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Dell Compellent Storage Center (SC8000) 10,000 Mailbox Exchange 2010 Resiliency Storage Solution

Dell Compellent Technical Solutions



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Contents

- Introduction..... 5
 - Simulated Environment..... 5
 - Solution Description 5
- The Dell Compellent Storage Center (SC8000) Solution..... 8
 - Powerful Suite of Software 8
 - Intuitive, Unified Interface 8
 - Targeted Customer Profile 10
 - Volume sizing..... 10
 - Tested Deployment 11
- Best Practices 13
 - Using Dell Compellent Storage Center Data Progression 14
 - Core Storage..... 15
 - Backup Strategy 17
- Additional Information 18
 - Test Results Summary 19
 - Reliability 19
 - Storage Performance Results 20
 - Server 1 – JS6 20
 - Server 2 – JS7 20
 - Server 3 – JS8 21
 - Server 4 – JS9 21
- Database Backup/Recovery Performance 22
- Conclusion..... 22
- Appendix A: Performance Testing 23
 - Server 1 – JS6 23
 - Server 2 – JS7 30
 - Server 3 – JS8 37
 - Server 4 – JS9 44
- Appendix B: Stress Testing 51

Server 1 – JS6 51

Server 2 – JS7 57

Server 3 – JS8 63

Server 4 – JS9 68

Appendix C: Backup testing 73

 Server 1 – JS6 73

 Server 2 – JS7 76

 Server 3 – JS8 79

 Server 4 – JS9 82

Appendix D: Recovery testing 85

 Server 1 – JS6 85

 Server 2 – JS7 89

 Server 3 – JS8 94

 Server 4 – JS9 99

Introduction

Simulated Environment

The solution presented in this document is designed to simulate a large number of mailboxes hosted on highly redundant hardware. Application level redundancy is augmented with redundant storage to create a highly available and fault tolerant solution.

The Mailbox Resiliency features of Exchange 2010 have greatly enhanced the availability of Exchange 2010, while also improving I/O performance. The solution presented here is a Mailbox Resiliency solution utilizing 1 Database Availability Group (DAG) and 2 copies of every database. The tested environment simulates all users in this DAG running on a single Storage Center or half of the solution. The number of users simulated was 10,000 across 4 servers, with 2,500 users per server. The mailbox size was 2GB per user. Each server has 4 databases, with one copy local and the second copy replicated to the second server. This provides redundancy through hardware and software.

The replication mechanism is the native Exchange 2010 DAG log shipping engine. This is a very efficient and reliable replication mechanism and is the recommended method for providing highly-available and redundant Exchange solutions.

Solution Description

The storage hardware tested was a Dell Compellent Storage Center (SC8000). This is a redundant controller pair, with redundant front-end and back-end connections. The front-end connections were fiber-channel based, over redundant fabrics, with 2 ports per server, and 4 ports per controller. Two 24 bay 2.5" drive enclosures are utilized with each Storage Center.

The disk connectivity is SAS 6Gbps. The spindle count is 46 disks/2 spares for database and logs, on a dedicated disk pool on each Storage Center. As this is a redundant solution, databases and logs are stored together on the same volumes. All volumes are RAID-5.

For information about compatibility please use the following link:

<http://windowsservercatalog.com/item.aspx?idItem=9fb76108-7f81-d263-24dd-7c037bd9a4d1&bCatID=1282>

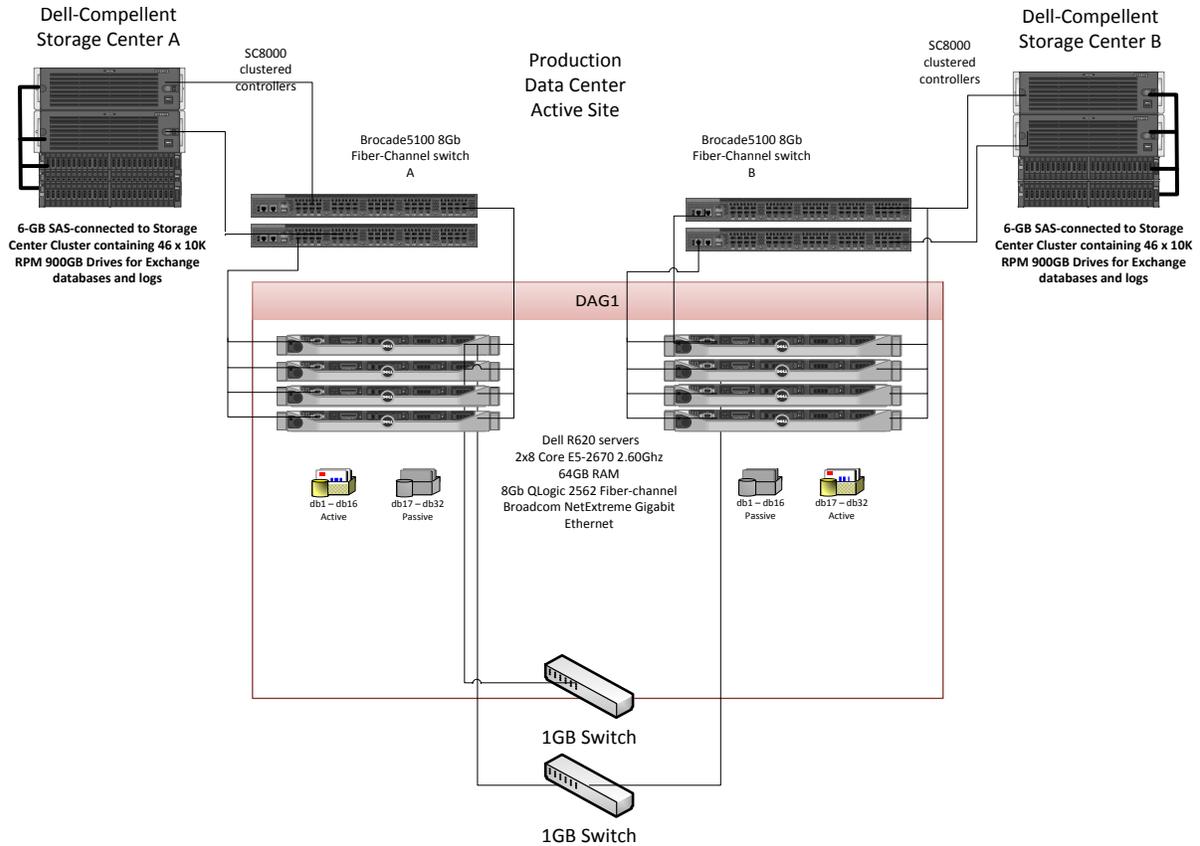


Figure 1 – Highly Available Data Center Design

The solution is designed around a highly available data center model (Figure 1). There are 2 disk arrays, for complete redundancy. The Exchange configuration is 1 DAG. The LAN ports are in a dedicated replication VLAN, for traffic isolation. There are 2 networks for redundancy.

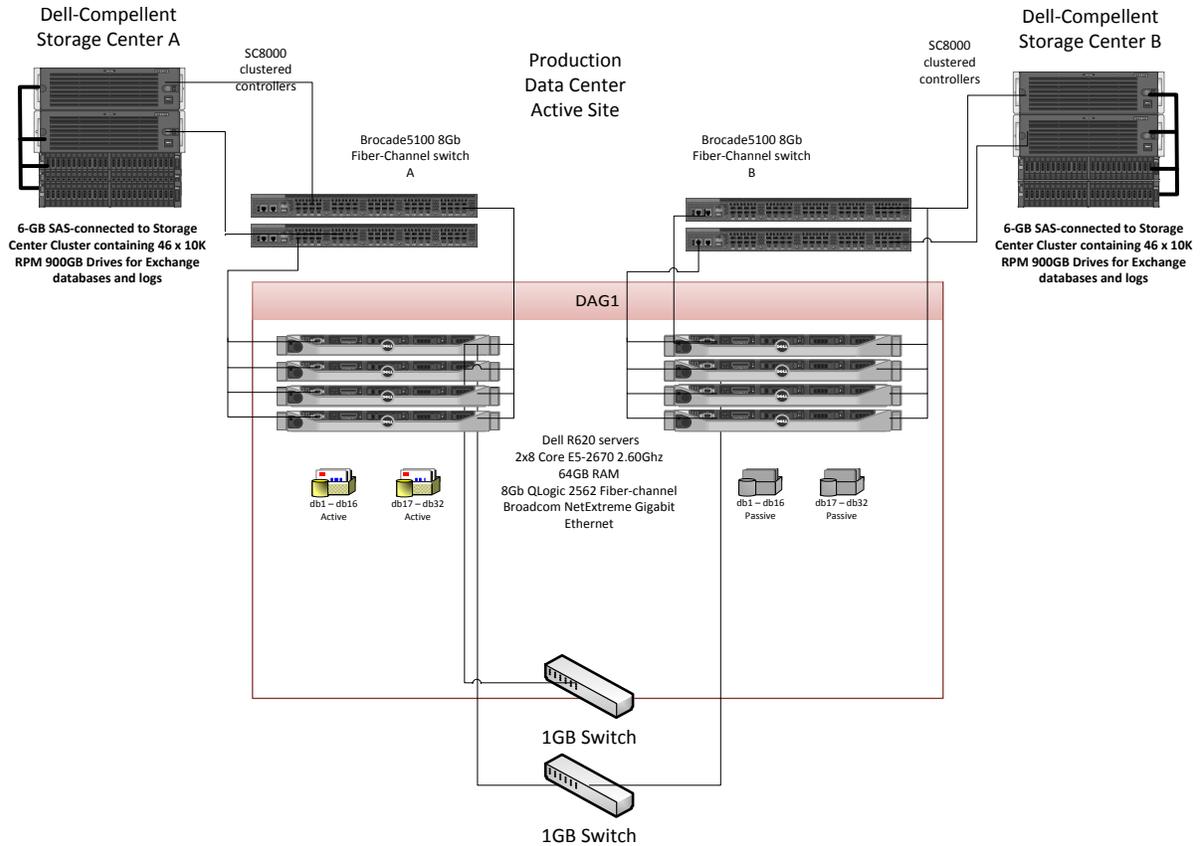


Figure 2 – Tested configuration with Storage Center A with Full user Load and Storage Center B offline

The tested configuration was a single Storage Center array (Figure 2), running with the full user load. This is to clearly show a single array can handle the user load in an array failure scenario. Under normal operating conditions the preferred activation scenario would be to run half of the mailbox databases active on each Storage Center array, while either array could handle the entire workload at any given time.

The ability to handle the entire workload on a single Storage Center array means no IO performance degradation will occur if an array or any volume(s) were to fail. All mailbox servers would have volumes mapped to both arrays, with 1 copy of each database on each array.

The Dell Compellent Storage Center (SC8000) Solution

A Modular Hardware Design

The hardware design consists of Dell 12G server-based clustered controllers providing automatic failover. Dell Compellent can seamlessly connect to any open-systems server without the need for server side agents. Organizations can mix and match Fiber Channel and iSCSI server connectivity, and disk enclosures support any external interface and disks based on Solid State, Fiber Channel, and/or Serial ATA.

Next-generation SC8000 controllers combine the benefits of proven Dell™ Fluid Data™ architecture with resilient Dell hardware design to provide efficiency, quality and durability. Compared with previous generations of Compellent controllers, the SC8000 offers increased density, exceptional processing power, greater memory, and faster PCIe Gen3 I/O bus — making the SC8000 the scalability and performance platform choice for the future.

Powerful Suite of Software

Storage Center offers a powerful suite of enterprise capabilities to manage data differently. Building on Dell Compellent's Dynamic Block Architecture, Storage Center software intelligently optimizes data movement and access at the block-level to maximize utilization, automate tiered storage, simplify replication and speed data recovery.

Intuitive, Unified Interface

A centralized management interface streamlines administration and speeds common storage management tasks. The interface features a point-and-click wizard-based setup and management, comprehensive Phone Home capabilities, automatic notification when user-defined capacity thresholds are reached, and advanced storage consumption and chargeback reporting.

Dell Compellent's Enterprise Manager further simplifies storage management by providing comprehensive monitoring of all local and remote Storage Center environments.

Enterprise Manager allows you to gain better insight into your Storage Center deployments and reduces planning and configuration time for remote replications.

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

This solution is targeted for users large and small. Capacity can be dynamically scaled from 1TB to over a Petabyte. This provides excellent growth potential with no downtime required for upgrades.

- A Storage Center solution can be sized for any size organization
- Unlimited number of hosts can be attached, via Fiber-Channel and iSCSI
- User IO profile (.15 IOPS per user, .18 tested, giving 20% headroom).
- User mailbox size (2 GB quota)
- Backup strategy - VSS backup using SAN based snapshots, use Mailbox Resiliency as primary data protection mechanism.
- Using SAN based snapshots, and boot from SAN, a complete server can be restored in minutes.
- The tested RAID type was RAID 5 for database volumes and log volumes, while a mix of RAID10, RAID5, and RAID6 can be blended, with fully automated tiered storage providing the most efficient and best performing storage where needed.

Volume sizing

- The volume size tested was just large enough to support the database size. Volumes on Dell Compellent storage can be grown dynamically, without affecting service. As database sizes approach volume sizes, any volume can be automatically increased on demand. This simplifies sizing, as capacity can be added as needed.
- Using Dell Compellent Dynamic Capacity and hot upgrades additional disk capacity can be added as needed. If more spindles are required to accommodate growth they can simply be cabled and added to the disk pool to grow volume space. Since volumes are not tied to spindle boundaries adding spindles will increase performance and capacity as the system grows.
- The testing environment was configured for 67% storage utilization. If the storage requirement grows beyond the design specified, additional spindles will provide additional capacity for any volume to be expanded.

Tested Deployment

The following tables summarize the testing environment.

Simulated Exchange Configuration

Number of Exchange mailboxes simulated	10,000
Number of Database Availability Groups (DAGs)	1
Number of servers/DAG	4
Number of active mailboxes/server	2,500
Number of databases/host	4
Number of copies/database	2
Number of mailboxes/database	625
Simulated profile: I/O's per second per mailbox (IOPS, include 20% headroom)	.15 (.18 tested)
Database/Log LUN size	1.4 TB
Total database size for performance testing	7.6 TB
% storage capacity used by Exchange database**	67%

Note: Database size and capacity utilized may not match on a thin-provisioned system, as only used pages will consume space. Pages that are allocated, but contain blank data, may not use disk.

Primary Storage Hardware

Storage Connectivity (Fiber Channel, SAS, SATA, iSCSI)	SAS
Storage model and OS/firmware revision	Dell Compellent Storage Center (SC8000) v6.3 http://windowsservercatalog.com/item.aspx?idItem=9fb76108-7f81-d263-24dd-7c037bd9a4d1&bCatID=1282
Storage cache	16 GB
Number of storage controllers	2
Number of storage ports	8 active ports per controller
Maximum bandwidth of storage connectivity to host	64 Gb/sec (8x8Gb GB HBA)
Switch type/model/firmware revision	Brocade Model 510 36- port 8Gb Fiber Channel Switch Firmware version 7.0.0b
HBA model and firmware	QLogic QMH2564 (Driver FW 5.04.04, Flash FW 4.04.02)
Number of HBA's/host	1 Dual-port QLogic 2562 8Gb HBA
Host server type	2x8 Core E5-2670 2.60Ghz 64GB RAM

Total number of disks tested in solution	46 Active for DB and log, 2 hot spares = 48 total spindles
Maximum number of spindles can be hosted in the storage	960

Primary Storage Software

HBA driver	QLogic StorPort FC HBA Driver 9.1.9.27
HBA Queue Depth Setting	65535
Multi-Pathing	Microsoft Windows 2008 R2 MPIO Round-Robin(In-Box DSM)
Host OS	Microsoft Windows 2008 R2
ESE.dll file version	14.02.0283.000
Replication solution name/version	Microsoft Exchange Server 2010 DAG replication

Primary Storage Disk Configuration (Mailbox Store/Log Disks)

Disk type, speed and firmware revision	SAS 10k 900GB, XRC0
Raw capacity per disk (GB)	838.36 GB
Number of physical disks in test	46
Total raw storage capacity (GB)	38.564 TB
Raid level	RAID5
Total formatted capacity	37.62TB
Storage capacity utilization	77.07 %
Database capacity utilization	67%

Best Practices

Exchange Server 2010 has changed dramatically from previous versions. For a list of what has changed see the following: <http://technet.microsoft.com/en-us/library/dd298136.aspx>

The best practices have also changed, based on the changes in behavior in Exchange 2010. A big part of the change is the shift away from Single Instance Storage. This allows greater control over disk IO, as a mailbox is more self-contained within the database, changing reads and writes to or from a mailbox to be much more sequential. This greatly improves throughput.

