latency slope.

10/1/2013 9:10:40 AM -- Instance1988.6 has 0.34 for read latency slope.

10/1/2013 9:11:13 AM -- Instance1988.1 has 0.00 for read latency slope.

10/1/2013 9:11:13 AM -- Instance1988.2 has 0.01 for read latency slope.

10/1/2013 9:11:13 AM -- Instance1988.3 has 0.07 for read latency slope.

10/1/2013 9:11:13 AM -- Instance1988.4 has 0.07 for read latency slope.

10/1/2013 9:11:13 AM -- Instance1988.5 has 0.29 for read latency slope.

10/1/2013 9:11:13 AM -- Instance1988.6 has 0.20 for read latency slope.

10/1/2013 9:13:26 AM -- 466 batch transactions/sec and 32 sessions have 1074 IOPS.

10/1/2013 9:13:26 AM -- 32 sessions have actual 1074 IOPS (target IOPS: 600)

10/1/2013 9:13:26 AM -- Instance1988.1 has 25.8 for I/O Database Reads Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.2 has 23.2 for I/O Database Reads Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.3 has 22.3 for I/O Database Reads Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.4 has 22.3 for I/O Database Reads Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.5 has 22.9 for I/O Database Reads Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.6 has 25.3 for I/O Database Reads Average Latency.

10/1/2013 9:13:26 AM -- The process has average database read latencies higher than 20.000 msec.

10/1/2013 9:13:26 AM -- Instance1988.1 has 0.3 for I/O Log Writes Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.1 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.2 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.3 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.4 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.5 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 9:13:26 AM -- Instance1988.6 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 9:13:26 AM -- Operation mix: Sessions 16, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.

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10/1/2013 9:13:59 AM -- Instance1988.1 has 0.07 for read latency slope.

10/1/2013 9:13:59 AM -- Instance1988.2 has 0.11 for read latency slope.

10/1/2013 9:13:59 AM -- Instance1988.3 has 0.09 for read latency slope.

10/1/2013 9:13:59 AM -- Instance1988.4 has 0.01 for read latency slope.

10/1/2013 9:13:59 AM -- Instance1988.5 has 0.06 for read latency slope.

10/1/2013 9:13:59 AM -- Instance1988.6 has 0.11 for read latency slope.

10/1/2013 9:16:12 AM -- 342 batch transactions/sec and 16 sessions have 802 IOPS.

10/1/2013 9:16:12 AM -- 16 sessions have actual 802 IOPS (target IOPS: 600)

10/1/2013 9:16:12 AM -- Instance1988.1 has 16.5 for I/O Database Reads Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.2 has 15.8 for I/O Database Reads Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.3 has 16.0 for I/O Database Reads Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.4 has 15.2 for I/O Database Reads Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.5 has 15.2 for I/O Database Reads Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.6 has 16.0 for I/O Database Reads Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.1 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.1 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.2 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.3 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.4 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.5 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.6 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 9:16:12 AM -- Performance logging has ended.

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10/1/2013 9:16:21 AM -- Operation mix: Sessions 16, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.

10/1/2013 9:16:21 AM -- Performance logging started (interval: 15000 ms).

10/1/2013 9:16:21 AM -- Attaining prerequisites:

10/1/2013 9:16:21 AM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last: 1591333000.0 (lower bound: 1449551000.0, upper bound: none)

10/1/2013 11:16:22 AM -- Performance logging has ended.

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10/1/2013 1:18:33 PM -- Dispatching transactions ends.

10/1/2013 1:18:33 PM -- Shutting down databases ...

10/1/2013 1:18:36 PM -- Instance1988.1 (complete), Instance1988.2 (complete), Instance1988.3 (complete), Instance1988.4 (complete), Instance1988.5 (complete) and Instance1988.6 (complete)

10/1/2013 1:18:36 PM -- C:\Users\Administrator\Desktop\3016G SAS\Performance\Performance_2013_10_1_9_16_12.blg has 479 samples.

10/1/2013 1:18:36 PM -- Creating test report ...

10/1/2013 1:18:41 PM -- Instance1988.1 has 17.0 for I/O Database Reads Average Latency.

