

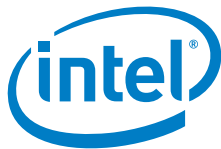
Intel® 1800 Mailbox Exchange Server 2007 Storage Solution

Intel® Server Chassis SC5400 and Server Board S5000PSL

Tested with: ESRP – Storage Version 2.1, Windows Server 2003 R2

Tested Date: February 7, 2009

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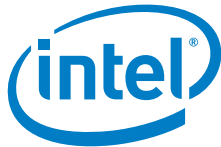
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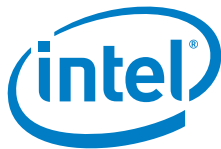
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Hardware Components

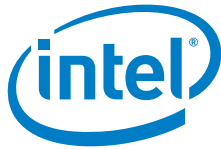
| Quantity | Item | Manufacturer | Model |
|---------------------|----------------------------------|---------------|---|
| One | Intel® Server Board | Intel | S5000PSL. Additional information is available at: http://www.intel.com/products/server/motherboards/s5000psl/s5000psl-overview.htm . |
| One | Intel® Server Chassis | Intel | SC5400. Additional information is available at: http://www.intel.com/products/server/chassis/sc5400/sc5400-overview.htm . |
| One (Select one) | Intel® RAID Controller | Intel | SRCSASJV. Additional information is available at: http://www.intel.com/products/server/raid-controllers/srcsasjv/srcsasjv-overview.htm . |
| | Intel® RAID Controller | Intel | SRCSASRB. Additional information is available at: http://www.intel.com/products/server/raid-controllers/srcsasrb/srcsasrb-overview.htm . |
| Two | Intel® Xeon® Processors | Intel | Please refer to the Supported Processor List at http://www.intel.com/support/motherboards/server/sb/CS-022346.htm . Processors must support Intel® EM64T. |
| 4 GB minimum | Memory | Any supported | Please refer to the Tested Memory List at http://www.intel.com/support/motherboards/server/s5000psl/sb/CS-022924.htm . |
| One (60 GB minimum) | SAS or SATA 3.5-inch hard drives | Any supported | Please refer to the Server Hard Drive Validation Test Report at http://www.intel.com/support/motherboards/server/sb/CS-025416.htm . |

Table 1 - Intel® Server Board S5000PSL Hardware Configuration

Software Components

| Item | Version | Manufacturer | Comment |
|------|------------------------|--------------|--------------------------|
| 1 | Windows Server 2003 R2 | Microsoft | Any 64-bit edition |
| 1 | Exchange Server 2007 | Microsoft | Available in 64-bit only |

Table 2 - Installation Software BOM



Introduction

This document provides information on Intel's storage solution for Microsoft Exchange Server 2007, based on the Microsoft Exchange Solution Reviewed Program (ESRP) – Storage program*.

*The ESRP – Storage program was developed by Microsoft Corporation to provide a common storage testing framework for vendors to provide information on its storage solutions for Microsoft Exchange Server 2007 software. For more details on the Microsoft ESRP – Storage program, please view:

<http://www.microsoft.com/technet/prodtechnol/exchange/2007/esrp.msp>.

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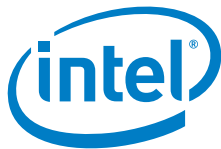
Features

This document describes an Exchange storage solution for 1800 users on the Intel® Server Chassis SC5400 storage system. The tested user profile was 0.50 IOPS per user with a mailbox limit of 250 MB.

Solution Description

The tested solution consists of one Intel® server chassis and server board with an Intel® SRCSASJV RAID controller and 10 146GB SAS-interface enterprise-class disk drives installed into the 4-drive and 6-drive cages in the Intel® SC5400 system chassis. This configuration includes 5TB of raw capacity. The Intel® SRCSASJV controller supports SAS and SATA interfaces to disk drives, and can support a mixture of SAS and SATA interface disk drives.

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>.