The increase in database size is offset by inline page compression, so that database sizes in Exchange 2010 are similar to Exchange 2007 sizes. This does have an impact on processor and memory load. Because processor performance has increased dramatically, and servers support much larger memory models, sizing requirements for servers have changed to reflect this. For server sizing please refer to the Microsoft Mailbox Role Calculator.

For general sizing and requirements please visit the following link:

<http://technet.microsoft.com/en-us/library/aa996719.aspx>

One of the Microsoft best practices states that transaction logs and databases be separated from each other and dedicated to their own set of spindles. Dell Compellent virtualizes at the disk level within Storage Center, accelerating data access by spreading read/write operations across all disk drives in the SAN so multiple requests are processed in parallel. Dell Compellent virtualization allows the creation of high performance, highly efficient virtual volumes in just seconds without allocating drives to specific servers, without complicated capacity planning and without manual performance tuning. By managing disk drives as a single resource, Dell Compellent provides increased storage performance, availability and utilization.

Dell Compellent's storage virtualization is optimized to take advantage of all available spindles as part of a single disk folder, but is flexible enough to be configured allowing storage configurations where specific spindles are dedicated to a particular volume.

Another best practice in past versions of Exchange Server has been to align Exchange IO with disk page boundaries. With Windows Server 2008 this is no longer required, as Windows 2008 automatically aligns to a 1024k page boundary.

The volume on which transaction logs are stored is critical to a well performing Exchange environment. Since all transactions are first written to a transaction log before being committed to the information store database, it is important that this volume has the lowest possible write latency. Transaction logs should be placed on volumes with faster rotational speeds. For optimal transaction log performance, consider using drives with a rotational speed of 10,000 RPM or greater. Exchange 2010 no longer requires log files to be stored on

a volume separate from the database volumes; The Dell Compellent Storage Center can be flexibly designed for separate disk folders or as a single disk folder configuration.

For issues related to performance and event monitoring please see the following:

<http://technet.microsoft.com/en-us/library/ee332313.aspx>

[For more information on Exchange best practices when implemented with Dell Compellent Storage Center, visit the Dell Compellent Knowledge Center at http://kc.compellent.com/.](http://kc.compellent.com/)

Using Dell Compellent Storage Center Data Progression

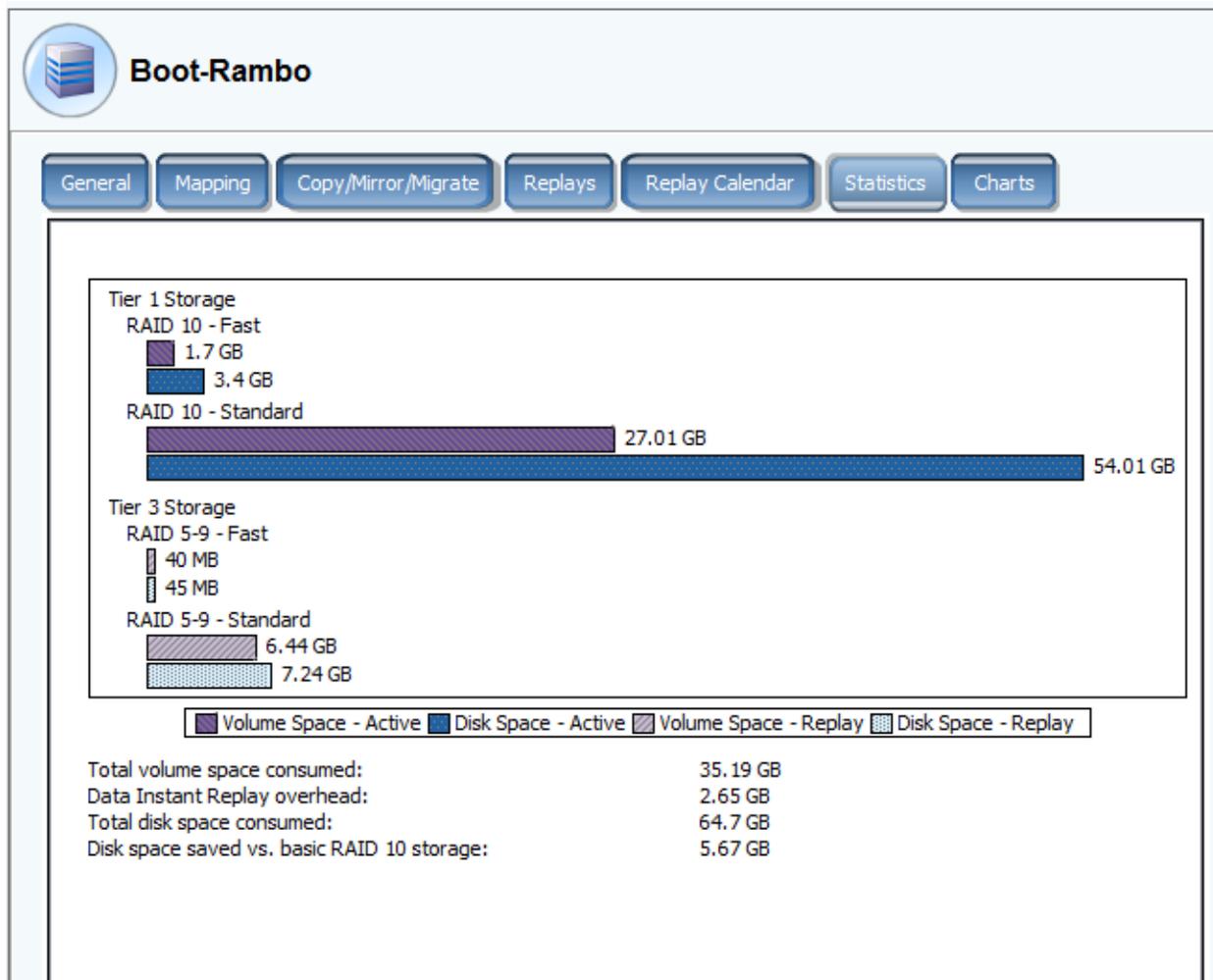
Industry studies show that as much of 80% of Exchange data is inactive. This means that a lot of fast, higher-cost storage is being unnecessarily utilized.

Storage Center's Data Progression is a complete hardware and software architecture that delivers fully automated tiered storage. This patented technology cuts administrative time and reduces overall storage costs by dynamically classifying and moving data at the block-level between tiers of storage based on frequency of access. This complete Automated Tiered Storage solution does not require time consuming data classification and the repetitive manual transfer of data between tiers.

Each volume is configured by default with a recommended storage profile that manages the RAID configuration and provides optimal operation and performance for Exchange on the Dell Compellent Storage Center. With this configuration all data written to each volume is written at RAID10 providing the best possible I/O performance for Exchange database and log operations.

Snapshots, known as Replays on the Dell Compellent Storage Center, are an integral part of the Data Progression solution. As data grows and usage patterns change, Data Progression can automatically move inactive blocks of data to a lower tier of storage (both disk class and RAID level) on-the-fly. With the recommended storage profile, active data is always written at RAID10, while any replays are initially stored at Tier 1 on RAID-5. This data eventually makes its way down the RAID levels and tiers.

The following chart is an example of how Data Progression moves data to the most appropriate tier:



Core Storage

1. Dell Compellent storage by its nature does not need disk sector alignment to perform properly. Dell Compellent virtualizes all disk reads and writes, and applies them across system managed data pages, so by nature isolates disk IOs from sector boundaries. The page to sector alignment for all volumes and data pages is handled automatically by the system.
2. The Dell Compellent method of IO and disk capacity aggregation provides maximum IO to all hosted applications. All the IOPS for all of the assigned drives can be applied to all applications hosted on a Storage Center. If IOPS need to be dedicated to an application, such as Exchange, a dedicated disk pool can be created for each IO type, such as database or log files. As Exchange 2010 IO is mostly sequential, using a smaller number of database files will greatly improve the performance. This is due to the fact that the more sequential streams you have, the more random it looks. Minimizing the number of file streams while meeting business requirements will

provide a more responsive solution. Isolating the log files can also provide a performance benefit in an IO constrained system. Using Dell Compellent Dynamic Storage, a small system can start with all volumes sharing spindles, and volumes can dynamically be moved to dedicated spindles and load increases.

3. Dell Compellent Storage Center is a true thin provisioned system. This means that volumes will truly only consume space when and where data is written. The volume sizes should be created to reflect the maximum size they will achieve. The volumes will only consume the space actually used by data, so the storage can be sized to host the actual storage requirement, rather than the volume sizes allocated. This allows the volumes to be sized properly to meet growth while requiring the minimum number of disks to meet the storage and IOP requirement.
4. Dell Compellent's Fluid Data architecture uses an IOP and storage aggregation model. This means that the IOPS and storage capacity of all available disks will be available to the entire disk pool. This provides a huge performance boost to all applications and all LUNs, as the combined IO performance of all spindles will apply to all configured storage. If dedicated spindles are desired, a disk pool can be created that will dedicate those spindles to the LUNs created in that pool. All disks in a disk pool will have multiple RAID types applied to them. This is done by virtualizing the RAID pools on the disks. For example, a write could come in on RAID 10, and would be mirrored at the block level, across a pair of disks. In essence each write could hit a different pair of disks, dramatically improving performance. The next write could be a RAID5 block, with the blocks striped across all the disks available to the pool. In this method a disk pool will balance the IO across all the available spindles.
5. Latency and IO load can be measured real-time, or logged historically for reporting purposes. This means if a volume is performing poorly, its IO can be reported over time, and compared to IO load on the server, for any length of time you wish to store. If you need to report on the last month of IO history, a report can be generated showing the IO graphically or as a summary chart. This provides the ability to trend and determine when IO performance changed. Volumes can also be summarized as a group, to determine if IO load is shifting, increasing, or disk performance is changing. Reporting can be done at any level, including at the disk device level. This allows reporting on the latency at the Server, LUN, or disk level to provide more accurate performance monitoring and diagnostics.
6. Because Storage Center manages block placement, defragmentation is not required. Dell Compellent Data Progression computes block placement and optimizes block placement based on access patterns. Because block placement is relative to other stored blocks Exchange On-line defragmentation is accounted for.

7. Dell Compellent Fluid Data also allows disks to be added to a pool to increase performance dynamically. This allows for accurate sizing on day one and disks to be added as performance requirements increase. If after one year IO requirements double, additional disks could simply be added (without any downtime), and RAID stripes rebalanced.
8. The most common cause of performance issues is low spindle count. To achieve a given IO level requires a spindle count equal to or greater than the IOP target. If the IO load exceeds the capabilities of the spindles poor performance will result. Dell Compellent, along with a business partner, will work with customers to determine the correct spindle count. As IO load grows the spindle count must increase to maintain performance. Using Dell Compellent Enterprise Manager, current IO loads can be tracked, and thresholds can be set for alerting, to warn of IO usage approaching or exceeding acceptable performance levels. Because IO patterns can be very diverse, creating a baseline and using historical reporting will be a key strategy for planning for and managing growth. With an accurate growth plan, disk can be added before it is needed, and performance as well as capacity can be increased with down time.

Backup Strategy

1. The Dell Compellent Storage Center has an integrated snapshot facility that provides basic volume based snapshots. In order to provide VSS integration with a graphical management interface, Dell Compellent Replay Manager for Microsoft Servers should be implemented. This provides a full interface for scheduling database backups. Using Replay Manger Exchange Servers can be restored in less than a minute to any available restore point. It also provides detailed reporting on snapshots. Because Dell Compellent Storage Center has the ability to manage thousands of snapshots, a fine grained backup strategy can be defined to greatly reduce reliance on tape for historical data recovery. Combined with a lagged database copy, data can be recovered very quickly with minimal administrative effort.
2. Since Dell Compellent Replays take do not require page pre-allocation or disk allocation disk space requirements are much smaller for snapshots. Backup verification can also be passed to a secondary server to isolate the impact of backups on the production Exchange environment. By automating the creation and verification process using a secondary server, more frequent database backups and more frequent database scans can be implemented reducing exposure.
3. Replay restore points can also be replicated and tested in a remote environment without breaking replication. This allows Disaster Recovery testing of a production restore point without pausing replication, reducing exposure even further.

Additional Information

For more information on Dell Compellent Storage Center and other Dell Compellent solutions, visit our website at <http://www.compellent.com>.

Test Results Summary

This section provides a high level summary of the test data from ESRP. The detailed html reports which are generated by ESRP testing framework are shown in the Appendices later in this whitepaper.

Reliability

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

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

- No errors were reported in either the application or system log
- No errors were reported during the [database](#) and [log](#) checksum process
- No errors were reported during either the backup or restore process

Storage Performance Results

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

Individual Server Metrics:

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

Server 1 – JS6

Database I/O	
Database Disks Transfers/sec	579.152
Database Disks Reads/sec	406.704
Database Disks Writes/sec	172.816
Average Database Disk Read Latency (ms)	10.603
Average Database Disk Write Latency (ms)	1.925
Transaction Log I/O	
Log Disks Writes/sec	142.97
Average Log Disk Write Latency (ms)	0.96

Server 2 – JS7

Database I/O	
Database Disks Transfers/sec	568.706
Database Disks Reads/sec	399.634
Database Disks Writes/sec	169.072
Average Database Disk Read Latency (ms)	10.745
Average Database Disk Write Latency (ms)	2.073
Transaction Log I/O	
Log Disks Writes/sec	140.706
Average Log Disk Write Latency (ms)	0.913

Server 3 – JS8

Database I/O	
Database Disks Transfers/sec	559.384
Database Disks Reads/sec	393.952
Database Disks Writes/sec	165.432
Average Database Disk Read Latency (ms)	10.897
Average Database Disk Write Latency (ms)	2.118
Transaction Log I/O	
Log Disks Writes/sec	137.69
Average Log Disk Write Latency (ms)	0.914

Server 4 – JS9

Database I/O	
Database Disks Transfers/sec	561.34
Database Disks Reads/sec	397.252
Database Disks Writes/sec	164.088
Average Database Disk Read Latency (ms)	10.771
Average Database Disk Write Latency (ms)	2.04
Transaction Log I/O	
Log Disks Writes/sec	144.46
Average Log Disk Write Latency (ms)	0.93

Aggregate Performance across all servers/DAGs 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	2268.95
Database Disks Reads/sec	1597.542
Database Disks Writes/sec	671.40
Average Database Disk Read Latency (ms)	10.754
Average Database Disk Write Latency (ms)	2.039
Transaction Log I/O	
Log Disks Writes/sec	565.826
Average Log Disk Write Latency (ms)	0.929

Database Backup/Recovery Performance

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

Database Read-only Performance

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

MB read/sec per database	114.065
MB read/sec total per server	456.26

Transaction Log Recovery/Replay Performance

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

Average time to play one Log file (sec)	1.894
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Conclusion

The testing shows the scalability and performance of the Dell Compellent Storage Center.

This document is developed by storage solution providers, and reviewed by the Microsoft Exchange Product team. The test results/data presented in this document are based on the tests introduced in the ESRP test framework. Customers 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.

