Fujitsu PRIMEFLEX for VMware vSAN 20,000 User Mailbox Exchange 2016 Mailbox Resiliency Storage Solution

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Overview

This document provides information on Fujitsu PRIMEFLEX for VMware vSAN solution for Microsoft Exchange Server, based on the *Microsoft Exchange Solution Reviewed Program (ESRP) – Storage* program*. For any questions or comments regarding the contents of this document, see <u>Contact for Additional Information</u>.

*The *ESRP* – *Storage* program was developed by Microsoft Corporation to provide a common storage testing framework for storage and server OEMs to provide information on its storage solutions for Microsoft Exchange Server software. For more details on the *Microsoft ESRP* – *Storage* program, click <u>http://technet.microsoft.com/enus/exchange/ff182054.aspx.</u>

Disclaimer

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

Components

Hardware Resource

<u>Fujitsu Integrated System PRIMEFLEX for VMware vSAN</u> is a validated server configuration for VMware[®] vSAN ReadyNode[™] in a tested and certified hardware form factor for vSAN deployment, jointly recommended by Fujitsu and VMware. For more details about VMware vSAN ReadyNode, visit <u>VMware Compatibility Guide</u>.

Hardware List

ltem	Description
Platform	Fujitsu PRIMEFLEX for VMware vSAN
Hardware Model	Fujitsu PRIMERGY RX2540 M4
CPU	Intel(R) Xeon(R) Gold 6154 CPU @ 3.00GHz
Socket/core	2/18
Memory	192GB
Network	2 x 1Gbps Intel Corporation I350 Gigabit Network Connection
	4 x Intel(R) Ethernet Connection X722 for 10GBASE-T
Hypervisor	VMware ESXi, 6.7.0, 9214924
Storage	VMware vSAN 6.7.0
	1 x 400GB Cache SSD
	4 x 1,920GB Capacity SSDs

On top of the general VMware vSAN ReadyNode, PRIMEFLEX for VMware vSAN adds several unique features delivered through Fujitsu factory integration service and Fujitsu Software Infrastructure Manager.



Figure 1. Fujitsu Factory Integration Service and Fujitsu Software Infrastructure Manager

Fujitsu offers several types of PRIMEFLEX system which can fit various workloads.

Line up



Figure 2. PRIMEFLEX System Types

For more details about PRIMEFLEX for VMware vSAN, visit FUJITSU Integrated System.

VMware vSphere 6.7

VMware vSphere 6.7 is the next-generation infrastructure for next-generation applications. It provides a powerful, flexible, and secure foundation for business agility that accelerates the digital transformation to cloud computing and promotes success in the digital economy. vSphere 6.7 supports both existing and next-generation applications through its:

- Simplified customer experience for automation and management at scale
- Comprehensive built-in security for protecting data, infrastructure, and access
- Universal application platform for running any application anywhere

With vSphere 6.7, customers can run, manage, connect, and secure their applications in a common operating environment, across clouds and devices.

VMware vSAN 6.7

VMware vSAN, the market leader hyper converged infrastructure (HCI), enables low-cost and high-performance next-generation HCI solutions. vSAN converges traditional IT infrastructure silos onto industry-standard servers and virtualizes physical infrastructure to help customers easily evolve their infrastructure without risk, improve TCO over traditional resource silos, and scale to tomorrow with support for new hardware, applications, and cloud strategies. The natively integrated VMware infrastructure combines radically simple VMware vSAN storage, the market-leading VMware vSphere Hypervisor, and the VMware vCenter Server[®] unified management solution, all on the broadest and deepest set of HCI deployment options.

vSAN 6.7 introduces further performance and space efficiencies. Adaptive Resync ensures fair-share of resources are available for VM IOs and Resync IOs during dynamic changes in load on the system providing optimal use of resources. Optimization of the destaging mechanism has resulted in data that drains more quickly from the write buffer to the capacity tier. The swap object for each VM is now thin provisioned by default and will also match the storage policy attributes assigned to the VM introducing the potential for significant space efficiency.