Test Server Configuration

| Component | Description |
|--------------------|--|
| Server Chassis | Intel® SC5400 |
| Server Board | Intel® S500PSL |
| CPU | 2 Intel® Xeon® E5320, quad-core, 1.86 GHz (8 total cores) |
| Memory | 4 GB DDR2 ECC |
| NIC | Dual Intel® Gigabit Ethernet (Intel® 82563EB) |
| RAID Controller | Intel® SRCSASJV |
| Internal Boot Disk | Qty. 1 - Seagate 320GB |
| Disk Array Disks | Qty. 10 - Seagate Cheetah 15K.5, ST3146855SS, 146GB, 15K RPM |

Targeted Customer Profile

This solution is intended for small and medium-sized organization hosting up to 1800 mailboxes. The configuration used for testing is:

- Number of mailboxes: 1800
- Number of hosts: 1
- User I/O profile: 0.50 I/O per second (IOPS)
- 4 Storage Groups, 4 Databases
- Mailbox size: 250 MB



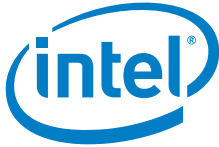
Tested Deployment

The following tables summarize the testing environment:

| Description | Data |
|---|-----------|
| Number of Exchange mailboxes simulated | 1800 |
| Number of hosts | 1 |
| Number of storage groups / host | 4 |
| Number of mailbox stores / storage group | 1 |
| Number of mailboxes / mailbox store | 450 |
| Number of mailbox store LUNs / storage group | 1 |
| Simulated profile: I/O's per second per mailbox | 0.50 IOPS |
| Database LUN size | 544 GB |
| Log LUN size | 136 GB |
| Backup LUN size / storage group | N/A |
| Total database size for performance testing | 439.6 GB |
| % storage capacity used by Exchange database | 81% |

Primary Storage Hardware

| Component | Description |
|---|---|
| Storage Connectivity (Fibre Channel, SAS, SATA, iSCSI) | SAS/SATA |
| Storage model and OS firmware | |
| Storage cache | 512 MB |
| Number of storage controllers | 1 |
| Number of storage ports | 2 |
| Maximum bandwidth of storage | 6 Gb/sec (2 x 3 Gb SAS ports) |
| Adapter model and firmware | Intel® SRCASJV |
| Number of adapters / host | 1 |
| Host server type | Intel® S5000PSL, 2 Intel® Xeon® E5320 quad-core (1.86 GHz), 8 total cores |
| Total number of disks tested in solution | 10 |
| Maximum number of spindles can be hosted in the storage | 10 |



Primary Storage Software

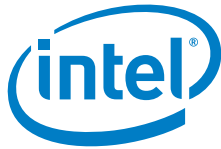
| Component | Description |
|-------------------------------------|--|
| HBA driver | Intel SRCASJV |
| HBA Queue Target Setting | N/A |
| HBA Queue Depth Setting | N/A |
| Multi-Pathing | N/A |
| Host OS | MS Windows Server 2003 R2 Enterprise x64 Edition w/ Service Pack 1 |
| ESE.dll file version | 08.00.0685.024 |
| Replication solution name / version | N/A |

Primary Storage Disk Configuration (Mailbox Store Disks)

| Component | Description |
|---|--|
| Disk type, speed and firmware revision | Seagate SAS, 15K RPM, 0002 (ST3146855SS) |
| Raw capacity per disk (GB) | 136.7 |
| Number of physical disks in test | 8 |
| Total raw storage capacity (GB) | 1093.6 |
| Number of slices per LUN or number of disks per LUN | 2 |
| RAID level | RAID 10 |
| Total formatted capacity | 544 |

Primary Storage Disk Configuration (Transactional Log Disks)

| Component | Description |
|---|--|
| Disk type, speed and firmware revision | Seagate SAS, 15K RPM, 0002 (ST3146855SS) |
| Raw capacity per disk (GB) | 136.7 |
| Number of physical disks in test | 2 |
| Total raw storage capacity (GB) | 273.4 |
| Number of slices per LUN or number of disks per LUN | 2 |
| RAID level | RAID 1 |
| Total formatted capacity | 136.0 |



Best Practices

Exchange Server is a disk-intensive application. Based on the testing runs using the ESRP framework, we recommend the following Microsoft best practices for storage system design for Exchange Server 2007, available at: <http://technet.microsoft.com/en-us/library/bb124518.aspx>.

Contact for Additional Information

Consult the *Certified Intel RAID Configurations for Microsoft Exchange Servers* document available at: <http://www.intelraid.com/tech.php>.