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

Appendix A: Performance Testing

Server 1 – JS6

Test Summary

Overall Test Result	Pass
Machine Name	JS6
Test Description	2500 users/server 4 servers 2GB mailboxes .15 IOPS/user .18 IOPS tested 4 dbs per server 1300GB db/log combined volumes 2 copies 3 threads/db
Test Start Time	5/14/2013 1:17:01 PM
Test End Time	5/15/2013 9:17:30 AM
Collection Start Time	5/14/2013 1:19:56 PM
Collection End Time	5/14/2013 3:19:56 PM
Jetstress Version	14.01.0180.003
Ese Version	14.03.0123.002
Operating System	Windows Server 2008 R2 Standard Service Pack 1 (6.1.7601.65536)
Performance Log	C:\Program Files\Exchange Jetstress\Performance_2013_5_14_13_17_10.blg

Database Sizing and Throughput

Achieved Transactional I/O per Second	455.126
Target Transactional I/O per Second	375
Initial Database Size (bytes)	5521015046144
Final Database Size (bytes)	5534671699968
Database Files (Count)	4

Jetstress System Parameters

Thread Count	3 (per database)
Minimum Database Cache	64.0 MB
Maximum Database Cache	512.0 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

Instance1312.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance1312.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance1312.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance1312.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance1312.1	10.725	1.906	70.577	43.149	34800.533	34961.187	0.000	0.969	0.000	35.847	0.000	4606.745
Instance1312.2	10.748	1.835	70.364	43.023	34987.321	34923.980	0.000	0.961	0.000	35.634	0.000	4541.801
Instance1312.3	10.466	1.891	70.690	43.436	35023.700	34948.374	0.000	0.947	0.000	35.972	0.000	4582.181
Instance1312.4	10.474	2.071	70.679	43.208	34869.088	34992.480	0.000	0.966	0.000	35.517	0.000	4584.968

Background Database Maintenance I/O Performance

MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance1312.1	31.095	261864.179
Instance1312.2	31.070	261823.521
Instance1312.3	31.102	261816.969
Instance1312.4	31.127	261875.465

Log Replication I/O Performance

MSExchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance1312.1	0.668	219513.580
Instance1312.2	0.657	217352.717
Instance1312.3	0.668	218008.246
Instance1312.4	0.658	220345.350

Total I/O Performance

MSExchange 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
Instance1312.1	10.725	1.906	101.673	43.149	104245.264	34961.187	10.430	0.969	0.668	35.847	219513.580	4606.745
Instance1312.2	10.748	1.835	101.434	43.023	104469.263	34923.980	11.697	0.961	0.657	35.634	217352.717	4541.801
Instance1312.3	10.466	1.891	101.791	43.436	104318.656	34948.374	11.068	0.947	0.668	35.972	218008.246	4582.181
Instance1312.4	10.474	2.071	101.806	43.208	104276.008	34992.480	10.970	0.966	0.658	35.517	220345.350	4584.968

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.444	0.000	2.272
Available MBytes	28985.988	28969.000	29078.000
Free System Page Table Entries	33555161.921	33555100.000	33555164.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	91909102.933	91860992.000	91963392.000
Pool Paged Bytes	225844292.267	223080448.000	226115584.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/14/2013 9:49:56 AM -- Jetstress testing begins ...
5/14/2013 9:49:56 AM -- Prepare testing begins ...
5/14/2013 9:50:01 AM -- Attaching databases ...
5/14/2013 9:50:01 AM -- Prepare testing ends.
5/14/2013 9:50:01 AM -- Dispatching transactions begins ...
5/14/2013 9:50:01 AM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
5/14/2013 9:50:01 AM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
5/14/2013 9:50:05 AM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
5/14/2013 9:50:05 AM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
5/14/2013 9:50:09 AM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
5/14/2013 9:50:09 AM -- Performance logging begins (interval: 15000 ms).
5/14/2013 9:50:09 AM -- Attaining prerequisites:
5/14/2013 9:52:57 AM -- VMExchange Database(JetstressWin)\Database Cache Size, Last: 976252900.0 (lower bound: 966367600.0, upper bound: none)
5/14/2013 10:37:03 AM -- Performance logging ends.
5/14/2013 10:37:31 AM -- JetInterop batch transaction stats: 9653, 9651, 9755 and 9547.
5/14/2013 10:37:31 AM -- Dispatching transactions ends.
5/14/2013 10:37:31 AM -- Shutting down databases ...
5/14/2013 10:37:37 AM -- Instance1312.1 (complete), Instance1312.2 (complete), Instance1312.3 (complete) and Instance1312.4 (complete)
5/14/2013 10:37:37 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_9_50_6.blg has 187 samples.
5/14/2013 10:37:37 AM -- Creating test report ...
5/14/2013 10:37:39 AM -- Instance1312.1 has 10.4 for I/O Database Reads Average Latency.
5/14/2013 10:37:39 AM -- Instance1312.1 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:39 AM -- Instance1312.1 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:39 AM -- Instance1312.2 has 10.5 for I/O Database Reads Average Latency.
5/14/2013 10:37:39 AM -- Instance1312.2 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:39 AM -- Instance1312.2 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:39 AM -- Instance1312.3 has 10.2 for I/O Database Reads Average Latency.
5/14/2013 10:37:39 AM -- Instance1312.3 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:39 AM -- Instance1312.3 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:39 AM -- Instance1312.4 has 10.0 for I/O Database Reads Average Latency.
5/14/2013 10:37:39 AM -- Instance1312.4 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:39 AM -- Instance1312.4 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:39 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/14/2013 10:37:39 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/14/2013 10:37:39 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_9_50_6.xml has 175 samples queried.
5/14/2013 10:37:39 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_9_50_6.html is saved.

Dell Compellent Storage Center (SC8000) 10,000 Mailbox Exchange 2010 Resiliency Storage Solution

5/14/2013 10:37:40 AM -- Performance logging begins (interval: 30000 ms).
5/14/2013 10:37:40 AM -- Verifying database checksums ...
5/14/2013 10:38:01 AM -- C:\DB\DB1 (0% processed), C:\DB\DB2 (0% processed), C:\DB\DB3 (0% processed) and C:\DB\DB4 (0% processed)
5/14/2013 10:38:01 AM -- Verifying log checksums ...
5/14/2013 10:38:01 AM -- C:\DB\DB1 (0 log(s) processed), C:\DB\DB2 (0 log(s) processed), C:\DB\DB3 (0 log(s) processed) and C:\DB\DB4 (0 log(s) processed)
5/14/2013 10:38:01 AM -- [C:\Program Files\Exchange Jetstress\Application_2013_5_14_10_38_1.evt](#) is saved.
5/14/2013 10:38:01 AM -- [C:\Program Files\Exchange Jetstress\System_2013_5_14_10_38_1.evt](#) is saved.
5/14/2013 10:38:01 AM -- [C:\Program Files\Exchange Jetstress\XmlConfig_2013_5_14_10_38_1.xml](#) is saved.
5/14/2013 10:38:01 AM -- Jetstress testing ends.
5/14/2013 1:17:01 PM -- Jetstress testing begins ...
5/14/2013 1:17:01 PM -- Prepare testing begins ...
5/14/2013 1:17:06 PM -- Attaching databases ...
5/14/2013 1:17:06 PM -- Prepare testing ends.
5/14/2013 1:17:06 PM -- Dispatching transactions begins ...
5/14/2013 1:17:06 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
5/14/2013 1:17:06 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
5/14/2013 1:17:10 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
5/14/2013 1:17:10 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
5/14/2013 1:17:15 PM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
5/14/2013 1:17:15 PM -- Performance logging begins (interval: 15000 ms).
5/14/2013 1:17:15 PM -- Attaining prerequisites:
5/14/2013 1:19:56 PM -- \MSEExchange Database(JetstressWin)\Database Cache Size, Last: 970690600.0 (lower bound: 966367600.0, upper bound: none)
5/14/2013 3:19:56 PM -- Performance logging ends.
5/15/2013 9:17:27 AM -- JetInterop batch transaction stats: 239689, 239694, 238860 and 239415.
5/15/2013 9:17:28 AM -- Dispatching transactions ends.
5/15/2013 9:17:28 AM -- Shutting down databases ...
5/15/2013 9:17:30 AM -- Instance1312.1 (complete), Instance1312.2 (complete), Instance1312.3 (complete) and Instance1312.4 (complete)
5/15/2013 9:17:30 AM -- [C:\Program Files\Exchange Jetstress\Performance_2013_5_14_13_17_10.blg](#) has 490 samples.
5/15/2013 9:17:30 AM -- Creating test report ...
5/15/2013 9:17:33 AM -- Instance1312.1 has 10.7 for I/O Database Reads Average Latency.
5/15/2013 9:17:33 AM -- Instance1312.1 has 1.0 for I/O Log Writes Average Latency.
5/15/2013 9:17:33 AM -- Instance1312.1 has 1.0 for I/O Log Reads Average Latency.
5/15/2013 9:17:33 AM -- Instance1312.2 has 10.7 for I/O Database Reads Average Latency.
5/15/2013 9:17:33 AM -- Instance1312.2 has 1.0 for I/O Log Writes Average Latency.
5/15/2013 9:17:33 AM -- Instance1312.2 has 1.0 for I/O Log Reads Average Latency.
5/15/2013 9:17:33 AM -- Instance1312.3 has 10.5 for I/O Database Reads Average Latency.
5/15/2013 9:17:33 AM -- Instance1312.3 has 0.9 for I/O Log Writes Average Latency.

Dell Compellent Storage Center (SC8000) 10,000 Mailbox Exchange 2010 Resiliency Storage Solution

5/15/2013 9:17:33 AM -- Instance1312.3 has 0.9 for I/O Log Reads Average Latency.
5/15/2013 9:17:33 AM -- Instance1312.4 has 10.5 for I/O Database Reads Average Latency.
5/15/2013 9:17:33 AM -- Instance1312.4 has 1.0 for I/O Log Writes Average Latency.
5/15/2013 9:17:33 AM -- Instance1312.4 has 1.0 for I/O Log Reads Average Latency.
5/15/2013 9:17:33 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/15/2013 9:17:33 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/15/2013 9:17:33 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_13_17_10.xml has 479 samples queried.

Server 2 – JS7

Test Summary

Overall Test Result	Pass
Machine Name	JS7
Test Description	2500 users/server 4 servers 2GB mailboxes .15 IOPS/user .18 IOPS tested 4 dbs per server 1300GB db/log combined volumes 2 copies 3 threads/db
Test Start Time	3/8/2013 9:29:47 PM
Test End Time	3/8/2013 11:38:16 PM
Collection Start Time	3/8/2013 9:32:25 PM
Collection End Time	3/8/2013 11:32:21 PM
Jetstress Version	14.01.0180.003
Ese Version	14.02.0283.000
Operating System	Windows Server 2008 R2 Standard Service Pack 1 (6.1.7601.65536)
Performance Log	C:\Program Files\Exchange Jetstress\Performance_2013_3_8_21_29_52.blg

Database Sizing and Throughput

Achieved Transactional I/O per Second	444.48
Target Transactional I/O per Second	375
Initial Database Size (bytes)	5518120976384
Final Database Size (bytes)	5531727298560
Database Files (Count)	4

Jetstress System Parameters

Thread Count	3 (per database)
Minimum Database Cache	128.0 MB
Maximum Database Cache	1024.0 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

Instance3264.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance3264.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance3264.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance3264.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance3264.1	10.744	2.094	69.279	42.589	35208.573	35001.137	0.000	0.919	0.000	35.525	0.000	4607.310
Instance3264.2	10.632	2.239	69.211	42.432	35209.977	34958.937	0.000	0.912	0.000	35.130	0.000	4600.478
Instance3264.3	11.164	2.054	69.221	42.472	34742.548	34940.653	0.000	0.906	0.000	35.252	0.000	4527.089
Instance3264.4	10.440	1.908	67.698	41.579	34936.237	35033.253	0.000	0.915	0.000	34.799	0.000	4645.854

Background Database Maintenance I/O Performance

MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance3264.1	31.088	261835.472
Instance3264.2	31.030	261886.638
Instance3264.3	31.040	261850.279
Instance3264.4	31.068	261853.609

Log Replication I/O Performance

MSExchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance3264.1	0.662	217011.826
Instance3264.2	0.652	217996.322
Instance3264.3	0.645	221370.739
Instance3264.4	0.654	216034.621

Total I/O Performance

MSExchange 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
Instance3264.1	10.744	2.094	100.367	42.589	105404.516	35001.137	10.129	0.919	0.662	35.525	217011.826	4607.310
Instance3264.2	10.632	2.239	100.240	42.432	105378.035	34958.937	10.705	0.912	0.652	35.130	217996.322	4600.478
Instance3264.3	11.164	2.054	100.261	42.472	105054.161	34940.653	10.671	0.906	0.645	35.252	221370.739	4527.089
Instance3264.4	10.440	1.908	98.766	41.579	106316.004	35033.253	9.510	0.915	0.654	34.799	216034.621	4645.854

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.516	0.000	2.752
Available MBytes	29057.110	29048.000	29164.000
Free System Page Table Entries	33555669.913	33555608.000	33555672.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	87786393.600	87732224.000	87846912.000
Pool Paged Bytes	214775082.667	212004864.000	215019520.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/14/2013 9:49:58 AM -- Jetstress testing begins ...
5/14/2013 9:49:59 AM -- Prepare testing begins ...
5/14/2013 9:50:03 AM -- Attaching databases ...
5/14/2013 9:50:03 AM -- Prepare testing ends.
5/14/2013 9:50:03 AM -- Dispatching transactions begins ...
5/14/2013 9:50:03 AM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
5/14/2013 9:50:03 AM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
5/14/2013 9:50:08 AM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
5/14/2013 9:50:08 AM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
5/14/2013 9:50:13 AM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
5/14/2013 9:50:13 AM -- Performance logging begins (interval: 15000 ms).
5/14/2013 9:50:13 AM -- Attaining prerequisites:
5/14/2013 9:52:54 AM -- VMExchange Database(JetstressWin)\Database Cache Size, Last: 966905900.0 (lower bound: 966367600.0, upper bound: none)
5/14/2013 10:37:09 AM -- Performance logging ends.
5/14/2013 10:37:27 AM -- JetInterop batch transaction stats: 9775, 9718, 9718 and 9699.
5/14/2013 10:37:28 AM -- Dispatching transactions ends.
5/14/2013 10:37:28 AM -- Shutting down databases ...
5/14/2013 10:37:31 AM -- Instance3264.1 (complete), Instance3264.2 (complete), Instance3264.3 (complete) and Instance3264.4 (complete)
5/14/2013 10:37:31 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_9_50_8.blg has 187 samples.
5/14/2013 10:37:31 AM -- Creating test report ...
5/14/2013 10:37:32 AM -- Instance3264.1 has 10.3 for I/O Database Reads Average Latency.
5/14/2013 10:37:32 AM -- Instance3264.1 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:32 AM -- Instance3264.1 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:32 AM -- Instance3264.2 has 10.2 for I/O Database Reads Average Latency.
5/14/2013 10:37:32 AM -- Instance3264.2 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:32 AM -- Instance3264.2 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:32 AM -- Instance3264.3 has 10.8 for I/O Database Reads Average Latency.
5/14/2013 10:37:32 AM -- Instance3264.3 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:32 AM -- Instance3264.3 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:32 AM -- Instance3264.4 has 9.9 for I/O Database Reads Average Latency.
5/14/2013 10:37:32 AM -- Instance3264.4 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:32 AM -- Instance3264.4 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:32 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/14/2013 10:37:32 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/14/2013 10:37:33 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_9_50_8.xml has 176 samples queried.
5/14/2013 10:37:33 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_9_50_8.html is saved.