Native to vSphere Hypervisor

vSAN does not require the deployment of storage virtual appliances or the installation of a vSphere Installation Bundle (VIB) on every host in the cluster. vSAN is native in the vSphere hypervisor and typically consumes less than 10% of the computing resources on each host. vSAN does not compete with other virtual machines for resources and the I/O path is shorter.



Figure 3. vSAN is Native in the vSphere Hypervisor

As shown in Figure 3, a shorter I/O path and the absence of resource-intensive storage virtual appliances enables vSAN to provide excellent performance with minimal overhead. Higher virtual machine consolidation ratios translate into lower total costs of ownership.

Storage Policy Based Management

As shown in Figure 4, Storage Policy-Based Management (SPBM) from VMware enables the precise control of storage services. Like other storage solutions, VMware vSAN provides services such as resiliency, tolerance method, capacity reservation, and IOPS limits. A storage policy contains one or more rules that define service levels.

	Storage policies (
	VM / VMDK <u>Policy</u>	policy profile <u>Value</u>
	Resiliency Tolerance Method	FTT = 1 RAID-1 (mirror)
vSphere vSAN	Capacity reservation	40%
	IOPS Limits	1000
	Policy	y Gold

Figure 4. vSAN Storage Policy Based Management

Storage policies are created and managed using the vSphere Web Client. Policies can be assigned to virtual machines and individual objects such as a virtual disk. Storage policies are easily changed or reassigned if application requirements change. These modifications are performed with no downtime and without the need to migrate virtual machines from one datastore to another. SPBM makes it possible to assign and modify service levels with precision on a per-virtual machine basis.

Monitoring with vRealize Operations

vSphere and vSAN 6.7 includes VMware vRealize[®] Operations[™] within vCenter. This new feature allows vSphere customers to see a subset of intelligence offered up by vRealize Operations through a single vCenter user interface. Light-weight purpose-built dashboards are included for both vSphere and vSAN. It is easy to deploy, provides multi-cluster visibility, and does not require any additional licensing.

vm vSphere Client	Menu V Q, Search				C 0*	Administrator@VSPHERELOCAL V
Home Shortcuts	vRealize Operations					Quick Links
Hosts and Clusters VMs and Templates Storage Content Lances	1 Datasenteris	1 Cuatora	4 Hosts	10 Virtual Machines	5 Datastories	O Resource Pools
Global Inventory Lists	Are there any issues?	ubisitas Operativas regas po	promise your seems	Am I running out of Capacity?	What can be	e Reclaimed?
VReatize Operations	No critical alerts	symmetriate Warning		Based On Compute	-	Assisters received
Tasks Events	VIEW DETAILS	(a) into		WOH TUO DW1		
Tags & Custom Attribu.	How many VMs are running?	What is Operating System	n distribution?	Are Clusters configured for HA7	Are Clusters	Workload Balanced?
	5 VMs running	**				

Figure 5. vRealize Operation Management Portal

Solution Description

Solution Overview

As shown in Figure 6, we design Microsoft Exchange 2016 Mailbox resiliency solution targeted for medium to large enterprises. Exchange Database Availability Group feature is enabled to support Mailbox resiliency across the VMware vSAN clusters. Each VMware vSAN cluster consists of four Fujitsu PRIMERGY RX2540 M4 ESXi servers with 1x400GB SSD as cache tier and 4x1,920GB SSDs as capacity tier.

Each mailbox virtual machine is configured with 8 vCPU and 64 GB memory, running Microsoft Exchange 2016 on Windows Server 2016 Datacenter platform. A single mailbox VM contains eight databases including 4 active copies and 4 passive copies.



Figure 6. 20,000 Mailbox Resilience Solution Architecture on VMware vSAN

Network configuration

We created a vSphere Distributed Switch™ to act as a single virtual switch across all four Fujitsu PRIMERGY RX2540 M4 server in the vSAN cluster.