Test Result Summary

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

Reliability

A number of tests in the framework are to check Reliability tests runs for 24 hours. The goal is to verify the storage can handle high I/O 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)

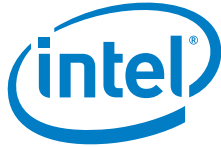
- No errors reported in the saved eventlog file.
- No errors reported in during the database and log checksum process.

Primary Storage Performance Results

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

Individual Server Metrics:

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

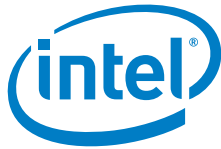


| I/O Component | Metric |
|--|---------------|
| Database I/O | |
| Average Database Disk Transfers/sec | 120.147 |
| Average Database Disk Reads/sec | 128.113 |
| Average Database Disk Writes/sec | 111.982 |
| Average Database Disk Read Latency (ms) | 0.016 |
| Average Database Disk Write Latency (ms) | 0.020 |
| Transaction Log I/O | |
| Average Log Disk Writes/sec | 42.043 |
| Average Log Disk Write Latency (ms) | 0.009 |

Conclusion

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

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



Appendix A - Test Results

Microsoft Exchange Server Jetstress 24 Hour Reliability

Microsoft Exchange Server **Jetstress**

Stress Test Result Report

Test Summary

Overall Test Result **Pass**

Machine Name DMRTK-SRVR-12

Test Description Intel® SRCASJV mailboxes=1800, size=250, IOPS=0.5, threads=12, DB=RAID10(4+4), Log=RAID1(1+1), SG=4

Test Start Time 2/6/2009 3:53:02 PM

Test End Time 2/7/2009 4:00:23 PM

Jetstress Version 08.02.0060.000

Ese Version 08.00.0685.024

Operating System Microsoft Windows Server 2003 R2 Service Pack 2 (5.2.3790.131072)

Performance Log C:\Data\Jetstress\Stress_2009_2_6_15_53_12.blg
C:\Data\Jetstress\DBChecksum_2009_2_7_16_0_23.blg

Database Sizing and Throughput

Achieved I/O per Second 960.381

Target I/O per Second 900

Initial database size 480796803072

Final database size 576179994624

Database files (count) 4

Jetstress System Parameters

Thread count 12 (per-storage group)

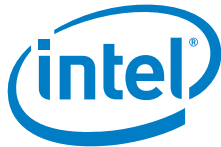
Log buffers 9000

Minimum database cache 128.0 MB

Maximum database cache 1024.0 MB

Insert operations 25%

Delete operations 10%



Replace operations 50%
Read operations 15%
Lazy commits 80%

Disk Subsystem Performance

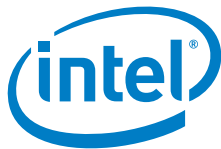
| LogicalDisk | Avg. Disk sec/Read | Avg. Disk sec/Write | Disk Reads/sec | Disk Writes/sec | Avg. Disk Bytes/Write |
|---------------|--------------------|---------------------|----------------|-----------------|-----------------------|
| Database (M:) | 0.015 | 0.020 | 128.362 | 112.223 | (n/a) |
| Database (N:) | 0.016 | 0.020 | 127.674 | 111.500 | (n/a) |
| Database (O:) | 0.015 | 0.020 | 128.106 | 112.197 | (n/a) |
| Database (P:) | 0.017 | 0.020 | 128.310 | 112.009 | (n/a) |
| Log (Q:) | 0.000 | 0.009 | 0.000 | 41.971 | 17907.246 |
| Log (R:) | 0.000 | 0.009 | 0.000 | 42.080 | 17840.833 |
| Log (S:) | 0.000 | 0.009 | 0.000 | 42.226 | 17831.081 |
| Log (T:) | 0.000 | 0.010 | 0.000 | 41.896 | 17953.047 |

Host System Performance

| Counter | Average | Minimum | Maximum |
|---------------------------------|--------------|--------------|--------------|
| % Processor Time | 1.407 | 0.573 | 3.516 |
| Available MBytes | 2308.652 | 2288.000 | 2409.000 |
| Free System Page Table Entries | 4170136.000 | 4170136.000 | 4170136.000 |
| Transition Pages RePurposed/sec | 0.000 | 0.000 | 0.000 |
| Pool Nonpaged Bytes | 34989578.667 | 34967552.000 | 35057664.000 |
| Pool Paged Bytes | 46893974.756 | 45748224.000 | 47980544.000 |
| Database Page Fault Stalls/sec | 0.000 | 0.000 | 0.000 |