Dell Compellent Storage Center (SC8000) 10,000 Mailbox Exchange 2010 Resiliency Storage Solution

5/14/2013 10:37:34 AM -- Performance logging begins (interval: 30000 ms).
5/14/2013 10:37:34 AM -- Verifying database checksums ...
5/14/2013 10:37:53 AM -- C:\DB\DB1 (0% processed), C:\DB\DB2 (0% processed), C:\DB\DB3 (0% processed) and C:\DB\DB4 (0% processed)
5/14/2013 10:37:53 AM -- Verifying log checksums ...
5/14/2013 10:37:53 AM -- C:\DB\DB1 (0 log(s) processed), C:\DB\DB2 (0 log(s) processed), C:\DB\DB3 (0 log(s) processed) and C:\DB\DB4 (0 log(s) processed)
5/14/2013 10:37:53 AM -- [C:\Program Files\Exchange Jetstress\Application_2013_5_14_10_37_53.evt](#) is saved.
5/14/2013 10:37:53 AM -- [C:\Program Files\Exchange Jetstress\System_2013_5_14_10_37_53.evt](#) is saved.
5/14/2013 10:37:53 AM -- [C:\Program Files\Exchange Jetstress\XmlConfig_2013_5_14_10_37_53.xml](#) is saved.
5/14/2013 10:37:53 AM -- Jetstress testing ends.
5/14/2013 1:17:07 PM -- Jetstress testing begins ...
5/14/2013 1:17:07 PM -- Prepare testing begins ...
5/14/2013 1:17:11 PM -- Attaching databases ...
5/14/2013 1:17:11 PM -- Prepare testing ends.
5/14/2013 1:17:11 PM -- Dispatching transactions begins ...
5/14/2013 1:17:11 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
5/14/2013 1:17:11 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
5/14/2013 1:17:16 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
5/14/2013 1:17:16 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
5/14/2013 1:17:20 PM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
5/14/2013 1:17:20 PM -- Performance logging begins (interval: 15000 ms).
5/14/2013 1:17:20 PM -- Attaining prerequisites:
5/14/2013 1:20:04 PM -- \MSEExchange Database(JetstressWin)\Database Cache Size, Last: 968761300.0 (lower bound: 966367600.0, upper bound: none)
5/14/2013 3:20:04 PM -- Performance logging ends.
5/15/2013 9:17:23 AM -- JetInterop batch transaction stats: 239038, 238070, 238610 and 238490.
5/15/2013 9:17:24 AM -- Dispatching transactions ends.
5/15/2013 9:17:24 AM -- Shutting down databases ...
5/15/2013 9:17:25 AM -- Instance3264.1 (complete), Instance3264.2 (complete), Instance3264.3 (complete) and Instance3264.4 (complete)
5/15/2013 9:17:25 AM -- [C:\Program Files\Exchange Jetstress\Performance_2013_5_14_13_17_16.blg](#) has 490 samples.
5/15/2013 9:17:25 AM -- Creating test report ...
5/15/2013 9:17:28 AM -- Instance3264.1 has 10.7 for I/O Database Reads Average Latency.
5/15/2013 9:17:28 AM -- Instance3264.1 has 0.9 for I/O Log Writes Average Latency.
5/15/2013 9:17:28 AM -- Instance3264.1 has 0.9 for I/O Log Reads Average Latency.
5/15/2013 9:17:28 AM -- Instance3264.2 has 10.6 for I/O Database Reads Average Latency.
5/15/2013 9:17:28 AM -- Instance3264.2 has 0.9 for I/O Log Writes Average Latency.
5/15/2013 9:17:28 AM -- Instance3264.2 has 0.9 for I/O Log Reads Average Latency.
5/15/2013 9:17:28 AM -- Instance3264.3 has 11.2 for I/O Database Reads Average Latency.
5/15/2013 9:17:28 AM -- Instance3264.3 has 0.9 for I/O Log Writes Average Latency.

Dell Compellent Storage Center (SC8000) 10,000 Mailbox Exchange 2010 Resiliency Storage Solution

5/15/2013 9:17:28 AM -- Instance3264.3 has 0.9 for I/O Log Reads Average Latency.
5/15/2013 9:17:28 AM -- Instance3264.4 has 10.4 for I/O Database Reads Average Latency.
5/15/2013 9:17:28 AM -- Instance3264.4 has 0.9 for I/O Log Writes Average Latency.
5/15/2013 9:17:28 AM -- Instance3264.4 has 0.9 for I/O Log Reads Average Latency.
5/15/2013 9:17:28 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/15/2013 9:17:28 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/15/2013 9:17:28 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_13_17_16.xml has 479 samples queried.

Server 3 – JS8

Test Summary

Overall Test Result	Pass
Machine Name	JS8
Test Description	2500 users/server 4 servers 2GB mailboxes .15 IOPS/user .18 IOPS tested 4 dbs per server 1300GB db/log combined volumes 2 copies 3 threads/db
Test Start Time	5/14/2013 1:17:11 PM
Test End Time	5/15/2013 9:17:21 AM
Collection Start Time	5/14/2013 1:20:18 PM
Collection End Time	5/14/2013 3:20:06 PM
Jetstress Version	14.01.0180.003
Ese Version	14.03.0123.002
Operating System	Windows Server 2008 R2 Standard Service Pack 1 (6.1.7601.65536)
Performance Log	C:\Program Files\Exchange Jetstress\Performance_2013_5_14_13_17_20.blg

Database Sizing and Throughput

Achieved Transactional I/O per Second	435.184
Target Transactional I/O per Second	375
Initial Database Size (bytes)	5522524995584
Final Database Size (bytes)	5535829327872
Database Files (Count)	4

Jetstress System Parameters

Thread Count	3 (per database)
Minimum Database Cache	64.0 MB
Maximum Database Cache	512.0 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

Instance3644.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance3644.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance3644.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance3644.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance3644.1	10.639	2.225	68.604	42.126	34807.645	34957.363	0.000	0.905	0.000	34.954	0.000	4563.744
Instance3644.2	10.480	2.172	66.385	40.593	35155.417	34936.471	0.000	0.920	0.000	33.805	0.000	4604.087
Instance3644.3	11.461	2.103	67.047	41.111	34688.189	34999.989	0.000	0.912	0.000	34.374	0.000	4588.609
Instance3644.4	11.011	1.975	67.715	41.602	34979.909	34941.264	0.000	0.918	0.000	34.557	0.000	4613.592

Background Database Maintenance I/O Performance

MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance3644.1	31.073	261829.323
Instance3644.2	31.065	261841.786
Instance3644.3	31.031	261823.743
Instance3644.4	31.030	261837.876

Log Replication I/O Performance

MSExchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance3644.1	0.645	217896.265
Instance3644.2	0.630	212069.005
Instance3644.3	0.638	221677.970
Instance3644.4	0.645	218453.694

Total I/O Performance

MSExchange 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
Instance3644.1	10.639	2.225	99.678	42.126	105578.531	34957.363	9.774	0.905	0.645	34.954	217896.265	4563.744
Instance3644.2	10.480	2.172	97.450	40.593	107419.060	34936.471	11.192	0.920	0.630	33.805	212069.005	4604.087
Instance3644.3	11.461	2.103	98.078	41.111	106552.162	34999.989	13.103	0.912	0.638	34.374	221677.970	4588.609
Instance3644.4	11.011	1.975	98.746	41.602	106268.709	34941.264	13.604	0.918	0.645	34.557	218453.694	4613.592

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.494	0.000	2.915
Available MBytes	29016.676	29006.000	29093.000
Free System Page Table Entries	33555672.902	33555611.000	33555675.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	87741125.745	87732224.000	87773184.000
Pool Paged Bytes	226361814.313	223592448.000	226676736.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/14/2013 9:50:01 AM -- Jetstress testing begins ...
5/14/2013 9:50:01 AM -- Prepare testing begins ...
5/14/2013 9:50:06 AM -- Attaching databases ...
5/14/2013 9:50:06 AM -- Prepare testing ends.
5/14/2013 9:50:06 AM -- Dispatching transactions begins ...
5/14/2013 9:50:06 AM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
5/14/2013 9:50:06 AM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
5/14/2013 9:50:11 AM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
5/14/2013 9:50:11 AM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
5/14/2013 9:50:16 AM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
5/14/2013 9:50:16 AM -- Performance logging begins (interval: 15000 ms).
5/14/2013 9:50:16 AM -- Attaining prerequisites:
5/14/2013 9:53:10 AM -- \MSEXchange Database(JetstressWin)\Database Cache Size, Last: 973275100.0 (lower bound: 966367600.0, upper bound: none)
5/14/2013 10:37:14 AM -- Performance logging ends.
5/14/2013 10:37:25 AM -- JetInterop batch transaction stats: 9026, 9307, 9293 and 9107.
5/14/2013 10:37:25 AM -- Dispatching transactions ends.
5/14/2013 10:37:25 AM -- Shutting down databases ...
5/14/2013 10:37:27 AM -- Instance3644.1 (complete), Instance3644.2 (complete), Instance3644.3 (complete) and Instance3644.4 (complete)
5/14/2013 10:37:27 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_9_50_11.blg has 187 samples.
5/14/2013 10:37:27 AM -- Creating test report ...
5/14/2013 10:37:28 AM -- Instance3644.1 has 10.2 for I/O Database Reads Average Latency.
5/14/2013 10:37:28 AM -- Instance3644.1 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:28 AM -- Instance3644.1 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:28 AM -- Instance3644.2 has 10.2 for I/O Database Reads Average Latency.
5/14/2013 10:37:28 AM -- Instance3644.2 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:28 AM -- Instance3644.2 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:28 AM -- Instance3644.3 has 11.3 for I/O Database Reads Average Latency.
5/14/2013 10:37:28 AM -- Instance3644.3 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:28 AM -- Instance3644.3 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:28 AM -- Instance3644.4 has 10.7 for I/O Database Reads Average Latency.
5/14/2013 10:37:28 AM -- Instance3644.4 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:28 AM -- Instance3644.4 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:28 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/14/2013 10:37:28 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/14/2013 10:37:28 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_9_50_11.xml has 175 samples queried.
5/14/2013 10:37:29 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_9_50_11.html is saved.

Dell Compellent Storage Center (SC8000) 10,000 Mailbox Exchange 2010 Resiliency Storage Solution

5/14/2013 10:37:30 AM -- Performance logging begins (interval: 30000 ms).
5/14/2013 10:37:30 AM -- Verifying database checksums ...
5/14/2013 10:37:46 AM -- C:\DB\DB1 (0% processed), C:\DB\DB2 (0% processed), C:\DB\DB3 (0% processed) and C:\DB\DB4 (0% processed)
5/14/2013 10:37:47 AM -- Verifying log checksums ...
5/14/2013 10:37:47 AM -- C:\DB\DB1 (0 log(s) processed), C:\DB\DB2 (0 log(s) processed), C:\DB\DB3 (0 log(s) processed) and C:\DB\DB4 (0 log(s) processed)
5/14/2013 10:37:47 AM -- [C:\Program Files\Exchange Jetstress\Application_2013_5_14_10_37_47.evnt](#) is saved.
5/14/2013 10:37:47 AM -- [C:\Program Files\Exchange Jetstress\System_2013_5_14_10_37_47.evnt](#) is saved.
5/14/2013 10:37:47 AM -- [C:\Program Files\Exchange Jetstress\XmlConfig_2013_5_14_10_37_47.xml](#) is saved.
5/14/2013 10:37:47 AM -- Jetstress testing ends.
5/14/2013 1:17:11 PM -- Jetstress testing begins ...
5/14/2013 1:17:11 PM -- Prepare testing begins ...
5/14/2013 1:17:15 PM -- Attaching databases ...
5/14/2013 1:17:15 PM -- Prepare testing ends.
5/14/2013 1:17:15 PM -- Dispatching transactions begins ...
5/14/2013 1:17:15 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
5/14/2013 1:17:15 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
5/14/2013 1:17:20 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
5/14/2013 1:17:20 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
5/14/2013 1:17:25 PM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
5/14/2013 1:17:25 PM -- Performance logging begins (interval: 15000 ms).
5/14/2013 1:17:25 PM -- Attaining prerequisites:
5/14/2013 1:20:18 PM -- \MSEExchange Database(JetstressWin)\Database Cache Size, Last: 970956800.0 (lower bound: 966367600.0, upper bound: none)
5/14/2013 3:20:18 PM -- Performance logging ends.
5/15/2013 9:17:20 AM -- JetInterop batch transaction stats: 232719, 233476, 233183 and 233901.
5/15/2013 9:17:20 AM -- Dispatching transactions ends.
5/15/2013 9:17:20 AM -- Shutting down databases ...
5/15/2013 9:17:21 AM -- Instance3644.1 (complete), Instance3644.2 (complete), Instance3644.3 (complete) and Instance3644.4 (complete)
5/15/2013 9:17:21 AM -- [C:\Program Files\Exchange Jetstress\Performance_2013_5_14_13_17_20.blg](#) has 490 samples.
5/15/2013 9:17:21 AM -- Creating test report ...
5/15/2013 9:17:24 AM -- Instance3644.1 has 10.6 for I/O Database Reads Average Latency.
5/15/2013 9:17:24 AM -- Instance3644.1 has 0.9 for I/O Log Writes Average Latency.
5/15/2013 9:17:24 AM -- Instance3644.1 has 0.9 for I/O Log Reads Average Latency.
5/15/2013 9:17:24 AM -- Instance3644.2 has 10.5 for I/O Database Reads Average Latency.
5/15/2013 9:17:24 AM -- Instance3644.2 has 0.9 for I/O Log Writes Average Latency.
5/15/2013 9:17:24 AM -- Instance3644.2 has 0.9 for I/O Log Reads Average Latency.
5/15/2013 9:17:24 AM -- Instance3644.3 has 11.5 for I/O Database Reads Average Latency.
5/15/2013 9:17:24 AM -- Instance3644.3 has 0.9 for I/O Log Writes Average Latency.

Dell Compellent Storage Center (SC8000) 10,000 Mailbox Exchange 2010 Resiliency Storage Solution

5/15/2013 9:17:24 AM -- Instance3644.3 has 0.9 for I/O Log Reads Average Latency.
5/15/2013 9:17:24 AM -- Instance3644.4 has 11.0 for I/O Database Reads Average Latency.
5/15/2013 9:17:24 AM -- Instance3644.4 has 0.9 for I/O Log Writes Average Latency.
5/15/2013 9:17:24 AM -- Instance3644.4 has 0.9 for I/O Log Reads Average Latency.
5/15/2013 9:17:24 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/15/2013 9:17:24 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/15/2013 9:17:24 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_13_17_20.xml has 478 samples queried.

Server 4 – JS9

Test Summary

Overall Test Result	Pass
Machine Name	JS9
Test Description	2500 users/server 4 servers 2GB mailboxes .15 IOPS/user .18 IOPS tested 4 dbs per server 1300GB db/log combined volumes 2 copies 3 threads/db
Test Start Time	5/14/2013 1:17:15 PM
Test End Time	5/15/2013 9:17:17 AM
Collection Start Time	5/14/2013 1:20:21 PM
Collection End Time	5/14/2013 3:20:10 PM
Jetstress Version	14.01.0180.003
Ese Version	14.03.0123.002
Operating System	Windows Server 2008 R2 Standard Service Pack 1 (6.1.7601.65536)
Performance Log	C:\Program Files\Exchange Jetstress\Performance_2013_5_14_13_17_24.blg

Database Sizing and Throughput

Achieved Transactional I/O per Second	436.29
Target Transactional I/O per Second	375
Initial Database Size (bytes)	5372519907328
Final Database Size (bytes)	5385522249728
Database Files (Count)	4

Jetstress System Parameters

Thread Count	3 (per database)
Minimum Database Cache	64.0 MB
Maximum Database Cache	512.0 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

Instance3940.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance3940.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance3940.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance3940.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance3940.1	10.457	2.094	67.573	40.812	34875.572	36239.323	0.000	0.932	0.000	35.817	0.000	4651.020
Instance3940.2	10.687	2.123	67.525	40.574	34895.265	36291.749	0.000	0.931	0.000	36.127	0.000	4662.157
Instance3940.3	10.733	2.005	68.360	41.240	34996.496	36265.414	0.000	0.932	0.000	36.339	0.000	4604.691
Instance3940.4	11.208	1.940	68.744	41.462	34842.908	36307.542	0.000	0.927	0.000	36.177	0.000	4605.769

Background Database Maintenance I/O Performance

MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance3940.1	31.248	261814.117
Instance3940.2	31.285	261851.256
Instance3940.3	31.259	261835.865
Instance3940.4	31.257	261886.358

Log Replication I/O Performance

MSExchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance3940.1	0.676	220352.354
Instance3940.2	0.682	222320.839
Instance3940.3	0.678	221404.617
Instance3940.4	0.674	223347.763

Total I/O Performance

MSExchange 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
Instance3940.1	10.457	2.094	98.821	40.812	106636.207	36239.323	10.758	0.932	0.676	35.817	220352.354	4651.020
Instance3940.2	10.687	2.123	98.810	40.574	106752.894	36291.749	10.628	0.931	0.682	36.127	222320.839	4662.157
Instance3940.3	10.733	2.005	99.619	41.240	106176.137	36265.414	13.206	0.932	0.678	36.339	221404.617	4604.691
Instance3940.4	11.208	1.940	100.002	41.462	105809.725	36307.542	10.329	0.927	0.674	36.177	223347.763	4605.769