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10/1/2013 1:18:41 PM -- Instance1988.1 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.1 has 0.2 for I/O Log Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.2 has 15.8 for I/O Database Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.2 has 0.2 for I/O Log Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.3 has 15.3 for I/O Database Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.3 has 0.2 for I/O Log Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.4 has 15.2 for I/O Database Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.4 has 0.2 for I/O Log Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.5 has 15.6 for I/O Database Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.5 has 0.2 for I/O Log Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.6 has 16.9 for I/O Database Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.6 has 0.2 for I/O Log Reads Average Latency.

10/1/2013 1:18:41 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.

10/1/2013 1:18:41 PM -- The test has 0 Database Page Fault Stalls/sec samples higher than 0.

10/1/2013 1:18:41 PM -- C:\Users\Administrator\Desktop\3016G SAS\Performance\Performance_2013_10_1_9_16_12.xml has 478 samples queried.

Performance test database checksum (Server 1)

Checksum statistics - all

Database	Seen pages	Bad pages	Correctable pages	Wrong page-number pages	File length / seconds taken
F:\db1\Jetstress001001.edb	48021090	0	0	0	1500659 MB/9566 sec
G:\db2\Jetstress002001.edb	48021346	0	0	0	1500667 MB/9054 sec
H:\db3\Jetstress003001.edb	48021346	0	0	0	1500667 MB/8437 sec
I:\db4\Jetstress004001.edb	48021346	0	0	0	1500667 MB/8472 sec
J:\db5\Jetstress005001.edb	48021090	0	0	0	1500659 MB/9004 sec
K:\db6\Jetstress006001.edb	48021090	0	0	0	1500659 MB/9524 sec
(Sum)	288127308	0	0	0	9003978 MB/9567 sec

Disk subsystem performance (of checksum)

Logical Disk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Read
F:	0.023	0.000	2452.794	0.000	65536.000

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G:	0.019	0.000	2643.028	0.000	65536.000
H:	0.017	0.000	2845.135	0.000	65536.000
I:	0.017	0.000	2832.713	0.000	65536.000
J:	0.018	0.000	2666.599	0.000	65536.000
K:	0.022	0.000	2516.395	0.000	65536.000

Memory system performance (of checksum)

Counter	Average	Minimum	Maximum
% Processor Time	4.945	3.472	7.906
Available MB	46395.000	46365.000	46413.000
Free System Page Table Entries	33555534.063	33555534.000	33555536.000
Transition Pages Repurposed/sec	0.000	0.000	0.000
Pool Non-Paged Bytes	37634498.818	37515264.000	37748736.000
Pool Paged Bytes	122365475.421	122331136.000	122515456.000

Test log

10/1/2013 9:08:31 AM -- Preparing for testing ...

10/1/2013 9:08:37 AM -- Attaching databases ...

10/1/2013 9:08:37 AM -- Preparations for testing are complete.

10/1/2013 9:08:37 AM -- Starting transaction dispatch ..

10/1/2013 9:08:37 AM -- Database cache settings: (minimum: 192.0 MB, maximum: 1.5 GB)

10/1/2013 9:08:37 AM -- Database flush thresholds: (start: 15.3 MB, stop: 30.7 MB)

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10/1/2013 9:11:13 AM -- Instance1988.6 has 0.20 for read latency slope.

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10/1/2013 9:16:12 AM -- Instance1988.2 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

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10/1/2013 9:16:12 AM -- Instance1988.3 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.4 has 0.0 for I/O Log Reads Average Latency.

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10/1/2013 9:16:12 AM -- Instance1988.5 has 0.0 for I/O Log Reads Average Latency.

10/1/2013 9:16:12 AM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

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10/1/2013 1:18:36 PM -- C:\Users\Administrator\Desktop\3016G SAS\Performance\Performance_2013_10_1_9_16_12.blg has 479 samples.

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10/1/2013 1:18:41 PM -- Instance1988.1 has 0.2 for I/O Log Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.2 has 15.8 for I/O Database Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.2 has 0.2 for I/O Log Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.3 has 15.3 for I/O Database Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.3 has 0.2 for I/O Log Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.4 has 15.2 for I/O Database Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.4 has 0.2 for I/O Log Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.5 has 15.6 for I/O Database Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.5 has 0.2 for I/O Log Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.6 has 16.9 for I/O Database Reads Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/1/2013 1:18:41 PM -- Instance1988.6 has 0.2 for I/O Log Reads Average Latency.