Test Log

2/6/2009 3:53:02 PM -- Jetstress testing begins ...
 2/6/2009 3:53:02 PM -- Prepare testing begins ...
 2/6/2009 3:53:06 PM -- Attaching databases ...
 2/6/2009 3:53:06 PM -- Prepare testing ends.
 2/6/2009 3:53:06 PM -- Dispatching transactions begins ...
 2/6/2009 3:53:06 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
 2/6/2009 3:53:06 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
 2/6/2009 3:53:12 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.1 seconds/read).



2/6/2009 3:53:12 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.1 seconds/write).

2/6/2009 3:53:13 PM -- Operation mix: Sessions 12, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.

2/6/2009 3:53:13 PM -- Performance logging begins (interval: 15000 ms).

2/6/2009 3:53:13 PM -- Attaining prerequisites:

2/6/2009 4:00:02 PM -- \Database(JetstressWin)\Database Cache Size, Last: 967262200.0 (lower bound: 966367600.0, upper bound: none)

2/7/2009 4:00:03 PM -- Performance logging ends.

2/7/2009 4:00:03 PM -- JetInterop batch transaction stats: 577422, 575965, 577966, and 576510.

2/7/2009 4:00:04 PM -- Dispatching transactions ends.

2/7/2009 4:00:04 PM -- Shutting down databases ...

2/7/2009 4:00:23 PM -- Instance2452.1 (complete), Instance2452.2 (complete), Instance2452.3 (complete), and Instance2452.4 (complete)

2/7/2009 4:00:24 PM -- Performance logging begins (interval: 30000 ms).

2/7/2009 4:00:24 PM -- Verifying database checksums ...

2/7/2009 4:46:09 PM -- M: (100% processed), N: (100% processed), O: (100% processed), and P: (100% processed)

2/7/2009 4:46:10 PM -- Performance logging ends.

2/7/2009 4:46:10 PM -- [C:\Data\Jetstress\DBChecksum_2009_2_7_16_0_23.blg](#) has 91 samples.

2/7/2009 4:46:14 PM -- [C:\Data\Jetstress\DBChecksum_2009_2_7_16_0_23.html](#) is saved.

2/7/2009 4:46:14 PM -- Verifying log checksums ...

2/7/2009 4:46:19 PM -- Q:\ (22 logs passed), R:\ (21 logs passed), S:\ (22 logs passed), and T:\ (22 logs passed)

2/7/2009 4:46:19 PM -- [C:\Data\Jetstress\Stress_2009_2_6_15_53_12.blg](#) has 5787 samples.

2/7/2009 4:46:19 PM -- Creating test report ...

2/7/2009 4:47:30 PM -- Volume M: has 0.0153 for Avg. Disk sec/Read.

2/7/2009 4:47:30 PM -- Volume N: has 0.0160 for Avg. Disk sec/Read.

2/7/2009 4:47:30 PM -- Volume O: has 0.0146 for Avg. Disk sec/Read.

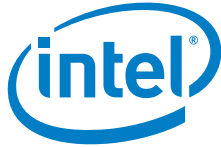
2/7/2009 4:47:30 PM -- Volume P: has 0.0165 for Avg. Disk sec/Read.

2/7/2009 4:47:30 PM -- Volume Q: has 0.0095 for Avg. Disk sec/Write.

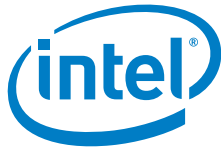
2/7/2009 4:47:30 PM -- Volume Q: has 0.0000 for Avg. Disk sec/Read.

2/7/2009 4:47:30 PM -- Volume R: has 0.0094 for Avg. Disk sec/Write.

2/7/2009 4:47:30 PM -- Volume R: has 0.0000 for Avg. Disk sec/Read.



2/7/2009 4:47:30 PM -- Volume S: has 0.0095 for Avg. Disk sec/Write.
2/7/2009 4:47:30 PM -- Volume S: has 0.0000 for Avg. Disk sec/Read.
2/7/2009 4:47:30 PM -- Volume T: has 0.0097 for Avg. Disk sec/Write.
2/7/2009 4:47:30 PM -- Volume T: has 0.0000 for Avg. Disk sec/Read.
2/7/2009 4:47:30 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.
2/7/2009 4:47:30 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
2/7/2009 4:47:31 PM -- [C:\Data\Jetstress\Stress_2009_2_6_15_53_12.xml](#) has 5759 samples queried.