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.511	0.000	2.704
Available MBytes	28993.762	28867.000	29069.000
Free System Page Table Entries	33555674.050	33555612.000	33555676.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	79386252.025	79290368.000	79446016.000
Pool Paged Bytes	223717423.031	220909568.000	224296960.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/14/2013 9:50:05 AM -- Jetstress testing begins ...
5/14/2013 9:50:05 AM -- Prepare testing begins ...
5/14/2013 9:50:10 AM -- Attaching databases ...
5/14/2013 9:50:10 AM -- Prepare testing ends.
5/14/2013 9:50:10 AM -- Dispatching transactions begins ...
5/14/2013 9:50:10 AM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
5/14/2013 9:50:10 AM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
5/14/2013 9:50:15 AM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
5/14/2013 9:50:15 AM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
5/14/2013 9:50:18 AM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
5/14/2013 9:50:18 AM -- Performance logging begins (interval: 15000 ms).
5/14/2013 9:50:18 AM -- Attaining prerequisites:
5/14/2013 9:53:08 AM -- \MSEExchange Database(JetstressWin)\Database Cache Size, Last: 968663000.0 (lower bound: 966367600.0, upper bound: none)
5/14/2013 10:37:19 AM -- Performance logging ends.
5/14/2013 10:37:23 AM -- JetInterop batch transaction stats: 10039, 9991, 9991 and 9830.
5/14/2013 10:37:23 AM -- Dispatching transactions ends.
5/14/2013 10:37:23 AM -- Shutting down databases ...
5/14/2013 10:37:24 AM -- Instance3940.1 (complete), Instance3940.2 (complete), Instance3940.3 (complete) and Instance3940.4 (complete)
5/14/2013 10:37:24 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_9_50_15.blg has 187 samples.
5/14/2013 10:37:24 AM -- Creating test report ...
5/14/2013 10:37:25 AM -- Instance3940.1 has 10.3 for I/O Database Reads Average Latency.
5/14/2013 10:37:25 AM -- Instance3940.1 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:25 AM -- Instance3940.1 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:25 AM -- Instance3940.2 has 10.3 for I/O Database Reads Average Latency.
5/14/2013 10:37:25 AM -- Instance3940.2 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:25 AM -- Instance3940.2 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:25 AM -- Instance3940.3 has 10.4 for I/O Database Reads Average Latency.
5/14/2013 10:37:25 AM -- Instance3940.3 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:25 AM -- Instance3940.3 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:25 AM -- Instance3940.4 has 10.8 for I/O Database Reads Average Latency.
5/14/2013 10:37:25 AM -- Instance3940.4 has 0.9 for I/O Log Writes Average Latency.
5/14/2013 10:37:25 AM -- Instance3940.4 has 0.9 for I/O Log Reads Average Latency.
5/14/2013 10:37:25 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/14/2013 10:37:25 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/14/2013 10:37:25 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_9_50_15.xml has 175 samples queried.
5/14/2013 10:37:26 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_9_50_15.html is saved.

Dell Compellent Storage Center (SC8000) 10,000 Mailbox Exchange 2010 Resiliency Storage Solution

5/14/2013 10:37:27 AM -- Performance logging begins (interval: 30000 ms).
5/14/2013 10:37:27 AM -- Verifying database checksums ...
5/14/2013 10:37:39 AM -- C:\DB\DB1 (0% processed), C:\DB\DB2 (0% processed), C:\DB\DB3 (0% processed) and C:\DB\DB4 (0% processed)
5/14/2013 10:37:39 AM -- Verifying log checksums ...
5/14/2013 10:37:39 AM -- C:\DB\DB1 (0 log(s) processed), C:\DB\DB2 (0 log(s) processed), C:\DB\DB3 (0 log(s) processed) and C:\DB\DB4 (0 log(s) processed)
5/14/2013 10:37:39 AM -- [C:\Program Files\Exchange Jetstress\Application_2013_5_14_10_37_39.evt](#) is saved.
5/14/2013 10:37:39 AM -- [C:\Program Files\Exchange Jetstress\System_2013_5_14_10_37_39.evt](#) is saved.
5/14/2013 10:37:39 AM -- [C:\Program Files\Exchange Jetstress\XmlConfig_2013_5_14_10_37_39.xml](#) is saved.
5/14/2013 10:37:39 AM -- Jetstress testing ends.
5/14/2013 1:17:15 PM -- Jetstress testing begins ...
5/14/2013 1:17:15 PM -- Prepare testing begins ...
5/14/2013 1:17:19 PM -- Attaching databases ...
5/14/2013 1:17:19 PM -- Prepare testing ends.
5/14/2013 1:17:19 PM -- Dispatching transactions begins ...
5/14/2013 1:17:19 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
5/14/2013 1:17:19 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
5/14/2013 1:17:24 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
5/14/2013 1:17:24 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
5/14/2013 1:17:29 PM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
5/14/2013 1:17:29 PM -- Performance logging begins (interval: 15000 ms).
5/14/2013 1:17:29 PM -- Attaining prerequisites:
5/14/2013 1:20:21 PM -- \MSEExchange Database(JetstressWin)\Database Cache Size, Last: 971599900.0 (lower bound: 966367600.0, upper bound: none)
5/14/2013 3:20:22 PM -- Performance logging ends.
5/15/2013 9:17:15 AM -- JetInterop batch transaction stats: 232394, 232238, 232466 and 232701.
5/15/2013 9:17:15 AM -- Dispatching transactions ends.
5/15/2013 9:17:15 AM -- Shutting down databases ...
5/15/2013 9:17:17 AM -- Instance3940.1 (complete), Instance3940.2 (complete), Instance3940.3 (complete) and Instance3940.4 (complete)
5/15/2013 9:17:17 AM -- [C:\Program Files\Exchange Jetstress\Performance_2013_5_14_13_17_24.blg](#) has 490 samples.
5/15/2013 9:17:17 AM -- Creating test report ...
5/15/2013 9:17:20 AM -- Instance3940.1 has 10.5 for I/O Database Reads Average Latency.
5/15/2013 9:17:20 AM -- Instance3940.1 has 0.9 for I/O Log Writes Average Latency.
5/15/2013 9:17:20 AM -- Instance3940.1 has 0.9 for I/O Log Reads Average Latency.
5/15/2013 9:17:20 AM -- Instance3940.2 has 10.7 for I/O Database Reads Average Latency.
5/15/2013 9:17:20 AM -- Instance3940.2 has 0.9 for I/O Log Writes Average Latency.
5/15/2013 9:17:20 AM -- Instance3940.2 has 0.9 for I/O Log Reads Average Latency.
5/15/2013 9:17:20 AM -- Instance3940.3 has 10.7 for I/O Database Reads Average Latency.
5/15/2013 9:17:20 AM -- Instance3940.3 has 0.9 for I/O Log Writes Average Latency.

Dell Compellent Storage Center (SC8000) 10,000 Mailbox Exchange 2010 Resiliency Storage Solution

5/15/2013 9:17:20 AM -- Instance3940.3 has 0.9 for I/O Log Reads Average Latency.
5/15/2013 9:17:20 AM -- Instance3940.4 has 11.2 for I/O Database Reads Average Latency.
5/15/2013 9:17:20 AM -- Instance3940.4 has 0.9 for I/O Log Writes Average Latency.
5/15/2013 9:17:20 AM -- Instance3940.4 has 0.9 for I/O Log Reads Average Latency.
5/15/2013 9:17:20 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/15/2013 9:17:20 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/15/2013 9:17:20 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_14_13_17_24.xml has 478 samples queried.

Appendix B: Stress Testing

Server 1 – JS6

Test Summary

Overall Test Result	Pass
Machine Name	JS6
Test Description	2500 users/server 4 servers 2GB mailboxes .15 IOPS/user .18 IOPS tested 4 dbs per server 1300GB db/log combined volumes 2 copies 3 threads/db
Test Start Time	5/15/2013 12:49:21 PM
Test End Time	5/16/2013 2:13:47 PM
Collection Start Time	5/15/2013 12:52:27 PM
Collection End Time	5/16/2013 12:52:18 PM
Jetstress Version	14.01.0180.003
Ese Version	14.03.0123.002
Operating System	Windows Server 2008 R2 Standard Service Pack 1 (6.1.7601.65536)
Performance Log	C:\Program Files\Exchange Jetstress\Performance_2013_5_15_12_49_31.blg

Database Sizing and Throughput

Achieved Transactional I/O per Second	466.104
Target Transactional I/O per Second	375
Initial Database Size (bytes)	5534671699968
Final Database Size (bytes)	5551960621056
Database Files (Count)	4

Jetstress System Parameters

Thread Count	3 (per database)
Minimum Database Cache	64.0 MB
Maximum Database Cache	512.0 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

Instance3544.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance3544.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance3544.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance3544.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance3292.1	12.493	1.860	78.921	48.252	33718.790	34949.348	0.000	0.905	0.000	40.023	0.000	4575.632
Instance3544.1	10.465	1.705	72.114	44.179	34324.032	34939.980	0.000	0.908	0.000	36.566	0.000	4596.547
Instance3544.2	10.483	1.640	72.398	44.345	34348.619	34944.384	0.000	0.909	0.000	36.638	0.000	4582.962
Instance3544.3	10.264	1.742	72.146	44.177	34398.176	34945.598	0.000	0.901	0.000	36.512	0.000	4576.710

Background Database Maintenance I/O Performance

MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance3544.1	31.179	261841.084
Instance3544.2	31.177	261852.057
Instance3544.3	31.188	261852.418
Instance3544.4	31.214	261843.924

Log Replication I/O Performance

MSExchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance3292.1	0.742	228549.505
MSExchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance3544.1	0.680	223315.051
Instance3544.2	0.679	223313.439

Total I/O Performance

MSExchange 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
Instance3544.1	10.465	1.705	103.293	44.179	103000.518	34939.980	10.524	0.908	0.680	36.566	223315.051	4596.547
Instance3544.2	10.483	1.640	103.575	44.345	102828.999	34944.384	11.446	0.909	0.679	36.638	223313.439	4582.962
Instance3544.3	10.264	1.742	103.334	44.177	103047.541	34945.598	10.560	0.901	0.676	36.512	222911.232	4576.710

Instance3544.4	10.280	1.928	103.607	44.350	102887.440	34926.967	10.418	0.908	0.678	36.611	223304.880	4579.980
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Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.458	0.000	3.138
Available MBytes	28936.981	28792.000	29000.000
Free System Page Table Entries	33555161.886	33555098.000	33555164.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	91903937.680	91885568.000	91979776.000
Pool Paged Bytes	223844501.923	222498816.000	226840576.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/15/2013 12:49:21 PM -- Jetstress testing begins ...
5/15/2013 12:49:21 PM -- Prepare testing begins ...
5/15/2013 12:49:26 PM -- Attaching databases ...
5/15/2013 12:49:26 PM -- Prepare testing ends.
5/15/2013 12:49:26 PM -- Dispatching transactions begins ...
5/15/2013 12:49:26 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
5/15/2013 12:49:26 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
5/15/2013 12:49:31 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
5/15/2013 12:49:31 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
5/15/2013 12:49:34 PM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
5/15/2013 12:49:34 PM -- Performance logging begins (interval: 15000 ms).
5/15/2013 12:49:34 PM -- Attaining prerequisites:
5/15/2013 12:52:27 PM -- \MSEExchange Database(JetstressWin)\Database Cache Size, Last: 969437200.0 (lower bound: 966367600.0, upper bound: none)
5/16/2013 12:52:27 PM -- Performance logging ends.
5/16/2013 2:13:43 PM -- JetInterop batch transaction stats: 302986, 303116, 302330 and 302783.
5/16/2013 2:13:44 PM -- Dispatching transactions ends.
5/16/2013 2:13:44 PM -- Shutting down databases ...
5/16/2013 2:13:47 PM -- Instance3544.1 (complete), Instance3544.2 (complete), Instance3544.3 (complete) and Instance3544.4 (complete)
5/16/2013 2:13:47 PM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_15_12_49_31.blg has 5762 samples.
5/16/2013 2:13:47 PM -- Creating test report ...
5/16/2013 2:14:13 PM -- Instance3544.1 has 10.5 for I/O Database Reads Average Latency.
5/16/2013 2:14:13 PM -- Instance3544.1 has 0.9 for I/O Log Writes Average Latency.
5/16/2013 2:14:13 PM -- Instance3544.1 has 0.9 for I/O Log Reads Average Latency.
5/16/2013 2:14:13 PM -- Instance3544.2 has 10.5 for I/O Database Reads Average Latency.
5/16/2013 2:14:13 PM -- Instance3544.2 has 0.9 for I/O Log Writes Average Latency.
5/16/2013 2:14:13 PM -- Instance3544.2 has 0.9 for I/O Log Reads Average Latency.
5/16/2013 2:14:13 PM -- Instance3544.3 has 10.3 for I/O Database Reads Average Latency.
5/16/2013 2:14:13 PM -- Instance3544.3 has 0.9 for I/O Log Writes Average Latency.
5/16/2013 2:14:13 PM -- Instance3544.3 has 0.9 for I/O Log Reads Average Latency.
5/16/2013 2:14:13 PM -- Instance3544.4 has 10.3 for I/O Database Reads Average Latency.
5/16/2013 2:14:13 PM -- Instance3544.4 has 0.9 for I/O Log Writes Average Latency.
5/16/2013 2:14:13 PM -- Instance3544.4 has 0.9 for I/O Log Reads Average Latency.
5/16/2013 2:14:13 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/16/2013 2:14:13 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/16/2013 2:14:13 PM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_15_12_49_31.xml has 5750 samples queried.