10/1/2013 1:18:41 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.

10/1/2013 1:18:41 PM -- The test has 0 Database Page Fault Stalls/sec samples higher than 0.

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10/1/2013 1:18:41 PM -- C:\Users\Administrator\Desktop\3016G SAS\Performance\Performance_2013_10_1_9_16_12.xml has 478 samples queried.

10/1/2013 1:18:42 PM -- C:\Users\Administrator\Desktop\3016G SAS\Performance\Performance_2013_10_1_9_16_12.html was saved.

10/1/2013 1:18:43 PM -- Performance logging started (interval: 30000 ms).

10/1/2013 1:18:43 PM -- Verifying database checksums ...

10/1/2013 3:58:10 PM -- F: (100% processed), G: (100% processed), H: (100% processed), I: (100% processed), J: (100% processed) and K: (100% processed)

10/1/2013 3:58:10 PM -- Performance logging has ended.

10/1/2013 3:58:10 PM -- C:\Users\Administrator\Desktop\3016G SAS\Performance\DBChecksum_2013_10_1_13_18_42.blg has 318 samples.

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Appendix C: database backup test

Microsoft Exchange Jetstress 2013

Database backup test (server 1)

Database backup statistics - All

Database Instance	Database Size (MB)	Elapsed Backup Time	MB Transferred/sec
Instance1988.1	1504403.09	03:19:33	125.64
Instance1988.2	1504419.09	03:14:26	128.95
Instance1988.3	1504427.09	03:11:45	130.75
Instance1988.4	1504435.09	03:10:59	131.28
Instance1988.5	1504411.09	03:14:24	128.97
Instance1988.6	1504419.09	03:17:53	126.71
Avg			128.72
Sum			772.31

Jetstress system parameters

Thread Count	32
Minimum Database Cache	192.0 MB
Maximum Database Cache	1536.0 MB
Insert Operations	40%
Delete Operations	20%
Replace Operations	5%
Read Operations	35%
Lazy Commits	70%

Database configuration

Instance1988.1	Log path: F:\log1 Database: F:\db1\Jetstress001001.edb
Instance1988.2	Log path: G:\log2 Database: G:\db2\Jetstress002001.edb
Instance1988.3	Log path: H:\log3 Database: H:\db3\Jetstress003001.edb
Instance1988.4	Log path: I:\log4 Database: I:\db4\Jetstress004001.edb
Instance1988.5	Log path: J:\log5

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	Database: J:\db5\Jetstress005001.edb
Instance1988.6	Log path: K:\log6 Database: K:\db6\Jetstress006001.edb

Transactional I/O performance

MS Exchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance1988.1	2.488	0.000	498.804	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance1988.2	2.291	0.000	514.911	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance1988.3	2.248	0.000	522.853	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance1988.4	2.240	0.000	524.985	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance1988.5	2.292	0.000	515.055	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance1988.6	2.401	0.000	505.391	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	2.460	0.695	3.730
Available MB	46183.098	46164.000	46257.000
Free System Page Table Entries	33555535.781	33555534.000	33555536.000
Transition Pages Repurposed/sec	0.000	0.000	0.000
Pool Non-Paged Bytes	39546139.015	38477824.000	39768064.000
Pool Paged Bytes	131147261.427	127385600.000	131665920.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test log

10/3/2013 9:21:35 AM -- Preparing for testing ...

10/3/2013 9:21:42 AM -- Attaching databases ...

10/3/2013 9:21:42 AM -- Preparations for testing are complete.

10/3/2013 9:21:53 AM -- Performance logging started (interval: 30000 ms).

10/3/2013 9:21:53 AM -- Backing up databases ...

10/3/2013 12:41:27 PM -- Performance logging has ended.

10/3/2013 12:41:27 PM -- Instance1988.1 (100% processed), Instance1988.2 (100% processed), Instance1988.3 (100% processed), Instance1988.4 (100% processed), Instance1988.5 (100% processed) and Instance1988.6 (100% processed)

10/3/2013 12:41:27 PM -- C:\Users\Administrator\Desktop\3016G SAS\Database\DatabaseBackup_2013_10_3_9_21_42.blg has 398 samples.