Microsoft Exchange Server Jetstress

Test Result Report

Checksum Statistics - All

| Database | Seen pages | Bad pages | Correctable pages | Wrong page no pages | File length / seconds taken |
|-------------------|------------|-----------|-------------------|---------------------|------------------------------|
| M:\Jetstress1.edb | 17583234 | 0 | 0 | 0 | 137369 MBytes / 2321 seconds |
| N:\Jetstress1.edb | 17598594 | 0 | 0 | 0 | 137489 MBytes / 2744 seconds |
| O:\Jetstress1.edb | 17580674 | 0 | 0 | 0 | 137349 MBytes / 2623 seconds |
| P:\Jetstress1.edb | 17571970 | 0 | 0 | 0 | 137281 MBytes / 2712 seconds |
| (Sum) | 70334472 | 0 | 0 | 0 | 549488 MBytes / 2745 seconds |

Disk Subsystem Performance (of checksum)

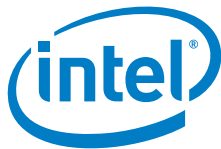
| LogicalDisk | Avg. Disk sec/Read | Avg. Disk sec/Write | Disk Reads/sec | Disk Writes/sec |
|-------------|--------------------|---------------------|----------------|-----------------|
| M: | 0.065 | 0.000 | 949.444 | 0.002 |
| N: | 0.088 | 0.000 | 778.878 | 0.004 |
| O: | 0.078 | 0.000 | 838.380 | 0.003 |
| P: | 0.083 | 0.000 | 802.024 | 0.004 |

Memory System Performance (of checksum)

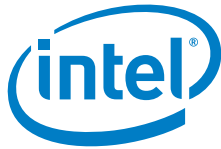
| Counter | Average | Minimum | Maximum |
|---------------------------------|--------------|--------------|--------------|
| % Processor Time | 3.846 | 3.184 | 6.725 |
| Available MBytes | 3362.560 | 3353.000 | 3378.000 |
| Free System Page Table Entries | 4170136.000 | 4170136.000 | 4170136.000 |
| Transition Pages RePurposed/sec | 0.000 | 0.000 | 0.000 |
| Pool Nonpaged Bytes | 36061454.066 | 35987456.000 | 36085760.000 |
| Pool Paged Bytes | 48377135.824 | 48234496.000 | 49299456.000 |

Test Log

2/6/2009 3:53:02 PM -- Jetstress testing begins ...
 2/6/2009 3:53:02 PM -- Prepare testing begins ...
 2/6/2009 3:53:06 PM -- Attaching databases ...
 2/6/2009 3:53:06 PM -- Prepare testing ends.
 2/6/2009 3:53:06 PM -- Dispatching transactions begins ...



2/6/2009 3:53:06 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
2/6/2009 3:53:06 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
2/6/2009 3:53:12 PM -- Database read latency thresholds: (average: 0.02 seconds/read,
maximum: 0.1 seconds/read).
2/6/2009 3:53:12 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum:
0.1 seconds/write).
2/6/2009 3:53:13 PM -- Operation mix: Sessions 12, Inserts 25%, Deletes 10%, Replaces 50%,
Reads 15%, Lazy Commits 80%.
2/6/2009 3:53:13 PM -- Performance logging begins (interval: 15000 ms).
2/6/2009 3:53:13 PM -- Attaining prerequisites:
2/6/2009 4:00:02 PM -- \Database(JetstressWin)\Database Cache Size, Last: 967262200.0
(lower bound: 966367600.0, upper bound: none)
2/7/2009 4:00:03 PM -- Performance logging ends.
2/7/2009 4:00:03 PM -- JetInterop batch transaction stats: 577422, 575965, 577966, and
576510.
2/7/2009 4:00:04 PM -- Dispatching transactions ends.
2/7/2009 4:00:04 PM -- Shutting down databases ...
2/7/2009 4:00:23 PM -- Instance2452.1 (complete), Instance2452.2 (complete),
Instance2452.3 (complete), and Instance2452.4 (complete)
2/7/2009 4:00:24 PM -- Performance logging begins (interval: 30000 ms).
2/7/2009 4:00:24 PM -- Verifying database checksums ...
2/7/2009 4:46:09 PM -- M: (100% processed), N: (100% processed), O: (100% processed), and
P: (100% processed)
2/7/2009 4:46:10 PM -- Performance logging ends.
2/7/2009 4:46:10 PM -- [C:\Data\Jetstress\DBChecksum_2009_2_7_16_0_23.blg](#) has 91
samples.