Server 2 – JS7

Test Summary

Overall Test Result	Pass
Machine Name	JS7
Test Description	2500 users/server 4 servers 2GB mailboxes .15 IOPS/user .18 IOPS tested 4 dbs per server 1300GB db/log combined volumes 2 copies 3 threads/db
Test Start Time	5/15/2013 12:49:19 PM
Test End Time	5/16/2013 2:13:43 PM
Collection Start Time	5/15/2013 12:52:20 PM
Collection End Time	5/16/2013 12:52:16 PM
Jetstress Version	14.01.0180.003
Ese Version	14.03.0123.002
Operating System	Windows Server 2008 R2 Standard Service Pack 1 (6.1.7601.65536)
Performance Log	C:\Program Files\Exchange Jetstress\Performance_2013_5_15_12_49_28.blg

Database Sizing and Throughput

Achieved Transactional I/O per Second	461.734
Target Transactional I/O per Second	375
Initial Database Size (bytes)	5531727298560
Final Database Size (bytes)	5548898779136
Database Files (Count)	4

Jetstress System Parameters

Thread Count	3 (per database)
Minimum Database Cache	128.0 MB
Maximum Database Cache	1024.0 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

Instance3748.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance3748.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance3748.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance3748.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance3748.1	10.437	1.620	71.543	43.850	34335.803	34946.484	0.000	0.911	0.000	36.331	0.000	4588.945
Instance3748.2	10.310	1.668	71.575	43.867	34396.363	34935.730	0.000	0.905	0.000	36.310	0.000	4579.135
Instance3748.3	10.831	1.729	71.674	43.915	34271.437	34954.146	0.000	0.906	0.000	36.296	0.000	4575.241
Instance3748.4	10.209	1.898	71.495	43.814	34451.868	34945.429	0.000	0.909	0.000	36.192	0.000	4584.346

Background Database Maintenance I/O Performance

MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance3748.1	31.196	261837.505
Instance3748.2	31.171	261857.076
Instance3748.3	31.147	261848.209
Instance3748.4	31.203	261842.185

Log Replication I/O Performance

MSExchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance3748.1	0.675	222530.940
Instance3748.2	0.673	222369.089
Instance3748.3	0.672	223704.920
Instance3748.4	0.671	222535.681

Total I/O Performance

MSExchange 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
Instance3748.1	10.437	1.620	102.739	43.850	103416.200	34946.484	10.431	0.911	0.675	36.331	222530.940	4588.945
Instance3748.2	10.310	1.668	102.746	43.867	103403.156	34935.730	11.029	0.905	0.673	36.310	222369.089	4579.135
Instance3748.3	10.831	1.729	102.821	43.915	103209.498	34954.146	10.688	0.906	0.672	36.296	223704.920	4575.241
Instance3748.4	10.209	1.898	102.698	43.814	103539.575	34945.429	10.380	0.909	0.671	36.192	222535.681	4584.346

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.463	0.000	3.023
Available MBytes	29006.582	28850.000	29058.000
Free System Page Table Entries	33555673.886	33555610.000	33555676.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	87988871.055	87965696.000	88064000.000
Pool Paged Bytes	214298146.810	213200896.000	216907776.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/15/2013 12:49:19 PM -- Jetstress testing begins ...
5/15/2013 12:49:19 PM -- Prepare testing begins ...
5/15/2013 12:49:23 PM -- Attaching databases ...
5/15/2013 12:49:23 PM -- Prepare testing ends.
5/15/2013 12:49:23 PM -- Dispatching transactions begins ...
5/15/2013 12:49:23 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
5/15/2013 12:49:23 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
5/15/2013 12:49:28 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
5/15/2013 12:49:28 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
5/15/2013 12:49:32 PM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
5/15/2013 12:49:32 PM -- Performance logging begins (interval: 15000 ms).
5/15/2013 12:49:32 PM -- Attaining prerequisites:
5/15/2013 12:52:20 PM -- \\MSEExchange Database(JetstressWin)\Database Cache Size, Last: 970485800.0 (lower bound: 966367600.0, upper bound: none)
5/16/2013 12:52:20 PM -- Performance logging ends.
5/16/2013 2:13:40 PM -- JetInterop batch transaction stats: 300316, 300280, 299960 and 300045.
5/16/2013 2:13:41 PM -- Dispatching transactions ends.
5/16/2013 2:13:41 PM -- Shutting down databases ...
5/16/2013 2:13:43 PM -- Instance3748.1 (complete), Instance3748.2 (complete), Instance3748.3 (complete) and Instance3748.4 (complete)
5/16/2013 2:13:43 PM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_15_12_49_28.blg has 5762 samples.
5/16/2013 2:13:43 PM -- Creating test report ...
5/16/2013 2:14:09 PM -- Instance3748.1 has 10.4 for I/O Database Reads Average Latency.
5/16/2013 2:14:09 PM -- Instance3748.1 has 0.9 for I/O Log Writes Average Latency.
5/16/2013 2:14:09 PM -- Instance3748.1 has 0.9 for I/O Log Reads Average Latency.
5/16/2013 2:14:09 PM -- Instance3748.2 has 10.3 for I/O Database Reads Average Latency.
5/16/2013 2:14:09 PM -- Instance3748.2 has 0.9 for I/O Log Writes Average Latency.
5/16/2013 2:14:09 PM -- Instance3748.2 has 0.9 for I/O Log Reads Average Latency.
5/16/2013 2:14:09 PM -- Instance3748.3 has 10.8 for I/O Database Reads Average Latency.
5/16/2013 2:14:09 PM -- Instance3748.3 has 0.9 for I/O Log Writes Average Latency.
5/16/2013 2:14:09 PM -- Instance3748.3 has 0.9 for I/O Log Reads Average Latency.
5/16/2013 2:14:09 PM -- Instance3748.4 has 10.2 for I/O Database Reads Average Latency.
5/16/2013 2:14:09 PM -- Instance3748.4 has 0.9 for I/O Log Writes Average Latency.
5/16/2013 2:14:09 PM -- Instance3748.4 has 0.9 for I/O Log Reads Average Latency.
5/16/2013 2:14:09 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/16/2013 2:14:09 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/16/2013 2:14:09 PM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_15_12_49_28.xml has 5750 samples queried.

Server 3 – JS8

Test Summary

Overall Test Result	Pass
Machine Name	JS8
Test Description	2500 users/server 4 servers 2GB mailboxes .15 IOPS/user .18 IOPS tested 4 dbs per server 1300GB db/log combined volumes 2 copies 3 threads/db
Test Start Time	5/15/2013 12:49:17 PM
Test End Time	5/16/2013 2:13:40 PM
Collection Start Time	5/15/2013 12:52:27 PM
Collection End Time	5/16/2013 12:52:13 PM
Jetstress Version	14.01.0180.003
Ese Version	14.03.0123.002
Operating System	Windows Server 2008 R2 Standard Service Pack 1 (6.1.7601.65536)
Performance Log	C:\Program Files\Exchange Jetstress\Performance_2013_5_15_12_49_26.blg

Database Sizing and Throughput

Achieved Transactional I/O per Second	457.468
Target Transactional I/O per Second	375
Initial Database Size (bytes)	5535829327872
Final Database Size (bytes)	5552841424896
Database Files (Count)	4

Jetstress System Parameters

Thread Count	3 (per database)
Minimum Database Cache	64.0 MB
Maximum Database Cache	512.0 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

Instance2920.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance2920.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance2920.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance2920.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance2920.1	10.319	2.063	71.166	43.640	34409.785	34941.151	0.000	0.849	0.000	36.152	0.000	4575.473
Instance2920.2	10.249	1.985	70.724	43.329	34441.655	34962.099	0.000	0.856	0.000	35.921	0.000	4588.400
Instance2920.3	11.057	1.944	70.657	43.289	34229.636	34939.402	0.000	0.849	0.000	35.978	0.000	4563.807
Instance2920.4	10.718	1.788	71.081	43.581	34334.487	34947.704	0.000	0.856	0.000	36.118	0.000	4577.781

Background Database Maintenance I/O Performance

MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance2920.1	31.091	261849.980
Instance2920.2	31.126	261851.194
Instance2920.3	31.092	261862.780
Instance2920.4	31.089	261838.661

Log Replication I/O Performance

MSExchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance2920.1	0.669	221461.016
Instance2920.2	0.667	222542.279
Instance2920.3	0.664	222052.001
Instance2920.4	0.668	224335.322

Total I/O Performance

MSExchange 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
Instance2920.1	10.319	2.063	102.257	43.640	103563.286	34941.151	10.149	0.849	0.669	36.152	221461.016	4575.473
Instance2920.2	10.249	1.985	101.850	43.329	103938.798	34962.099	11.659	0.856	0.667	35.921	222542.279	4588.400
Instance2920.3	11.057	1.944	101.748	43.289	103788.586	34939.402	12.523	0.849	0.664	35.978	222052.001	4563.807
Instance2920.4	10.718	1.788	102.170	43.581	103560.518	34947.704	13.291	0.856	0.668	36.118	224335.322	4577.781

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.512	0.000	3.041
Available MBytes	28973.311	28812.000	29065.000
Free System Page Table Entries	33555672.878	33555609.000	33555675.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	87852201.687	87830528.000	87912448.000
Pool Paged Bytes	223816695.275	223268864.000	226394112.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/15/2013 12:49:16 PM -- Jetstress testing begins ...
5/15/2013 12:49:17 PM -- Prepare testing begins ...
5/15/2013 12:49:21 PM -- Attaching databases ...
5/15/2013 12:49:21 PM -- Prepare testing ends.
5/15/2013 12:49:21 PM -- Dispatching transactions begins ...
5/15/2013 12:49:22 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
5/15/2013 12:49:22 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
5/15/2013 12:49:26 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
5/15/2013 12:49:26 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
5/15/2013 12:49:30 PM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
5/15/2013 12:49:30 PM -- Performance logging begins (interval: 15000 ms).
5/15/2013 12:49:30 PM -- Attaining prerequisites:
5/15/2013 12:52:27 PM -- \\MSEExchange Database(JetstressWin)\Database Cache Size, Last: 976478200.0 (lower bound: 966367600.0, upper bound: none)
5/16/2013 12:52:27 PM -- Performance logging ends.
5/16/2013 2:13:38 PM -- JetInterop batch transaction stats: 298360, 296942, 295648 and 297892.
5/16/2013 2:13:39 PM -- Dispatching transactions ends.
5/16/2013 2:13:39 PM -- Shutting down databases ...
5/16/2013 2:13:40 PM -- Instance2920.1 (complete), Instance2920.2 (complete), Instance2920.3 (complete) and Instance2920.4 (complete)
5/16/2013 2:13:40 PM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_15_12_49_26.blg has 5762 samples.
5/16/2013 2:13:40 PM -- Creating test report ...
5/16/2013 2:14:04 PM -- Instance2920.1 has 10.3 for I/O Database Reads Average Latency.
5/16/2013 2:14:04 PM -- Instance2920.1 has 0.8 for I/O Log Writes Average Latency.
5/16/2013 2:14:04 PM -- Instance2920.1 has 0.8 for I/O Log Reads Average Latency.
5/16/2013 2:14:04 PM -- Instance2920.2 has 10.2 for I/O Database Reads Average Latency.
5/16/2013 2:14:04 PM -- Instance2920.2 has 0.9 for I/O Log Writes Average Latency.
5/16/2013 2:14:04 PM -- Instance2920.2 has 0.9 for I/O Log Reads Average Latency.
5/16/2013 2:14:04 PM -- Instance2920.3 has 11.1 for I/O Database Reads Average Latency.
5/16/2013 2:14:04 PM -- Instance2920.3 has 0.8 for I/O Log Writes Average Latency.
5/16/2013 2:14:04 PM -- Instance2920.3 has 0.8 for I/O Log Reads Average Latency.
5/16/2013 2:14:04 PM -- Instance2920.4 has 10.7 for I/O Database Reads Average Latency.
5/16/2013 2:14:04 PM -- Instance2920.4 has 0.9 for I/O Log Writes Average Latency.
5/16/2013 2:14:04 PM -- Instance2920.4 has 0.9 for I/O Log Reads Average Latency.
5/16/2013 2:14:04 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/16/2013 2:14:04 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/16/2013 2:14:04 PM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_15_12_49_26.xml has 5750 samples queried.

Server 4 – JS9

Test Summary

Overall Test Result	Pass
Machine Name	JS9
Test Description	2500 users/server 4 servers 2GB mailboxes .15 IOPS/user .18 IOPS tested 4 dbs per server 1300GB db/log combined volumes 2 copies 3 threads/db
Test Start Time	5/15/2013 12:49:14 PM
Test End Time	5/16/2013 2:13:36 PM
Collection Start Time	5/15/2013 12:52:23 PM
Collection End Time	5/16/2013 12:52:10 PM
Jetstress Version	14.01.0180.003
Ese Version	14.03.0123.002
Operating System	Windows Server 2008 R2 Standard Service Pack 1 (6.1.7601.65536)
Performance Log	C:\Program Files\Exchange Jetstress\Performance_2013_5_15_12_49_23.blg

Database Sizing and Throughput

Achieved Transactional I/O per Second	442.875
Target Transactional I/O per Second	375
Initial Database Size (bytes)	5385522249728
Final Database Size (bytes)	5402047807488
Database Files (Count)	4

Jetstress System Parameters

Thread Count	3 (per database)
Minimum Database Cache	64.0 MB
Maximum Database Cache	512.0 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

Instance968.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance968.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance968.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance968.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance968.1	10.110	1.584	68.300	42.188	34584.369	35292.910	0.000	0.884	0.000	35.590	0.000	4635.626
Instance968.2	10.328	1.591	68.446	42.271	34468.385	35287.405	0.000	0.891	0.000	35.549	0.000	4626.177
Instance968.3	11.522	1.652	68.678	42.435	34214.209	35292.633	0.000	0.894	0.000	35.805	0.000	4615.361
Instance968.4	10.830	1.842	68.351	42.204	34369.629	35282.048	0.000	0.888	0.000	35.594	0.000	4620.827

Background Database Maintenance I/O Performance

MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance968.1	31.203	261831.435
Instance968.2	31.201	261842.126
Instance968.3	31.194	261829.885
Instance968.4	31.182	261840.681

Log Replication I/O Performance

MSExchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance968.1	0.668	222120.280
Instance968.2	0.665	221704.759
Instance968.3	0.669	222127.832
Instance968.4	0.666	222558.700

Total I/O Performance

MSExchange 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
Instance968.1	10.110	1.584	99.503	42.188	105845.873	35292.910	10.684	0.884	0.668	35.590	222120.280	4635.626
Instance968.2	10.328	1.591	99.647	42.271	105663.044	35287.405	10.627	0.891	0.665	35.549	221704.759	4626.177
Instance968.3	11.522	1.652	99.872	42.435	105307.404	35292.633	13.003	0.894	0.669	35.805	222127.832	4615.361
Instance968.4	10.830	1.842	99.533	42.204	105631.774	35282.048	11.197	0.888	0.666	35.594	222558.700	4620.827

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	0.470	0.000	2.730
Available MBytes	28959.354	28792.000	29045.000
Free System Page Table Entries	33555673.864	33555610.000	33555676.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	79400816.843	79376384.000	79663104.000
Pool Paged Bytes	222681079.809	221405184.000	225685504.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/15/2013 12:49:14 PM -- Jetstress testing begins ...
5/15/2013 12:49:14 PM -- Prepare testing begins ...
5/15/2013 12:49:18 PM -- Attaching databases ...
5/15/2013 12:49:18 PM -- Prepare testing ends.
5/15/2013 12:49:18 PM -- Dispatching transactions begins ...
5/15/2013 12:49:18 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
5/15/2013 12:49:18 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
5/15/2013 12:49:23 PM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
5/15/2013 12:49:23 PM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
5/15/2013 12:49:27 PM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
5/15/2013 12:49:27 PM -- Performance logging begins (interval: 15000 ms).
5/15/2013 12:49:27 PM -- Attaining prerequisites:
5/15/2013 12:52:23 PM -- \\MSEExchange Database(JetstressWin)\Database Cache Size, Last: 972808200.0 (lower bound: 966367600.0, upper bound: none)
5/16/2013 12:52:23 PM -- Performance logging ends.
5/16/2013 2:13:34 PM -- JetInterop batch transaction stats: 294339, 293460, 294695 and 294193.
5/16/2013 2:13:35 PM -- Dispatching transactions ends.
5/16/2013 2:13:35 PM -- Shutting down databases ...
5/16/2013 2:13:36 PM -- Instance968.1 (complete), Instance968.2 (complete), Instance968.3 (complete) and Instance968.4 (complete)
5/16/2013 2:13:36 PM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_15_12_49_23.blg has 5762 samples.
5/16/2013 2:13:36 PM -- Creating test report ...
5/16/2013 2:14:01 PM -- Instance968.1 has 10.1 for I/O Database Reads Average Latency.
5/16/2013 2:14:01 PM -- Instance968.1 has 0.9 for I/O Log Writes Average Latency.
5/16/2013 2:14:01 PM -- Instance968.1 has 0.9 for I/O Log Reads Average Latency.
5/16/2013 2:14:01 PM -- Instance968.2 has 10.3 for I/O Database Reads Average Latency.
5/16/2013 2:14:01 PM -- Instance968.2 has 0.9 for I/O Log Writes Average Latency.
5/16/2013 2:14:01 PM -- Instance968.2 has 0.9 for I/O Log Reads Average Latency.
5/16/2013 2:14:01 PM -- Instance968.3 has 11.5 for I/O Database Reads Average Latency.
5/16/2013 2:14:01 PM -- Instance968.3 has 0.9 for I/O Log Writes Average Latency.
5/16/2013 2:14:01 PM -- Instance968.3 has 0.9 for I/O Log Reads Average Latency.
5/16/2013 2:14:01 PM -- Instance968.4 has 10.8 for I/O Database Reads Average Latency.
5/16/2013 2:14:01 PM -- Instance968.4 has 0.9 for I/O Log Writes Average Latency.
5/16/2013 2:14:01 PM -- Instance968.4 has 0.9 for I/O Log Reads Average Latency.
5/16/2013 2:14:01 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/16/2013 2:14:01 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/16/2013 2:14:01 PM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_15_12_49_23.xml has 5750 samples queried.