10/3/2013 12:41:27 PM -- Creating test report ...

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Appendix D: soft recovery test

Microsoft Exchange Jetstress 2013

Soft recovery test (server 1)

Soft recovery statistics - all

Database instance	Log files replayed	Elapsed seconds
Instance1988.1	510	1146.7736142
Instance1988.2	504	1044.141034
Instance1988.3	504	983.4101273
Instance1988.4	501	967.4980994
Instance1988.5	503	1048.3842414
Instance1988.6	512	1162.4204417
Avg.	505	1058.771
Sum	3034	6352.627558

Database configuration

Instance1988.1	Log path: F:\log1 Database: F:\db1\Jetstress001001.edb
Instance1988.2	Log path: G:\log2 Database: G:\db2\Jetstress002001.edb
Instance1988.3	Log path: H:\log3 Database: H:\db3\Jetstress003001.edb
Instance1988.4	Log path: I:\log4 Database: I:\db4\Jetstress004001.edb
Instance1988.5	Log path: J:\log5 Database: J:\db5\Jetstress005001.edb
Instance1988.6	Log path: K:\log6 Database: K:\db6\Jetstress006001.edb

Transactional I/O performance

MS Exchange Database ==> Instances	I/O Database Reads	I/O Database Writes	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads	I/O Database Writes	I/O Log Reads Average	I/O Log Writes Average	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average	I/O Log Writes Average

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	Average Latency (msec)	Average Latency (msec)			Average Bytes	Average Bytes	Latency (msec)	Latency (msec)			Bytes	Bytes
Instance1988.1	14.118	0.179	373.532	1.778	40749.692	32768.000	11.902	0.000	2.224	0.000	209703.857	0.000
Instance1988.2	12.990	0.182	414.312	1.929	40864.640	32640.992	8.807	0.000	2.413	0.000	208930.258	0.000
Instance1988.3	12.431	0.179	441.729	2.047	40619.880	32768.000	7.448	0.000	2.561	0.000	209683.220	0.000
Instance1988.4	12.318	0.176	448.003	2.069	40538.261	32768.000	7.150	0.000	2.589	0.000	209590.833	0.000
Instance1988.5	13.078	0.184	415.495	1.913	40644.444	32768.000	7.581	0.000	2.394	0.000	209695.375	0.000
Instance1988.6	14.436	0.178	364.668	1.760	40850.486	32768.000	8.561	0.000	2.210	0.002	209677.498	14.222

Background database maintenance I/O performance

MS Exchange Database ==> Instances	Database Maintenance I/O Reads/sec	Database Maintenance I/O Reads Average Bytes
Instance1988.1	9.108	261942.695
Instance1988.2	9.138	261955.832
Instance1988.3	9.131	262045.317
Instance1988.4	9.147	261797.912
Instance1988.5	9.139	261853.072
Instance1988.6	9.139	261972.398

Total I/O performance

MS Exchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance1988.1	14.118	0.179	382.641	1.778	46014.919	32768.000	11.902	0.000	2.224	0.000	209703.857	0.000
Instance1988.2	12.990	0.182	423.450	1.929	45635.551	32640.992	8.807	0.000	2.413	0.000	208930.258	0.000
Instance1988.3	12.431	0.179	450.860	2.047	45104.318	32768.000	7.448	0.000	2.561	0.000	209683.220	0.000
Instance1988.4	12.318	0.176	457.149	2.069	44965.174	32768.000	7.150	0.000	2.589	0.000	209590.833	0.000
Instance1988.5	13.078	0.184	424.634	1.913	45405.254	32768.000	7.581	0.000	2.394	0.000	209695.375	0.000
Instance1988.6	14.436	0.178	373.807	1.760	46256.745	32768.000	8.561	0.000	2.210	0.002	209677.498	14.222

Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	1.991	0.000	10.651
Available MB	44791.882	44735.000	46275.000
Free System Page Table Entries	33555535.768	33555534.000	33555536.000

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Transition Pages Repurposed/sec	0.000	0.000	0.000
Pool Non-Paged Bytes	40218921.633	40136704.000	40280064.000
Pool Paged Bytes	133166104.803	133140480.000	133206016.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test log

10/3/2013 1:18:42 PM -- Preparing for testing ...