The vSphere Distributed Switch used two 10GbE adapters for the teaming and failover. A port group defines properties regarding security, traffic shaping, and NIC teaming. To isolate vSAN, VM (node) and vMotion traffic, we used the default port group settings except for the uplink failover order. We assigned one dedicated NIC as the active link and assigned another NIC as the standby link. For vSAN and vMotion, the uplink order is reversed. See Table 1 for network configuration.

Table 1	Distributed	Switch	Port (Group	Config	uration
	Distributed	Owneen	1 011	oroup	0011112	juluion

Distributed port group	Active uplink	Standby uplink
VMware vSAN	Uplink 1	Uplink 2
VM and vSphere vMotion	Uplink 2	Uplink 1

Exchange Virtual Machine Configuration

We configure each Exchange 2016 virtual machine as described in Table 2, and all the virtual machines are with the identical configuration. The virtual disks are configured with thin provisioning by default. We set the virtual SCSI controller mode for Exchange database disks for both data and transaction log to VMware Paravirtual with even distribution.

Exchange VM	vCPU	Memory (GB)	Virtual Disks	SCSI ID (Controller, ID)	SCSI Type
EX01,	8	64	OS disk: 40GB	SCSI(0, 0)	LSI Logic
EX02,			Data disk 1: 320GB	SCSI(1, 0)	VMware
EX03,					Paravirtual
EX04			Data disk 2: 320GB	SCSI(2, 0)	VMware
					Paravirtual
			Data disk 3: 320GB	SCSI(3, 0)	VMware
					Paravirtual
			Data disk 4: 320GB	SCSI(1, 1)	VMware
					Paravirtual
			Data disk 5: 320GB	SCSI(2, 1)	VMware
					Paravirtual
			Data disk 6: 320GB	SCSI(3, 1)	VMware
					Paravirtual
			Data disk 7: 320GB	SCSI(1, 2)	VMware
					Paravirtual
			Data disk 8: 320GB	SCSI(2, 2)	VMware
					Paravirtual

Table 2 Exchange Virtual Machine Configuration

vSAN Storage Policy Configuration

In this solution, we use the default vSAN storage policy for Exchange 2016 databases. The detailed configuration is defined in Table 3.

Table 3 vSAN Storage Policy Configuration

Settings	Value	Description
Failure to Tolerate	1	Defines the number of disk, host, or fault domain
		failures a storage object can tolerate.
Erasure Coding	RAID 1 (Mirroring)	Defines the method used to tolerate failures. By
		default, Exchange database will preserve two
		copies on vSAN as storage level protection.
Number of disk stripes per	1	The number of capacity disks across which each
object		replica of a storage object is striped.
Checksum	Enabled	Checksum is calculated by default to prevent
		from Exchange data corruption.

Scalability for Exchange 2016 on vSAN

VMware vSAN is designed for easy scalability for business-critical applications. In this solution, we configure a fournode Fujitsu PRIMEFLEX for VMware vSAN cluster with one disk group for Exchange 2016 mailbox resiliency solution. vSAN supports both scale-up and scale-out for capacity and performance considerations for Exchange.



number

Figure 7. Building Block Methodology for vSAN Scale-up and Scale-out Sizing for Exchange 2016

As shown in Figure 7, for larger mailbox size sizing, we set each building block as single disk group, or 1 x 400GB Cache Tier SSD plus 4 x 1,920GB Capacity Tier SSDs in the Fujitsu PRIMERGY Rx2540 M4 server. A single disk group can support up to 2,500 user mailboxes per node with 1GB per mailbox size, and up to 0.36 IOPS per user (including 20 percent overhead). It is easy to scale up for 2GB mailbox size with the same profile by simply adding another disk group to the system. As you may have multiple hosts in the vSAN cluster, it is recommended to plan for scale-up for all the servers with identical configuration in the cluster as best practices.

For larger mailbox number sizing, we set each building block as single vSAN node, or one Fujitsu PRIMERGY Rx2540 M4 server. You may scale out for additional 2,500 user mailboxes support with the same profile by adding another Fujitsu node to the vSAN cluster.