Appendix C: Backup testing

Server 1 – JS6

Database Backup Statistics - All

Database Instance	Database Size (MBytes)	Elapsed Backup Time	MBytes Transferred/sec
Instance3836.1	1323714.59	03:13:43	113.88
Instance3836.2	1323682.59	03:12:52	114.38
Instance3836.3	1323650.59	03:21:26	109.51
Instance3836.4	1323682.59	03:06:11	118.49

Jetstress System Parameters

Thread Count	3 (per database)
Minimum Database Cache	64.0 MB
Maximum Database Cache	512.0 MB
Insert Operations	40%
Delete Operations	20%
Replace Operations	5%
Read Operations	35%
Lazy Commits	70%

Database Configuration

Instance3836.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance3836.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance3836.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance3836.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance3836.1	3.242	0.000	455.638	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3836.2	3.134	0.000	457.659	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3836.3	3.732	0.000	437.815	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3836.4	3.121	0.000	474.047	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	0.971	0.000	1.726
Available MBytes	30041.338	29869.000	30052.000
Free System Page Table Entries	33555161.938	33555100.000	33555164.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	92104581.731	92090368.000	92160000.000
Pool Paged Bytes	228718133.493	225796096.000	228868096.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/17/2013 9:17:09 AM -- Jetstress testing begins ...

5/17/2013 9:17:10 AM -- Prepare testing begins ...

5/17/2013 9:17:14 AM -- Attaching databases ...

5/17/2013 9:17:14 AM -- Prepare testing ends.

5/17/2013 9:17:21 AM -- Performance logging begins (interval: 30000 ms).

5/17/2013 9:17:21 AM -- Backing up databases ...

5/17/2013 12:38:47 PM -- Performance logging ends.

5/17/2013 12:38:47 PM -- Instance3836.1 (100% processed), Instance3836.2 (100% processed), Instance3836.3 (100% processed) and Instance3836.4 (100% processed)

5/17/2013 12:38:47 PM -- [C:\Program Files\Exchange Jetstress\DatabaseBackup_2013_5_17_9_17_14.blg](#) has 402 samples.

5/17/2013 12:38:47 PM -- Creating test report ...

Server 2 – JS7

Database Backup Statistics - All

Database Instance	Database Size (MBytes)	Elapsed Backup Time	MBytes Transferred/sec
Instance2792.1	1322970.59	03:14:12	113.54
Instance2792.2	1322946.59	03:19:07	110.73
Instance2792.3	1322954.59	03:26:02	107.02
Instance2792.4	1322938.59	03:08:53	116.73

Jetstress System Parameters

Thread Count	3 (per database)
Minimum Database Cache	64.0 MB
Maximum Database Cache	512.0 MB
Insert Operations	40%
Delete Operations	20%
Replace Operations	5%
Read Operations	35%
Lazy Commits	70%

Database Configuration

Instance2792.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance2792.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance2792.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance2792.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance2792.1	3.242	0.000	454.353	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2792.2	3.409	0.000	442.329	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2792.3	3.888	0.000	426.511	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2792.4	3.064	0.000	467.151	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	0.954	0.000	1.812
Available MBytes	30101.124	30084.000	30108.000
Free System Page Table Entries	33555674.092	33555674.000	33555676.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	88380269.002	88358912.000	88428544.000
Pool Paged Bytes	219014186.355	216137728.000	219148288.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/17/2013 9:17:06 AM -- Jetstress testing begins ...

5/17/2013 9:17:06 AM -- Prepare testing begins ...

5/17/2013 9:17:11 AM -- Attaching databases ...

5/17/2013 9:17:11 AM -- Prepare testing ends.

5/17/2013 9:17:18 AM -- Performance logging begins (interval: 30000 ms).

5/17/2013 9:17:18 AM -- Backing up databases ...

5/17/2013 12:43:20 PM -- Performance logging ends.

5/17/2013 12:43:20 PM -- Instance2792.1 (100% processed), Instance2792.2 (100% processed), Instance2792.3 (100% processed) and Instance2792.4 (100% processed)

5/17/2013 12:43:20 PM -- [C:\Program Files\Exchange Jetstress\DatabaseBackup_2013_5_17_9_17_11.blg](#) has 411 samples.

5/17/2013 12:43:20 PM -- Creating test report ...

Server 3 – JS8

Database Backup Statistics - All

Database Instance	Database Size (MBytes)	Elapsed Backup Time	MBytes Transferred/sec
Instance3108.1	1323938.59	03:24:45	107.76
Instance3108.2	1323858.59	03:03:31	120.22
Instance3108.3	1323914.59	03:26:49	106.69
Instance3108.4	1323858.59	03:16:34	112.25

Jetstress System Parameters

Thread Count	3 (per database)
Minimum Database Cache	64.0 MB
Maximum Database Cache	512.0 MB
Insert Operations	40%
Delete Operations	20%
Replace Operations	5%
Read Operations	35%
Lazy Commits	70%

Database Configuration

Instance3108.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance3108.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance3108.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance3108.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance3108.1	3.680	0.000	430.916	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3108.2	3.135	0.000	480.817	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3108.3	3.808	0.000	426.311	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance3108.4	3.362	0.000	448.484	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	0.951	0.158	1.807
Available MBytes	30070.867	30053.000	30077.000
Free System Page Table Entries	33555672.879	33555611.000	33555675.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	87948191.303	87932928.000	87990272.000
Pool Paged Bytes	228930726.121	226054144.000	229072896.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/17/2013 9:17:04 AM -- Jetstress testing begins ...

5/17/2013 9:17:04 AM -- Prepare testing begins ...

5/17/2013 9:17:08 AM -- Attaching databases ...

5/17/2013 9:17:08 AM -- Prepare testing ends.

5/17/2013 9:17:15 AM -- Performance logging begins (interval: 30000 ms).

5/17/2013 9:17:15 AM -- Backing up databases ...

5/17/2013 12:44:05 PM -- Performance logging ends.

5/17/2013 12:44:05 PM -- Instance3108.1 (100% processed), Instance3108.2 (100% processed), Instance3108.3 (100% processed) and Instance3108.4 (100% processed)

5/17/2013 12:44:05 PM -- C:\Program Files\Exchange Jetstress\DatabaseBackup_2013_5_17_9_17_8.blg has 413 samples.

5/17/2013 12:44:05 PM -- Creating test report ...

Server 4 – JS9

Database Backup Statistics - All

Database Instance	Database Size (MBytes)	Elapsed Backup Time	MBytes Transferred/sec
Instance2944.1	1287954.59	03:11:27	112.11
Instance2944.2	1287930.59	02:56:33	121.58
Instance2944.3	1287954.59	03:17:16	108.81
Instance2944.4	1287922.59	03:25:27	104.48

Jetstress System Parameters

Thread Count	3 (per database)
Minimum Database Cache	64.0 MB
Maximum Database Cache	512.0 MB
Insert Operations	40%
Delete Operations	20%
Replace Operations	5%
Read Operations	35%
Lazy Commits	70%

Database Configuration

Instance2944.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance2944.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance2944.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance2944.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance2944.1	3.173	0.000	448.281	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2944.2	2.943	0.000	486.419	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2944.3	3.254	0.000	434.854	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance2944.4	3.997	0.000	417.348	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	0.912	0.000	1.825
Available MBytes	30056.973	29934.000	30063.000
Free System Page Table Entries	33555673.724	33555612.000	33555676.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	79650925.893	79642624.000	79699968.000
Pool Paged Bytes	227546736.390	224673792.000	227569664.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/17/2013 9:17:01 AM -- Jetstress testing begins ...

5/17/2013 9:17:01 AM -- Prepare testing begins ...

5/17/2013 9:17:05 AM -- Attaching databases ...

5/17/2013 9:17:05 AM -- Prepare testing ends.

5/17/2013 9:17:12 AM -- Performance logging begins (interval: 30000 ms).

5/17/2013 9:17:12 AM -- Backing up databases ...

5/17/2013 12:42:39 PM -- Performance logging ends.

5/17/2013 12:42:39 PM -- Instance2944.1 (100% processed), Instance2944.2 (100% processed), Instance2944.3 (100% processed) and Instance2944.4 (100% processed)

5/17/2013 12:42:39 PM -- C:\Program Files\Exchange Jetstress\DatabaseBackup_2013_5_17_9_17_5.blg has 410 samples.

5/17/2013 12:42:39 PM -- Creating test report ...

Appendix D: Recovery testing

Server 1 – JS6

Soft-Recovery Statistics - All

Database Instance	Log files replayed	Elapsed seconds
Instance1428.1	501	991.854358
Instance1428.2	502	990.7935512
Instance1428.3	503	952.8697081
Instance1428.4	501	937.7532112

Database Configuration

Instance1428.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance1428.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance1428.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance1428.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance1428.1	11.684	1.052	445.404	3.028	39455.460	31626.492	11.494	0.005	4.547	0.012	222545.823	1.049
Instance1428.2	11.728	1.037	436.144	3.032	39417.126	31624.148	9.525	0.000	4.547	0.000	223074.160	0.000
Instance1428.3	11.379	1.015	462.520	3.161	39424.871	32277.880	10.687	0.000	4.741	0.000	227455.764	0.000
Instance1428.4	11.184	1.069	473.097	3.196	39476.215	32270.438	11.388	0.000	4.794	0.000	227985.299	0.000

Background Database Maintenance I/O Performance

MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance1428.1	0.000	0.000
Instance1428.2	0.000	0.000
Instance1428.3	0.000	0.000
Instance1428.4	0.000	0.000

Total I/O Performance

MSExchange 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
Instance1428.1	11.684	1.052	445.404	3.028	39455.460	31626.492	11.494	0.005	4.547	0.012	222545.823	1.049
Instance1428.2	11.728	1.037	436.144	3.032	39417.126	31624.148	9.525	0.000	4.547	0.000	223074.160	0.000
Instance1428.3	11.379	1.015	462.520	3.161	39424.871	32277.880	10.687	0.000	4.741	0.000	227455.764	0.000
Instance1428.4	11.184	1.069	473.097	3.196	39476.215	32270.438	11.388	0.000	4.794	0.000	227985.299	0.000

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	1.716	0.000	9.135
Available MBytes	28959.691	28917.000	29963.000
Free System Page Table Entries	33555162.014	33555161.000	33555164.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	92028718.593	92016640.000	92065792.000
Pool Paged Bytes	229299357.055	229281792.000	229429248.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/20/2013 9:12:49 AM -- Jetstress testing begins ...
 5/20/2013 9:12:49 AM -- Prepare testing begins ...
 5/20/2013 9:12:53 AM -- Attaching databases ...
 5/20/2013 9:12:53 AM -- Prepare testing ends.
 5/20/2013 9:12:54 AM -- Dispatching transactions begins ...
 5/20/2013 9:12:54 AM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
 5/20/2013 9:12:54 AM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
 5/20/2013 9:12:58 AM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
 5/20/2013 9:12:58 AM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
 5/20/2013 9:13:02 AM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
 5/20/2013 9:13:02 AM -- Performance logging begins (interval: 15000 ms).
 5/20/2013 9:13:02 AM -- Generating log files ...
 5/20/2013 11:01:57 AM -- C:\DB\DB1 (100.2% generated), C:\DB\DB2 (100.2% generated), C:\DB\DB3 (100.6% generated) and C:\DB\DB4 (100.2% generated)
 5/20/2013 11:01:57 AM -- Performance logging ends.
 5/20/2013 11:01:57 AM -- JetInterop batch transaction stats: 21768, 21748, 22024 and 22130.
 5/20/2013 11:01:57 AM -- Dispatching transactions ends.
 5/20/2013 11:01:57 AM -- Shutting down databases ...
 5/20/2013 11:01:58 AM -- Instance1428.1 (complete), Instance1428.2 (complete), Instance1428.3 (complete) and Instance1428.4 (complete)
 5/20/2013 11:01:58 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_20_9_12_58.blg has 434 samples.

Dell Compellent Storage Center (SC8000) 10,000 Mailbox Exchange 2010 Resiliency Storage Solution

5/20/2013 11:01:58 AM -- Creating test report ...
5/20/2013 11:02:00 AM -- Instance1428.1 has 14.2 for I/O Database Reads Average Latency.
5/20/2013 11:02:00 AM -- Instance1428.1 has 1.0 for I/O Log Writes Average Latency.
5/20/2013 11:02:00 AM -- Instance1428.1 has 1.0 for I/O Log Reads Average Latency.
5/20/2013 11:02:00 AM -- Instance1428.2 has 14.3 for I/O Database Reads Average Latency.
5/20/2013 11:02:00 AM -- Instance1428.2 has 1.0 for I/O Log Writes Average Latency.
5/20/2013 11:02:00 AM -- Instance1428.2 has 1.0 for I/O Log Reads Average Latency.
5/20/2013 11:02:00 AM -- Instance1428.3 has 13.8 for I/O Database Reads Average Latency.
5/20/2013 11:02:00 AM -- Instance1428.3 has 0.9 for I/O Log Writes Average Latency.
5/20/2013 11:02:00 AM -- Instance1428.3 has 0.9 for I/O Log Reads Average Latency.
5/20/2013 11:02:00 AM -- Instance1428.4 has 13.6 for I/O Database Reads Average Latency.
5/20/2013 11:02:00 AM -- Instance1428.4 has 1.0 for I/O Log Writes Average Latency.
5/20/2013 11:02:00 AM -- Instance1428.4 has 1.0 for I/O Log Reads Average Latency.
5/20/2013 11:02:00 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/20/2013 11:02:00 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/20/2013 11:02:00 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_20_9_12_58.xml has 433 samples queried.
5/20/2013 11:02:01 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_20_9_12_58.html is saved.
5/20/2013 11:20:17 AM -- Performance logging begins (interval: 2000 ms).
5/20/2013 11:20:17 AM -- Recovering databases ...
5/20/2013 11:36:49 AM -- Performance logging ends.
5/20/2013 11:36:49 AM -- Instance1428.1 (991.854358), Instance1428.2 (990.7935512), Instance1428.3 (952.8697081) and Instance1428.4 (937.7532112)
5/20/2013 11:36:49 AM -- C:\Program Files\Exchange Jetstress\SoftRecovery_2013_5_20_11_20_14.blg has 489 samples.
5/20/2013 11:36:49 AM -- Creating test report ...