10/3/2013 1:18:48 PM -- Attaching databases ...

10/3/2013 1:18:48 PM -- Preparations for testing are complete.

10/3/2013 1:18:48 PM -- Starting transaction dispatch ..

10/3/2013 1:18:48 PM -- Database cache settings: (minimum: 192.0 MB, maximum: 1.5 GB)

10/3/2013 1:18:48 PM -- Database flush thresholds: (start: 15.3 MB, stop: 30.7 MB)

10/3/2013 1:18:55 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).

10/3/2013 1:18:55 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).

10/3/2013 1:18:55 PM -- Attaining prerequisites:

10/3/2013 1:20:40 PM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last: 1452429000.0 (lower bound: 1449551000.0, upper bound: none)

10/3/2013 1:20:47 PM -- Performance logging started (interval: 5000 ms).

10/3/2013 1:20:47 PM -- Automatic tuning is starting ...

10/3/2013 1:21:20 PM -- Instance1988.1 has 0.18 for read latency slope.

10/3/2013 1:21:20 PM -- Instance1988.2 has 0.00 for read latency slope.

10/3/2013 1:21:20 PM -- Instance1988.3 has 0.14 for read latency slope.

10/3/2013 1:21:20 PM -- Instance1988.4 has 0.15 for read latency slope.

10/3/2013 1:21:20 PM -- Instance1988.5 has 0.14 for read latency slope.

10/3/2013 1:21:20 PM -- Instance1988.6 has 0.09 for read latency slope.

10/3/2013 1:23:32 PM -- 373 batch transactions/sec and 32 sessions have 981 IOPS.

10/3/2013 1:23:32 PM -- 32 sessions have actual 981 IOPS (target IOPS: 600)

10/3/2013 1:23:32 PM -- Instance1988.1 has 17.2 for I/O Database Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.2 has 17.1 for I/O Database Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.3 has 15.7 for I/O Database Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.4 has 15.5 for I/O Database Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.5 has 15.4 for I/O Database Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.6 has 16.4 for I/O Database Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.1 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.1 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.2 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.3 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.4 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

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10/3/2013 1:23:32 PM -- Instance1988.5 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.6 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:23:32 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.

10/3/2013 1:24:05 PM -- Instance1988.1 has 0.15 for read latency slope.

10/3/2013 1:24:05 PM -- Instance1988.2 has 0.00 for read latency slope.

10/3/2013 1:24:05 PM -- Instance1988.3 has 0.02 for read latency slope.

10/3/2013 1:24:05 PM -- Instance1988.4 has 0.04 for read latency slope.

10/3/2013 1:24:05 PM -- Instance1988.5 has 0.19 for read latency slope.

10/3/2013 1:24:05 PM -- Instance1988.6 has 0.14 for read latency slope.

10/3/2013 1:26:18 PM -- 334 batch transactions/sec and 16 sessions have 881 IOPS.

10/3/2013 1:26:18 PM -- 16 sessions have actual 881 IOPS (target IOPS: 600)

10/3/2013 1:26:18 PM -- Instance1988.1 has 17.4 for I/O Database Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.2 has 16.3 for I/O Database Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.3 has 15.5 for I/O Database Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.4 has 14.9 for I/O Database Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.5 has 15.6 for I/O Database Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.6 has 16.6 for I/O Database Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.1 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.1 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.2 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.3 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.4 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.5 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.6 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:26:18 PM -- Performance logging has ended.

10/3/2013 1:26:18 PM -- Automatic tuning succeeded.

10/3/2013 1:26:25 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.

10/3/2013 1:26:25 PM -- Performance logging started (interval: 15000 ms).

10/3/2013 1:26:25 PM -- Generating log files ...

10/3/2013 3:05:56 PM -- F:\log1 (102.0% generated), G:\log2 (100.8% generated), H:\log3 (100.8% generated), I:\log4 (100.2% generated), J:\log5 (100.6% generated) and K:\log6 (102.4% generated)

10/3/2013 3:05:56 PM -- Performance logging has ended.