For more details about vSAN sizing and scalability guide, visit VMware® vSAN™ Design and Sizing Guide.

Targeted Customer Profile

The targeted customer profile for the tested Microsoft Exchange 2016 Mailbox profile in this solution is defined as follows:

- 20,000 user mailboxes
- 1GB mailbox size
- 8 Exchange Servers with DAG configured
- Mailbox Resiliency with 2 database copies
- 0.36 IOPS per user mailbox (450 message per day, including 20 percent headroom)
- 24x7 Background Database Maintenance job enabled

Tested Deployment

The following tables summarize the testing environment:

Simulated Exchange Configuration

Number of Exchange mailboxes simulated	20,000
Mailbox Size	1GB
Number of Database Availability Groups (DAGs)	1
Number of servers/DAG	8 (4 tested)

Number of active mailboxes/server	2,500
Number of databases/host	8
Number of copies/database	2
Number of mailboxes/database	Up to 320
Simulated profile: I/O's per second per mailbox	0.36
(IOPS, include 20% headroom)	
Database/Log LUN size	320GB
Total database size for performance testing	10TB
% storage capacity used by Exchange database	71.4%
	(including voAn storage milloring copy)

Storage Hardware

Storage Connectivity	Pass-Through
Storage model and OS/firmware revision	VMware vSAN 6.7 build number 9214924
Storage cache	1 x 400GB SSD as Cache Tier per node
Number of storage controllers	4
Number of storage ports	2 x 10Gb Ethernet port per node
Maximum bandwidth of storage connectivity to host	2 x 10Gbps per node
HBA model and firmware	Fusion-MPT 12GSAS SAS3008 PCI-Express
	Fw Rev. 13.00.00.00
Number of HBA's/host	1
Host server type	4 x Fujitsu PRIMERGY RX2540 M4
	Intel(R) Xeon(R) Gold 6154 CPU @ 3.00GHz
	192GB memory
Total number of disks tested in solution	1 Cache Tier SSD and 4 Capacity Tier SSDs per
	host
Maximum number of spindles can be hosted in the	24 per host
storage	

Storage Software

Storage Software	VMware vSAN 6.7
HBA driver	lsi-msgpt3 version 16.00.01.00
HBA QueueTarget Setting	N/A
HBA QueueDepth Setting	N/A
Multi-Pathing	NMP (Direct-Access)
Host OS	FUJITSU Custom Image for ESXi 6.7
ESE.dll file version	15.01.1531.003
Replication solution name/version	N/A

Storage Disk Configuration (Mailbox Store and Transactional Log Disks)

Disk type, speed and firmware revision	Cache Tier: TOSHIBA PX05SMB040 SSD
	Capacity Tier: HGST SDLL1CLR020T5CF1 SSD
Raw capacity per disk (GB)	Cache Tier: 400GB per disk
	Capacity Tier: 1,920GB per disk
Number of physical disks in test	One disk group per host
	Cache Tier: 1 SSD
	Capacity Tier: 4 SSDs
Total raw storage capacity (GB)	27.95TB
Disk slice size (GB)	N/A
Number of slices per LUN or number of disks per	N/A
LUN	
Raid level	RAID 1 (Mirroring)
Total formatted capacity	19.22TB
Storage capacity utilization	68.7%
Database capacity utilization	35.7%

Best Practices

Exchange server is a disk-intensive application. Based on the testing run using the ESRP framework, we would recommend the following practices to improve the storage performance. The best practices for Microsoft Exchange 2013 and 2016 are applicable to each other.

- For Exchange virtualization best practices for VMware vSphere, visit <u>Microsoft Exchange 2013 on VMware</u> <u>Best Practices Guide</u>.
- For Exchange on VMware vSAN best practices, visit Microsoft Exchange 2013 on VMware vSAN.
- For Exchange 2007 best practices on storage design, visit Planning Storage Configurations.