Server 2 – JS7

Soft-Recovery Statistics - All

Database Instance	Log files replayed	Elapsed seconds
Instance2104.1	504	986.5659241
Instance2104.2	501	978.6098731
Instance2104.3	503	1002.4780261
Instance2104.4	501	933.7907858

Database Configuration

Instance2104.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance2104.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance2104.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance2104.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance2104.1	11.589	0.995	450.877	3.062	39457.858	32159.934	11.152	0.001	4.593	0.003	226106.124	1.056
Instance2104.2	11.586	0.999	460.730	3.069	39397.372	32086.753	9.397	0.001	4.604	0.003	225128.294	1.064
Instance2104.3	11.977	0.852	437.329	3.007	39326.903	31438.669	10.230	0.001	4.511	0.003	222441.524	1.039
Instance2104.4	11.134	1.026	477.202	3.210	39433.531	32411.050	11.764	0.000	4.815	0.000	229706.677	0.000

Background Database Maintenance I/O Performance

MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance2104.1	0.000	0.000
Instance2104.2	0.000	0.000
Instance2104.3	0.000	0.000
Instance2104.4	0.000	0.000

Total I/O Performance

MSExchange 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
Instance2104.1	11.589	0.995	450.877	3.062	39457.858	32159.934	11.152	0.001	4.593	0.003	226106.124	1.056
Instance2104.2	11.586	0.999	460.730	3.069	39397.372	32086.753	9.397	0.001	4.604	0.003	225128.294	1.064
Instance2104.3	11.977	0.852	437.329	3.007	39326.903	31438.669	10.230	0.001	4.511	0.003	222441.524	1.039
Instance2104.4	11.134	1.026	477.202	3.210	39433.531	32411.050	11.764	0.000	4.815	0.000	229706.677	0.000

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	2.136	0.000	16.058
Available MBytes	29020.658	28979.000	30021.000
Free System Page Table Entries	33555674.166	33555673.000	33555676.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	88335107.109	88305664.000	88408064.000
Pool Paged Bytes	219400009.587	219394048.000	219525120.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/20/2013 9:12:46 AM -- Jetstress testing begins ...
5/20/2013 9:12:46 AM -- Prepare testing begins ...
5/20/2013 9:12:51 AM -- Attaching databases ...
5/20/2013 9:12:51 AM -- Prepare testing ends.
5/20/2013 9:12:51 AM -- Dispatching transactions begins ...
5/20/2013 9:12:51 AM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
5/20/2013 9:12:51 AM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
5/20/2013 9:12:56 AM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
5/20/2013 9:12:56 AM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
5/20/2013 9:12:59 AM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
5/20/2013 9:12:59 AM -- Performance logging begins (interval: 15000 ms).
5/20/2013 9:12:59 AM -- Generating log files ...
5/20/2013 11:03:50 AM -- C:\DB\DB1 (100.8% generated), C:\DB\DB2 (100.2% generated), C:\DB\DB3 (100.6% generated) and C:\DB\DB4 (100.2% generated)
5/20/2013 11:03:50 AM -- Performance logging ends.
5/20/2013 11:03:50 AM -- JetInterop batch transaction stats: 21969, 22076, 22040 and 22118.
5/20/2013 11:03:50 AM -- Dispatching transactions ends.
5/20/2013 11:03:50 AM -- Shutting down databases ...
5/20/2013 11:03:51 AM -- Instance2104.1 (complete), Instance2104.2 (complete), Instance2104.3 (complete) and Instance2104.4 (complete)
5/20/2013 11:03:51 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_20_9_12_56.blg has 442 samples.
5/20/2013 11:03:51 AM -- Creating test report ...
5/20/2013 11:03:53 AM -- Instance2104.1 has 14.2 for I/O Database Reads Average Latency.
5/20/2013 11:03:53 AM -- Instance2104.1 has 0.9 for I/O Log Writes Average Latency.
5/20/2013 11:03:53 AM -- Instance2104.1 has 0.9 for I/O Log Reads Average Latency.
5/20/2013 11:03:53 AM -- Instance2104.2 has 14.0 for I/O Database Reads Average Latency.
5/20/2013 11:03:53 AM -- Instance2104.2 has 0.9 for I/O Log Writes Average Latency.
5/20/2013 11:03:53 AM -- Instance2104.2 has 0.9 for I/O Log Reads Average Latency.
5/20/2013 11:03:53 AM -- Instance2104.3 has 14.6 for I/O Database Reads Average Latency.
5/20/2013 11:03:53 AM -- Instance2104.3 has 0.9 for I/O Log Writes Average Latency.
5/20/2013 11:03:53 AM -- Instance2104.3 has 0.9 for I/O Log Reads Average Latency.
5/20/2013 11:03:53 AM -- Instance2104.4 has 13.7 for I/O Database Reads Average Latency.
5/20/2013 11:03:53 AM -- Instance2104.4 has 0.9 for I/O Log Writes Average Latency.

Dell Compellent Storage Center (SC8000) 10,000 Mailbox Exchange 2010 Resiliency Storage Solution

5/20/2013 11:03:53 AM -- Instance2104.4 has 0.9 for I/O Log Reads Average Latency.
5/20/2013 11:03:53 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/20/2013 11:03:53 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/20/2013 11:03:53 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_20_9_12_56.xml has 441 samples queried.
5/20/2013 11:03:54 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_20_9_12_56.html is saved.
5/20/2013 11:20:20 AM -- Performance logging begins (interval: 2000 ms).
5/20/2013 11:20:20 AM -- Recovering databases ...
5/20/2013 11:37:02 AM -- Performance logging ends.
5/20/2013 11:37:02 AM -- Instance2104.1 (986.5659241), Instance2104.2 (978.6098731), Instance2104.3 (1002.4780261) and Instance2104.4 (933.7907858)
5/20/2013 11:37:03 AM -- C:\Program Files\Exchange Jetstress\SoftRecovery_2013_5_20_11_20_17.blg has 494 samples.
5/20/2013 11:37:03 AM -- Creating test report ...

Server 3 – JS8

Soft-Recovery Statistics - All

Database Instance	Log files replayed	Elapsed seconds
Instance3548.1	501	973.0312746
Instance3548.2	501	948.6325618
Instance3548.3	507	1039.3321246
Instance3548.4	503	992.6563262

Database Configuration

Instance3548.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance3548.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance3548.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance3548.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance3548.1	11.649	0.875	452.905	3.082	39480.954	32013.925	10.720	0.000	4.624	0.000	226286.583	0.000
Instance3548.2	11.391	0.995	466.207	3.164	39351.072	32205.459	10.311	0.000	4.745	0.000	225578.983	0.000
Instance3548.3	12.346	0.970	420.917	2.920	39431.666	30844.243	11.191	0.000	4.380	0.000	216969.353	0.000
Instance3548.4	11.786	0.999	445.803	3.032	39530.429	32029.377	10.892	0.000	4.547	0.000	224546.380	0.000

Background Database Maintenance I/O Performance

MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance3548.1	0.000	0.000
Instance3548.2	0.000	0.000
Instance3548.3	0.000	0.000
Instance3548.4	0.000	0.000

Total I/O Performance

MSExchange 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
Instance3548.1	11.649	0.875	452.905	3.082	39480.954	32013.925	10.720	0.000	4.624	0.000	226286.583	0.000
Instance3548.2	11.391	0.995	466.207	3.164	39351.072	32205.459	10.311	0.000	4.745	0.000	225578.983	0.000
Instance3548.3	12.346	0.970	420.917	2.920	39431.666	30844.243	11.191	0.000	4.380	0.000	216969.353	0.000
Instance3548.4	11.786	0.999	445.803	3.032	39530.429	32029.377	10.892	0.000	4.547	0.000	224546.380	0.000

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	2.139	0.000	16.419
Available MBytes	29000.125	28957.000	30007.000
Free System Page Table Entries	33555673.031	33555673.000	33555675.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	88024896.000	87998464.000	88133632.000
Pool Paged Bytes	229980792.000	229965824.000	230006784.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/20/2013 9:12:44 AM -- Jetstress testing begins ...
5/20/2013 9:12:44 AM -- Prepare testing begins ...
5/20/2013 9:12:48 AM -- Attaching databases ...
5/20/2013 9:12:48 AM -- Prepare testing ends.
5/20/2013 9:12:48 AM -- Dispatching transactions begins ...
5/20/2013 9:12:48 AM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
5/20/2013 9:12:48 AM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
5/20/2013 9:12:53 AM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
5/20/2013 9:12:53 AM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
5/20/2013 9:12:56 AM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
5/20/2013 9:12:56 AM -- Performance logging begins (interval: 15000 ms).
5/20/2013 9:12:56 AM -- Generating log files ...
5/20/2013 11:06:03 AM -- C:\DB\DB1 (100.2% generated), C:\DB\DB2 (100.2% generated), C:\DB\DB3 (101.4% generated) and C:\DB\DB4 (100.6% generated)
5/20/2013 11:06:03 AM -- Performance logging ends.
5/20/2013 11:06:03 AM -- JetInterop batch transaction stats: 21958, 21910, 22128 and 21991.
5/20/2013 11:06:03 AM -- Dispatching transactions ends.
5/20/2013 11:06:03 AM -- Shutting down databases ...
5/20/2013 11:06:04 AM -- Instance3548.1 (complete), Instance3548.2 (complete), Instance3548.3 (complete) and Instance3548.4 (complete)
5/20/2013 11:06:04 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_20_9_12_53.blg has 451 samples.
5/20/2013 11:06:04 AM -- Creating test report ...
5/20/2013 11:06:06 AM -- Instance3548.1 has 14.1 for I/O Database Reads Average Latency.
5/20/2013 11:06:06 AM -- Instance3548.1 has 0.9 for I/O Log Writes Average Latency.
5/20/2013 11:06:06 AM -- Instance3548.1 has 0.9 for I/O Log Reads Average Latency.
5/20/2013 11:06:06 AM -- Instance3548.2 has 14.0 for I/O Database Reads Average Latency.
5/20/2013 11:06:06 AM -- Instance3548.2 has 0.9 for I/O Log Writes Average Latency.
5/20/2013 11:06:06 AM -- Instance3548.2 has 0.9 for I/O Log Reads Average Latency.
5/20/2013 11:06:06 AM -- Instance3548.3 has 15.1 for I/O Database Reads Average Latency.
5/20/2013 11:06:06 AM -- Instance3548.3 has 0.9 for I/O Log Writes Average Latency.
5/20/2013 11:06:06 AM -- Instance3548.3 has 0.9 for I/O Log Reads Average Latency.
5/20/2013 11:06:06 AM -- Instance3548.4 has 14.6 for I/O Database Reads Average Latency.
5/20/2013 11:06:06 AM -- Instance3548.4 has 0.9 for I/O Log Writes Average Latency.

Dell Compellent Storage Center (SC8000) 10,000 Mailbox Exchange 2010 Resiliency Storage Solution

5/20/2013 11:06:06 AM -- Instance3548.4 has 0.9 for I/O Log Reads Average Latency.
5/20/2013 11:06:06 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/20/2013 11:06:06 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/20/2013 11:06:06 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_20_9_12_53.xml has 450 samples queried.
5/20/2013 11:06:07 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_20_9_12_53.html is saved.
5/20/2013 11:20:22 AM -- Performance logging begins (interval: 2000 ms).
5/20/2013 11:20:22 AM -- Recovering databases ...
5/20/2013 11:37:42 AM -- Performance logging ends.
5/20/2013 11:37:42 AM -- Instance3548.1 (973.0312746), Instance3548.2 (948.6325618), Instance3548.3 (1039.3321246) and Instance3548.4 (992.6563262)
5/20/2013 11:37:42 AM -- C:\Program Files\Exchange Jetstress\SoftRecovery_2013_5_20_11_20_19.blg has 512 samples.
5/20/2013 11:37:42 AM -- Creating test report ...

Server 4 – JS9

Soft-Recovery Statistics - All

Database Instance	Log files replayed	Elapsed seconds
Instance368.1	502	942.0024768
Instance368.2	501	955.5278502
Instance368.3	504	1044.901396
Instance368.4	508	1013.3421914

Database Configuration

Instance368.1	Log Path: C:\DB\DB1 Database: C:\DB\DB1\Jetstress001001.edb
Instance368.2	Log Path: C:\DB\DB2 Database: C:\DB\DB2\Jetstress002001.edb
Instance368.3	Log Path: C:\DB\DB3 Database: C:\DB\DB3\Jetstress003001.edb
Instance368.4	Log Path: C:\DB\DB4 Database: C:\DB\DB4\Jetstress004001.edb

Transactional I/O Performance

MSExchange 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
Instance368.1	11.587	0.963	449.046	3.195	39869.974	32484.907	10.893	0.001	4.793	0.003	229661.636	1.106
Instance368.2	11.636	0.955	451.561	3.137	39857.027	32279.966	9.483	0.000	4.703	0.000	227346.926	0.000
Instance368.3	12.597	0.911	410.375	2.886	40122.137	30919.222	9.970	0.000	4.329	0.000	217368.696	0.000
Instance368.4	12.220	0.956	426.140	3.002	39990.721	31320.418	10.369	0.000	4.502	0.000	220070.908	0.000

Background Database Maintenance I/O Performance

MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance368.1	0.000	0.000
Instance368.2	0.000	0.000
Instance368.3	0.000	0.000
Instance368.4	0.000	0.000

Total I/O Performance

MSExchange 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
Instance368.1	11.587	0.963	449.046	3.195	39869.974	32484.907	10.893	0.001	4.793	0.003	229661.636	1.106
Instance368.2	11.636	0.955	451.561	3.137	39857.027	32279.966	9.483	0.000	4.703	0.000	227346.926	0.000
Instance368.3	12.597	0.911	410.375	2.886	40122.137	30919.222	9.970	0.000	4.329	0.000	217368.696	0.000
Instance368.4	12.220	0.956	426.140	3.002	39990.721	31320.418	10.369	0.000	4.502	0.000	220070.908	0.000

Host System Performance

Counter	Average	Minimum	Maximum
% Processor Time	2.434	0.000	18.751
Available MBytes	28982.318	28819.000	29989.000
Free System Page Table Entries	33555673.384	33555610.000	33555676.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	80091203.604	79892480.000	80486400.000
Pool Paged Bytes	228288953.414	228278272.000	228331520.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

5/20/2013 9:12:40 AM -- Jetstress testing begins ...
5/20/2013 9:12:40 AM -- Prepare testing begins ...
5/20/2013 9:12:45 AM -- Attaching databases ...
5/20/2013 9:12:45 AM -- Prepare testing ends.
5/20/2013 9:12:45 AM -- Dispatching transactions begins ...
5/20/2013 9:12:45 AM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
5/20/2013 9:12:45 AM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
5/20/2013 9:12:50 AM -- Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
5/20/2013 9:12:50 AM -- Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
5/20/2013 9:12:52 AM -- Operation mix: Sessions 3, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
5/20/2013 9:12:52 AM -- Performance logging begins (interval: 15000 ms).
5/20/2013 9:12:52 AM -- Generating log files ...
5/20/2013 11:05:22 AM -- C:\DB\DB1 (100.4% generated), C:\DB\DB2 (100.2% generated), C:\DB\DB3 (100.8% generated) and C:\DB\DB4 (101.6% generated)
5/20/2013 11:05:22 AM -- Performance logging ends.
5/20/2013 11:05:22 AM -- JetInterop batch transaction stats: 21712, 21899, 21922 and 21867.
5/20/2013 11:05:23 AM -- Dispatching transactions ends.
5/20/2013 11:05:23 AM -- Shutting down databases ...
5/20/2013 11:05:23 AM -- Instance368.1 (complete), Instance368.2 (complete), Instance368.3 (complete) and Instance368.4 (complete)
5/20/2013 11:05:23 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_20_9_12_50.blg has 449 samples.
5/20/2013 11:05:23 AM -- Creating test report ...
5/20/2013 11:05:25 AM -- Instance368.1 has 14.1 for I/O Database Reads Average Latency.
5/20/2013 11:05:25 AM -- Instance368.1 has 0.9 for I/O Log Writes Average Latency.
5/20/2013 11:05:25 AM -- Instance368.1 has 0.9 for I/O Log Reads Average Latency.
5/20/2013 11:05:25 AM -- Instance368.2 has 14.3 for I/O Database Reads Average Latency.
5/20/2013 11:05:25 AM -- Instance368.2 has 0.9 for I/O Log Writes Average Latency.
5/20/2013 11:05:25 AM -- Instance368.2 has 0.9 for I/O Log Reads Average Latency.
5/20/2013 11:05:25 AM -- Instance368.3 has 15.8 for I/O Database Reads Average Latency.
5/20/2013 11:05:25 AM -- Instance368.3 has 0.9 for I/O Log Writes Average Latency.
5/20/2013 11:05:25 AM -- Instance368.3 has 0.9 for I/O Log Reads Average Latency.
5/20/2013 11:05:25 AM -- Instance368.4 has 15.2 for I/O Database Reads Average Latency.
5/20/2013 11:05:25 AM -- Instance368.4 has 0.9 for I/O Log Writes Average Latency.

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5/20/2013 11:05:25 AM -- Instance368.4 has 0.9 for I/O Log Reads Average Latency.
5/20/2013 11:05:25 AM -- Test has 0 Maximum Database Page Fault Stalls/sec.
5/20/2013 11:05:25 AM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
5/20/2013 11:05:25 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_20_9_12_50.xml has 448 samples queried.
5/20/2013 11:05:26 AM -- C:\Program Files\Exchange Jetstress\Performance_2013_5_20_9_12_50.html is saved.
5/20/2013 11:20:25 AM -- Performance logging begins (interval: 2000 ms).
5/20/2013 11:20:25 AM -- Recovering databases ...
5/20/2013 11:37:50 AM -- Performance logging ends.
5/20/2013 11:37:50 AM -- Instance368.1 (942.0024768), Instance368.2 (955.5278502), Instance368.3 (1044.901396) and Instance368.4 (1013.3421914)
5/20/2013 11:37:50 AM -- C:\Program Files\Exchange Jetstress\SoftRecovery_2013_5_20_11_20_22.blg has 515 samples.
5/20/2013 11:37:50 AM -- Creating test report ...