10/3/2013 3:05:56 PM -- JetInterop batch transaction stats: 21741, 21741, 21741, 21741, 21741 and 21740.

10/3/2013 3:05:56 PM -- Dispatching transactions ends.

10/3/2013 3:05:57 PM -- Shutting down databases ...

10/3/2013 3:06:04 PM -- Instance1988.1 (complete), Instance1988.2 (complete), Instance1988.3 (complete), Instance1988.4 (complete),

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Instance1988.5 (complete) and Instance1988.6 (complete)

10/3/2013 3:06:04 PM -- C:\Users\Administrator\Desktop\3016G SAS\Software Recovery\Performance_2013_10_3_13_26_18.blg has 397 samples.

10/3/2013 3:06:04 PM -- Creating test report ...

10/3/2013 3:06:06 PM -- Instance1988.1 has 16.2 for I/O Database Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.1 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.1 has 0.2 for I/O Log Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.2 has 15.3 for I/O Database Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.2 has 0.2 for I/O Log Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.3 has 14.7 for I/O Database Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.3 has 0.2 for I/O Log Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.4 has 14.7 for I/O Database Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.4 has 0.2 for I/O Log Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.5 has 15.1 for I/O Database Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.5 has 0.2 for I/O Log Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.6 has 16.1 for I/O Database Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.6 has 0.2 for I/O Log Reads Average Latency.

10/3/2013 3:06:06 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.

10/3/2013 3:06:06 PM -- The test has 0 Database Page Fault Stalls/sec samples higher than 0.

10/3/2013 3:06:06 PM -- C:\Users\Administrator\Desktop\3016G SAS\Software Recovery\Performance_2013_10_3_13_26_18.xml has 396 samples queried.

10/3/2013 3:06:06 PM -- C:\Users\Administrator\Desktop\3016G SAS\Software Recovery\Performance_2013_10_3_13_26_18.html was saved.

10/3/2013 3:16:13 PM -- Performance logging started (interval: 4000 ms).

10/3/2013 3:16:13 PM -- Recovering databases ...

10/3/2013 3:35:35 PM -- Performance logging has ended.

10/3/2013 3:35:35 PM -- Instance1988.1 (1146.7736142), Instance1988.2 (1044.141034), Instance1988.3 (983.4101273), Instance1988.4 (967.4980994), Instance1988.5 (1048.3842414) and Instance1988.6 (1162.4204417)

10/3/2013 3:35:36 PM -- C:\Users\Administrator\Desktop\3016G SAS\Software Recovery\SoftRecovery_2013_10_3_15_16_7.blg has 289 samples.

10/3/2013 3:35:36 PM -- Creating test report ...

Soft recovery performance test (server 1)

Test summary

Overall Test Result	**Pass**
Machine Name	WIN-2IPTC89B5DU
Test Description	
Test Start Time	10/3/2013 1:18:42 PM

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Test End Time	10/3/2013 3:06:04 PM
Collection Start Time	10/3/2013 1:26:40 PM
Collection End Time	10/3/2013 3:05:49 PM
Jetstress Version	15.00.0658.004
ESE Version	15.00.0516.026
Operating System	Windows Server 2008 R2 Enterprise (6.1.7600.0)
Performance Log	C:\Users\Administrator\Desktop\3016G SAS\Software Recovery\Tuning_2013_10_3_13_20_40.blg C:\Users\Administrator\Desktop\3016G SAS\Software Recovery\Performance_2013_10_3_13_26_18.blg

Database sizing and throughput

Achieved Transactional I/O per Second	871.94
Target Transactional I/O per Second	600
Initial Database Size (bytes)	9465036668928
Final Database Size (bytes)	9466848608256
Database Files (Count)	6

Jetstress system parameters

Thread Count	16
Minimum Database Cache	192.0 MB
Maximum Database Cache	1536.0 MB
Insert Operations	40%
Delete Operations	20%
Replace Operations	5%
Read Operations	35%
Lazy Commits	70%

Database configuration

Instance1988.1	Log path: F:\log1 Database: F:\db1\Jetstress001001.edb
Instance1988.2	Log path: G:\log2 Database: G:\db2\Jetstress002001.edb
Instance1988.3	Log path: H:\log3 Database: H:\db3\Jetstress003001.edb
Instance1988.4	Log path: I:\log4 Database: I:\db4\Jetstress004001.edb
Instance1988.5	Log path: J:\log5 Database: J:\db5\Jetstress005001.edb
Instance1988.6	Log path: K:\log6