Backup Strategy

VMware vSAN snapshot and clone technologies are primarily used for providing support to VM level backup and restore for Exchange operations.

vSphere Data Protection enables simple and robust backup and recovery solution integrated with vCenter and Microsoft Exchange. Site Recovery Manager provides a disaster recovery plan built in and automated within vCenter that can be tested before an outage, planned maintenance, or periodically in preparation for a disaster situation. Using VMware's Site Recovery Manager and vSphere Data Protection provides a resilient and highly available Microsoft Exchange environment.

Other third-party data protection products, like Veeam, provide application-level backup and restore since it internally integrated with Microsoft Volume Snapshot Service (VSS) Writer for application quiescing methodology to provide point-in-time backup and restore, which simplifies the database maintenance in a VMware virtualized environment for Exchange administrators. Best practices and implementation recommendations vary by the third-party and it is recommended to consult with your data protection product vendor for optimal solutions.

Contact for Additional Information

- vSAN
- Virtual Blocks Blog
- Customer Stories

See Storagehub for more vSAN details.

Test Result Summary

This section provides a high-level summary of the test data from ESRP and the link to the detailed html reports that are generated by the ESRP testing framework. See Appendix A—Stress Test Result Report to view the html report for each test.

Reliability

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

The reliability test results are summarized as follows:

- Minimal performance drop compared with 2-hour performance test.
- No error reported in the saved eventlog file.
- No error reported during the database and log checksum process.

See Appendix A—Stress Test Result Report for more details.

Storage Performance Results

The primary storage performance testing is designed to exercise the storage with the 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/Os and the average of all the logical disks I/O latency in the 2-hour test. Each server is listed separately and the aggregated number across all servers is listed as well.

Individual Server Metrics

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

Database I/O	EX01	EX02	EX03	EX04
Database Disks	11,508.80	11,551.85	11,684.21	11,834.36
Transfers/sec				
Database Disks Reads/sec	7,060.64	7,049.51	7,095.86	7,193.28
Database Disks Writes/sec	4,448.16	4,502.34	4,588.35	4,641.09
Average Database Disk	1.51	1.51	1.47	1.44
Read Latency (ms)				
Average Database Disk Write	5.13	5.05	4.99	5.23
Latency (ms)				
Transaction Log I/O				
Log Disks Writes/sec	1,003.47	1,015.28	1,018.85	1,015.86
Average Log Disk Write	2.58	2.51	2.47	2.51
Latency (ms)				

Aggregate Performance across All Servers Metrics

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

Database I/O	
Database Disks Transfers/sec	46,579.22
Database Disks Reads/sec	28,399.29
Database Disks Writes/sec	18,179.93
Average Database Disk Read Latency (ms)	1.48
Average Database Disk Write Latency (ms)	5.10
Transaction Log I/O	
Log Disks Writes/sec	4,053.44
Average Log Disk Write Latency (ms)	2.52

Database Backup/Recovery Performance

There are two test 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 Volume Shadow Copy Service (VSS). The following table shows the average rate for a single database file and the aggregated bandwidth.

MB read/sec per database	213.86
MB read/sec total per server (8 databases)	1,710.84
MB read/sec total per server (4 servers)	6,843.32

Transaction Log Recovery/Replay Performance

The 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 more than 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) 0.095	Average time to play one Log file (sec)	0.095
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Conclusion

This document is developed by storage solution providers, and reviewed by Microsoft Exchange Product team. The test results presented are 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.

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

In conclusion, the FUJITSU PRIMEFLEX for VMware vSAN with 4-node and 1+4 single disk group all-flash configuration achieved over 46,000 aggregated Exchange 2016 transactional IOPS with only 1.48 ms read latency and 5.10 ms write latency. With a simple calculation, we have achieved more than 4.6 IOPS per user mailbox, which equals 12.8 times the targeted performance profile (0.36 IOPS per user mailbox including 20 percent headroom). In addition, the performance test generated more than 4,000 log writes per second while keeping the log latency within 2.52 milliseconds.

The achieved backup performance for Exchange 2016 database is over 210 MBps per database and aggregated over 1,700 MBps per mailbox server. And a single log file replay for soft recovery test can be completed within 0.1 second.