Microsoft Exchange Server **Jetstress 2 Hour** **Performance**

Microsoft Exchange Server **Jetstress**

Performance Test Result Report

Test Summary

Overall Test Result **Pass**

Machine Name DMRTK-SRVR-I2

Test Description Intel® SRCASJV mailboxes=1800, size=250, IOPS=0.5, threads=12, DB=RAID10(4+4), Log=RAID1(1+1), SG=4

Test Start Time 2/6/2009 11:04:23 AM

Test End Time 2/6/2009 3:08:04 PM

Jetstress Version 08.02.0060.000

Ese Version 08.00.0685.024

Operating System Microsoft Windows Server 2003 R2 Service Pack 2 (5.2.3790.131072)

Performance Log C:\Data\Jetstress\Performance_2009_2_6_13_0_11.blg
C:\Data\Jetstress\DBChecksum_2009_2_6_15_8_4.blg

Database Sizing and Throughput

Achieved I/O per Second 922.929

Target I/O per Second 900

Initial database size 471871324160

Final database size 480796803072

Database files (count) 4

Jetstress System Parameters

Thread count 12 (per-storage group)

Log buffers 9000

Minimum database cache 128.0 MB

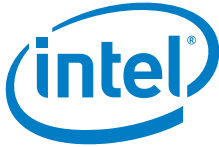
Maximum database cache 1024.0 MB

Insert operations 25%

Delete operations 10%

Replace operations 50%

Read operations 15%



Lazy commits 80%

Disk Subsystem Performance

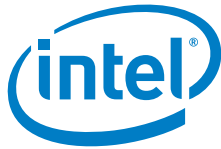
| LogicalDisk | Avg. Disk sec/Read | Avg. Disk sec/Write | Disk Reads/sec | Disk Writes/sec | Avg. Disk Bytes/Write |
|---------------|--------------------|---------------------|----------------|-----------------|-----------------------|
| Database (M:) | 0.015 | 0.020 | 119.389 | 113.186 | (n/a) |
| Database (N:) | 0.015 | 0.019 | 118.383 | 113.575 | (n/a) |
| Database (O:) | 0.014 | 0.018 | 117.451 | 110.157 | (n/a) |
| Database (P:) | 0.016 | 0.019 | 118.912 | 111.877 | (n/a) |
| Log (Q:) | 0.000 | 0.010 | 0.000 | 42.886 | 18643.473 |
| Log (R:) | 0.000 | 0.010 | 0.000 | 43.378 | 18611.034 |
| Log (S:) | 0.000 | 0.010 | 0.000 | 42.989 | 18095.195 |
| Log (T:) | 0.000 | 0.010 | 0.000 | 43.202 | 18343.638 |

Host System Performance

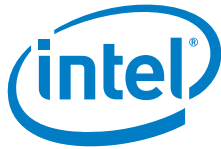
| Counter | Average | Minimum | Maximum |
|---------------------------------|--------------|--------------|--------------|
| % Processor Time | 1.242 | 0.742 | 1.901 |
| Available MBytes | 2288.760 | 2286.000 | 2367.000 |
| Free System Page Table Entries | 4170206.000 | 4170206.000 | 4170206.000 |
| Transition Pages RePurposed/sec | 0.000 | 0.000 | 0.000 |
| Pool Nonpaged Bytes | 34604364.800 | 34598912.000 | 34619392.000 |
| Pool Paged Bytes | 46267204.267 | 45801472.000 | 46596096.000 |
| Database Page Fault Stalls/sec | 0.000 | 0.000 | 0.000 |