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	Database: K:\db6\Jetstress006001.edb

Transactional I/O performance

MS Exchange Database ==> Instances	I/O Database Reads Average Latency (msec)	I/O Database Writes Average Latency (msec)	I/O Database Reads/sec	I/O Database Writes/sec	I/O Database Reads Average Bytes	I/O Database Writes Average Bytes	I/O Log Reads Average Latency (msec)	I/O Log Writes Average Latency (msec)	I/O Log Reads/sec	I/O Log Writes/sec	I/O Log Reads Average Bytes	I/O Log Writes Average Bytes
Instance1988.1	16.201	0.905	101.236	43.963	32768.000	35384.252	0.000	0.170	0.000	31.377	0.000	7809.559
Instance1988.2	15.263	0.951	101.348	43.589	32768.000	35406.379	0.000	0.170	0.000	31.126	0.000	7765.652
Instance1988.3	14.715	1.011	101.809	43.866	32768.277	35360.543	0.000	0.170	0.000	31.124	0.000	7756.228
Instance1988.4	14.686	1.081	101.624	43.720	32768.307	35376.878	0.000	0.170	0.000	30.746	0.000	7817.318
Instance1988.5	15.074	1.172	101.580	43.763	32768.000	35355.573	0.000	0.170	0.000	30.874	0.000	7799.285
Instance1988.6	16.055	1.285	101.377	44.063	32768.000	35443.178	0.000	0.170	0.000	31.404	0.000	7789.627

Host system performance

Counter	Average	Minimum	Maximum
% Processor Time	0.874	0.000	4.114
Available MB	44734.428	44722.000	44772.000
Free System Page Table Entries	33555535.872	33555534.000	33555536.000
Transition Pages Repurposed/sec	0.000	0.000	0.000
Pool Non-Paged Bytes	40440169.108	40357888.000	40570880.000
Pool Paged Bytes	132986204.212	132915200.000	133099520.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test log

10/3/2013 1:18:42 PM -- Preparing for testing ...

10/3/2013 1:18:48 PM -- Attaching databases ...

10/3/2013 1:18:48 PM -- Preparations for testing are complete.

10/3/2013 1:18:48 PM -- Starting transaction dispatch ..

10/3/2013 1:18:48 PM -- Database cache settings: (minimum: 192.0 MB, maximum: 1.5 GB)

10/3/2013 1:18:48 PM -- Database flush thresholds: (start: 15.3 MB, stop: 30.7 MB)

10/3/2013 1:18:55 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).

10/3/2013 1:18:55 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).

10/3/2013 1:18:55 PM -- Attaining prerequisites:

10/3/2013 1:20:40 PM -- \MSExchange Database(JetstressWin)\Database Cache Size, Last: 1452429000.0 (lower bound: 1449551000.0, upper bound: none)

10/3/2013 1:20:47 PM -- Performance logging started (interval: 5000 ms).

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10/3/2013 1:20:47 PM -- Automatic tuning is starting ...

10/3/2013 1:21:20 PM -- Instance1988.1 has 0.18 for read latency slope.

10/3/2013 1:21:20 PM -- Instance1988.2 has 0.00 for read latency slope.

10/3/2013 1:21:20 PM -- Instance1988.3 has 0.14 for read latency slope.

10/3/2013 1:21:20 PM -- Instance1988.4 has 0.15 for read latency slope.

10/3/2013 1:21:20 PM -- Instance1988.5 has 0.14 for read latency slope.

10/3/2013 1:21:20 PM -- Instance1988.6 has 0.09 for read latency slope.

10/3/2013 1:23:32 PM -- 373 batch transactions/sec and 32 sessions have 981 IOPS.

10/3/2013 1:23:32 PM -- 32 sessions have actual 981 IOPS (target IOPS: 600)

10/3/2013 1:23:32 PM -- Instance1988.1 has 17.2 for I/O Database Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.2 has 17.1 for I/O Database Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.3 has 15.7 for I/O Database Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.4 has 15.5 for I/O Database Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.5 has 15.4 for I/O Database Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.6 has 16.4 for I/O Database Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.1 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.1 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.2 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.3 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.4 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.5 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:23:32 PM -- Instance1988.6 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:23:32 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.