Appendix A—Stress Test Result Report

This section provides the 24-hour stress test results on one of the test virtual machine. All the other test results are comparable to one another.

Overall Test Result	Pass										
Machine Name	EX01										
Test Description											
Test Start Time	9/14/2018 9:17:0	9 PM									
Test End Time	9/15/2018 9:17:40 PM										
Collection Start Tim	e 9/14/2018 9:17:4	2 PM									
Collection End Time	9/15/2018 9:17:3	33 PM									
Jetstress Version	15.01.1019.000										
ESE Version	15 01 1531 003										
Operating System	Windows Server	2016 Datacenter (6.2.92	200.0)								
Performance Log	C:\Leare\Admini	2010 Datacenter (0.2.92	11\Stress 201	8 0 14 21	17.26 blg						
Terrormance Log	<u>C. 103013 (1411111</u>	suator to esktop octrest	111011035_201	10 2 14 21	<u>11_20.01</u>						
Database Sizing and Th	roughput										
Achieved Transaction	al I/O per Second 1	1132.026									
Capacity Percentage	1	00%									
Throughput Percentag	ge 1	00%									
Initial Database Size (bytes) 2	2223660597248									
Final Database Size (b	ytes) 2	2512480370688									
Database Files (Count) 8	\$									
Jetstress System Parame	eters										
Thread Count		32									
Minimum Database C	ache	256.0 MB									
Maximum Database C	ache	2048.0 MB									
Insert Operations		40%									
Delete Operations		20%									
Replace Operations		5%									
Read Operations		35%									
Lazy Commits		70%									
Run Background Data	base Maintenance	True									
Number of Copies per	Database	2									
Database Configuration											
Instance5096.1 Log pa	th: C:\EXDB\DB1\	logs									
Databa	se: C:\EXDB\DB1\	Jetstress001001.edb									
Instance5096 2 Log pa	th: C:\EXDB\DB2\]	0.95									
Databa	se: C:\EXDB\DB2\	Jetstress002001.edb									
Instance5096.3 Log pa	th: C:\EXDB\DB3\J	.025									
Databa	se: C:\EXDB\DB3\	Jetstress003001.edb									
Instance5096.4 Log pa	th: C:\EXDB\DB4\I	.095									
Databa	se: C:\EXDB\DB4\	Jetstress004001.edb									
Instance5096.5 Log pa	th: C:\EXDB\DB5\	Logs									
Databa	se: C:\EXDB\DB5\	Jetstress005001.edb									
Instance5096.6 Log pa	th: C:\EXDB\DB6\J	logs									
Databa	se: C:\EXDB\DB6\	Jetstress006001.edb									
Instance5096.7 Log pa	th: C:\EXDB\DB7\I	Logs									
Databa	se: C:\EXDB\DB7\	Jetstress007001.edb									
Instance5096.8 Log pa	th: C:\EXDB\DB8\	Logs									
Databa	se: C:\EXDB\DB8\	Jetstress008001.edb									
Transactional I/O Perfo	rmance		less	-					Lange and		Internet in the second second
MSExchange L	O Database Reads	I/O Database Writes	1/0	I/O	I/O Database	I/O Database	I/O Log Reads	I/O Log Writes	I/O Log	I/O Log	I/O Log Reads I/O Log Writes

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
Instance5096.1	1.451	4.603	867.088	529.399	32789.552	33730.397	0.000	2.229	0.000	122.366	0.000	15000.486
Instance5096.2	1.553	5.908	864.643	519.095	32789.138	33738.208	0.000	3.341	0.000	114.608	0.000	16054.480
Instance5096.3	1.526	4.643	869.282	529.510	32789.642	33726.216	0.000	2.211	0.000	123.276	0.000	14893.650
Instance5096.4	1.557	4.764	869.732	528.827	32789.477	33727.682	0.000	2.317	0.000	122.801	0.000	14972.682
Instance5096.5	1.351	4.446	866.493	533.614	32790.240	33726.909	0.000	2.026	0.000	123.615	0.000	14891.587
Instance5096.6	1.516	6.239	863.300	519.100	32789.656	33738.659	0.000	3.518	0.000	113.033	0.000	16295.189
Instance5096.7	1.519	4.883	863.782	530.248	32789.180	33726.291	0.000	2.249	0.000	123.460	0.000	14879.261
Instance5096.8	1.653	6.233	859.790	518.122	32789.138	33736.391	0.000	3.411	0.000	114.992	0.000	15992.954