Test Log

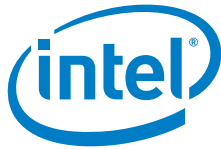
2/6/2009 11:04:23 AM -- Jetstress testing begins ...
 2/6/2009 11:04:23 AM -- Prepare testing begins ...
 2/6/2009 11:04:23 AM -- Creating M:\Jetstress1.edb.
 2/6/2009 11:04:23 AM -- Database cache settings: (minimum: 32.0 MB, maximum: 256.0 MB)
 2/6/2009 11:04:23 AM -- Database flush thresholds: (start: 2.6 MB, stop: 5.1 MB)
 2/6/2009 11:40:28 AM -- 60.0% of 109.9 GB complete (4016812 records inserted).
 2/6/2009 12:07:53 PM -- 100.0% of 109.9 GB complete (6425597 records inserted).
 2/6/2009 12:07:55 PM -- Duplicating 3 databases:
 2/6/2009 1:00:02 PM -- 100.0% of 329.6 GB complete (329.6 GB duplicated).
 2/6/2009 1:00:06 PM -- Attaching databases ...
 2/6/2009 1:00:06 PM -- Prepare testing ends.



2/6/2009 1:00:06 PM -- Dispatching transactions begins ...
2/6/2009 1:00:06 PM -- Database cache settings: (minimum: 128.0 MB, maximum: 1.0 GB)
2/6/2009 1:00:06 PM -- Database flush thresholds: (start: 10.2 MB, stop: 20.5 MB)
2/6/2009 1:00:11 PM -- Database read latency thresholds: (average: 0.02 seconds/read, maximum: 0.05 seconds/read).
2/6/2009 1:00:11 PM -- Log write latency thresholds: (average: 0.01 seconds/write, maximum: 0.05 seconds/write).
2/6/2009 1:00:13 PM -- Operation mix: Sessions 12, Inserts 25%, Deletes 10%, Replaces 50%, Reads 15%, Lazy Commits 80%.
2/6/2009 1:00:13 PM -- Performance logging begins (interval: 15000 ms).
2/6/2009 1:00:13 PM -- Attaining prerequisites:
2/6/2009 1:07:44 PM -- \Database(JetstressWin)\Database Cache Size, Last: 968171500.0 (lower bound: 966367600.0, upper bound: none)
2/6/2009 3:07:45 PM -- Performance logging ends.
2/6/2009 3:07:45 PM -- JetInterop batch transaction stats: 53828, 53921, 53531, and 53813.
2/6/2009 3:07:45 PM -- Dispatching transactions ends.
2/6/2009 3:07:45 PM -- Shutting down databases ...
2/6/2009 3:08:04 PM -- Instance2940.1 (complete), Instance2940.2 (complete), Instance2940.3 (complete), and Instance2940.4 (complete)
2/6/2009 3:08:05 PM -- Performance logging begins (interval: 15000 ms).
2/6/2009 3:08:05 PM -- Verifying database checksums ...
2/6/2009 3:46:25 PM -- M: (100% processed), N: (100% processed), O: (100% processed), and P: (100% processed)
2/6/2009 3:46:26 PM -- Performance logging ends.
2/6/2009 3:46:26 PM -- C:\Data\Jetstress\DBChecksum_2009_2_6_15_8_4.blg has 153 samples.
2/6/2009 3:46:32 PM -- C:\Data\Jetstress\DBChecksum_2009_2_6_15_8_4.html is saved.
2/6/2009 3:46:32 PM -- Verifying log checksums ...
2/6/2009 3:46:37 PM -- Q:\ (22 logs passed), R:\ (22 logs passed), S:\ (22 logs passed), and T:\ (22 logs passed)
2/6/2009 3:46:37 PM -- C:\Data\Jetstress\Performance_2009_2_6_13_0_11.blg has 510 samples.
2/6/2009 3:46:37 PM -- Creating test report ...
2/6/2009 3:46:43 PM -- Volume M: has 0.0146 for Avg. Disk sec/Read.
2/6/2009 3:46:43 PM -- Volume N: has 0.0151 for Avg. Disk sec/Read.
2/6/2009 3:46:43 PM -- Volume O: has 0.0138 for Avg. Disk sec/Read.