10/3/2013 1:24:05 PM -- Instance1988.1 has 0.15 for read latency slope.

10/3/2013 1:24:05 PM -- Instance1988.2 has 0.00 for read latency slope.

10/3/2013 1:24:05 PM -- Instance1988.3 has 0.02 for read latency slope.

10/3/2013 1:24:05 PM -- Instance1988.4 has 0.04 for read latency slope.

10/3/2013 1:24:05 PM -- Instance1988.5 has 0.19 for read latency slope.

10/3/2013 1:24:05 PM -- Instance1988.6 has 0.14 for read latency slope.

10/3/2013 1:26:18 PM -- 334 batch transactions/sec and 16 sessions have 881 IOPS.

10/3/2013 1:26:18 PM -- 16 sessions have actual 881 IOPS (target IOPS: 600)

10/3/2013 1:26:18 PM -- Instance1988.1 has 17.4 for I/O Database Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.2 has 16.3 for I/O Database Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.3 has 15.5 for I/O Database Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.4 has 14.9 for I/O Database Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.5 has 15.6 for I/O Database Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.6 has 16.6 for I/O Database Reads Average Latency.

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10/3/2013 1:26:18 PM -- Instance1988.1 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.1 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.2 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.3 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.4 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.5 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 1:26:18 PM -- Instance1988.6 has 0.0 for I/O Log Reads Average Latency.

10/3/2013 1:26:18 PM -- Performance logging has ended.

10/3/2013 1:26:18 PM -- Automatic tuning succeeded.

10/3/2013 1:26:25 PM -- Operation mix: Sessions 16, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.

10/3/2013 1:26:25 PM -- Performance logging started (interval: 15000 ms).

10/3/2013 1:26:25 PM -- Generating log files ...

10/3/2013 3:05:56 PM -- F:\log1 (102.0% generated), G:\log2 (100.8% generated), H:\log3 (100.8% generated), I:\log4 (100.2% generated), J:\log5 (100.6% generated) and K:\log6 (102.4% generated)

10/3/2013 3:05:56 PM -- Performance logging has ended.

10/3/2013 3:05:56 PM -- JetInterop batch transaction stats: 21741, 21741, 21741, 21741, 21741 and 21740.

10/3/2013 3:05:56 PM -- Dispatching transactions ends.

10/3/2013 3:05:57 PM -- Shutting down databases ...

10/3/2013 3:06:04 PM -- Instance1988.1 (complete), Instance1988.2 (complete), Instance1988.3 (complete), Instance1988.4 (complete), Instance1988.5 (complete) and Instance1988.6 (complete)

10/3/2013 3:06:04 PM -- C:\Users\Administrator\Desktop\3016G SAS\Software Recovery\Performance_2013_10_3_13_26_18.blg has 397 samples.

10/3/2013 3:06:04 PM -- Creating test report ...

10/3/2013 3:06:06 PM -- Instance1988.1 has 16.2 for I/O Database Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.1 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.1 has 0.2 for I/O Log Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.2 has 15.3 for I/O Database Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.2 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.2 has 0.2 for I/O Log Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.3 has 14.7 for I/O Database Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.3 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.3 has 0.2 for I/O Log Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.4 has 14.7 for I/O Database Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.4 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.4 has 0.2 for I/O Log Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.5 has 15.1 for I/O Database Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.5 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.5 has 0.2 for I/O Log Reads Average Latency.

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10/3/2013 3:06:06 PM -- Instance1988.6 has 16.1 for I/O Database Reads Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.6 has 0.2 for I/O Log Writes Average Latency.

10/3/2013 3:06:06 PM -- Instance1988.6 has 0.2 for I/O Log Reads Average Latency.

10/3/2013 3:06:06 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.

10/3/2013 3:06:06 PM -- The test has 0 Database Page Fault Stalls/sec samples higher than 0.

10/3/2013 3:06:06 PM -- C:\Users\Administrator\Desktop\3016G SAS\Software Recovery\Performance_2013_10_3_13_26_18.xml has 396 samples queried.

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