2/6/2009 3:46:43 PM -- Volume P: has 0.0155 for Avg. Disk sec/Read.
2/6/2009 3:46:43 PM -- Volume Q: has 0.0097 for Avg. Disk sec/Write.
2/6/2009 3:46:43 PM -- Volume Q: has 0.0000 for Avg. Disk sec/Read.
2/6/2009 3:46:43 PM -- Volume R: has 0.0096 for Avg. Disk sec/Write.
2/6/2009 3:46:43 PM -- Volume R: has 0.0000 for Avg. Disk sec/Read.
2/6/2009 3:46:43 PM -- Volume S: has 0.0097 for Avg. Disk sec/Write.
2/6/2009 3:46:43 PM -- Volume S: has 0.0000 for Avg. Disk sec/Read.
2/6/2009 3:46:43 PM -- Volume T: has 0.0099 for Avg. Disk sec/Write.
2/6/2009 3:46:43 PM -- Volume T: has 0.0000 for Avg. Disk sec/Read.
2/6/2009 3:46:43 PM -- Test has 0 Maximum Database Page Fault Stalls/sec.
2/6/2009 3:46:43 PM -- Test has 0 Database Page Fault Stalls/sec samples higher than 0.
2/6/2009 3:46:43 PM -- C:\Data\Jetstress\Performance_2009_2_6_13_0_11.xml has 479 samples queried.



Microsoft Exchange Server Jetstress

Test Result Report

Checksum Statistics - All

| Database | Seen pages | Bad pages | Correctable pages | Wrong page no pages | File length / seconds taken |
|-------------------|------------|-----------|-------------------|---------------------|------------------------------|
| M:\Jetstress1.edb | 14676594 | 0 | 0 | 0 | 114660 MBytes / 1932 seconds |
| N:\Jetstress1.edb | 14682738 | 0 | 0 | 0 | 114708 MBytes / 2300 seconds |
| O:\Jetstress1.edb | 14664562 | 0 | 0 | 0 | 114566 MBytes / 2166 seconds |
| P:\Jetstress1.edb | 14667122 | 0 | 0 | 0 | 114586 MBytes / 2274 seconds |
| (Sum) | 58691016 | 0 | 0 | 0 | 458523 MBytes / 2300 seconds |

Disk Subsystem Performance (of checksum)

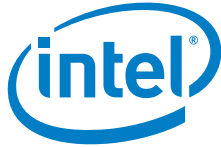
| LogicalDisk | Avg. Disk sec/Read | Avg. Disk sec/Write | Disk Reads/sec | Disk Writes/sec |
|-------------|--------------------|---------------------|----------------|-----------------|
| M: | 0.065 | 0.000 | 951.384 | 0.006 |
| N: | 0.088 | 0.000 | 788.021 | 0.000 |
| O: | 0.077 | 0.000 | 846.525 | 0.005 |
| P: | 0.085 | 0.001 | 798.307 | 0.005 |

Memory System Performance (of checksum)

| Counter | Average | Minimum | Maximum |
|---------------------------------|--------------|--------------|--------------|
| % Processor Time | 3.836 | 2.956 | 8.477 |
| Available MBytes | 3349.961 | 3340.000 | 3366.000 |
| Free System Page Table Entries | 4170136.000 | 4170136.000 | 4170136.000 |
| Transition Pages RePurposed/sec | 0.000 | 0.000 | 0.000 |
| Pool Nonpaged Bytes | 35710561.046 | 35684352.000 | 35729408.000 |
| Pool Paged Bytes | 45852016.105 | 45666304.000 | 46751744.000 |

Test Log

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 2/6/2009 11:04:23 AM -- Creating M:\Jetstress1.edb.
 2/6/2009 11:04:23 AM -- Database cache settings: (minimum: 32.0 MB, maximum: 256.0 MB)
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2/6/2009 3:07:45 PM -- Dispatching transactions ends.
2/6/2009 3:07:45 PM -- Shutting down databases ...
2/6/2009 3:08:04 PM -- Instance2940.1 (complete), Instance2940.2 (complete),
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2/6/2009 3:08:05 PM -- Performance logging begins (interval: 15000 ms).
2/6/2009 3:08:05 PM -- Verifying database checksums ...
2/6/2009 3:46:25 PM -- M: (100% processed), N: (100% processed), O: (100% processed), and
P: (100% processed)
2/6/2009 3:46:26 PM -- Performance logging ends.
2/6/2009 3:46:26 PM -- [C:\Data\Jetstress\DBChecksum_2009_2_6_15_8_4.blg](#) has 153
samples.