Background Database Maintenance I/O Performance								
MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes						
Instance5096.1	8.986	260816.877						
Instance5096.2	8.984	260727.706						
Instance5096.3	8.983	260761.454						
Instance5096.4	8.985	260768.178						
Instance5096.5	8.993	260842.108						
Instance5096.6	8.986	260740.689						
Instance5096.7	8.983	260781.306						
Instance5096.8	8.983	260665.662						

Log Replication I/O Performance

MSExchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance5096.1	4.073	209715.256
Instance5096.2	4.068	209715.254
Instance5096.3	4.069	209715.417
Instance5096.4	4.074	209715.444
Instance5096.5	4.075	209715.312
Instance5096.6	4.068	209715.091
Instance5096.7	4.070	209715.193
Instance5096.8	4.073	209715.148

- Total I/O Performance	0											
Total DO Ferrormane												
MSExchange	I/O Database Reads	I/O Database Writes	I/O	I/O	I/O Database	I/O Database	I/O Log Reads	I/O Log Writes	I/O Log	I/O Log	I/O Log Reads	I/O Log Writes
Database ==>	Average Latency	Average Latency	Database	Database	Reads Average	Writes Average	Average Latency	Average Latency	Reads/sec	Writes/sec	Average Bytes	Average Bytes
Instances	(msec)	(msec)	Reads/sec	Writes/sec	Bytes	Bytes	(msec)	(msec)				0
Instance5096.1	1.451	4.603	876.074	529.399	35128.452	33730.397	2.188	2.229	4.073	122.366	209715.256	15000.486
Instance5096.2	1.553	5.908	873.627	519.095	35133.121	33738.208	2.080	3.341	4.068	114.608	209715.254	16054.480
Instance5096.3	1.526	4.643	878.265	529.510	35121.381	33726.216	2.165	2.211	4.069	123.276	209715.417	14893.650
Instance5096.4	1.557	4.764	878.717	528.827	35120.673	33727.682	2.162	2.317	4.074	122.801	209715.444	14972.682
Instance5096.5	1.351	4.446	875.486	533.614	35132.679	33726.909	1.888	2.026	4.075	123.615	209715.312	14891.587
Instance5096.6	1.516	6.239	872.286	519.100	35138.057	33738.659	2.034	3.518	4.068	113.033	209715.091	16295.189
Instance5096.7	1.519	4.883	872.765	530.248	35135.783	33726.291	2.174	2.249	4.070	123.460	209715.193	14879.261
Instance5096.8	1.653	6.233	868.774	518.122	35145.451	33736.391	2.279	3.411	4.073	114.992	209715.148	15992.954

Host System Performance -

Counter	Average	Minimum	Maximum
% Processor Time	9.247	5.834	22.087
Available MBytes	59367.565	58953.000	59518.000
Free System Page Table Entries	12303849.196	12303062.000	12304425.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	142593235.776	136081408.000	151113728.000
Pool Paged Bytes	304950812.652	299929600.000	311906304.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

- Test Log
9/14/2018 9:17:09 PM Preparing for testing
9/14/2018 9:17:17 PM Attaching databases
9/14/2018 9:17:17 PM Preparations for testing are complete.
9/14/2018 9:17:17 PM Starting transaction dispatch
9/14/2018 9:17:17 PM Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)
9/14/2018 9:17:17 PM Database flush thresholds: (start: 20.5 MB, stor: 40.9 MB)
9/14/2018 9:17:26 PM Database read latency thresholds: (average: 20 msec/read), maximum: 200 msec/read).
9/14/2018 9:17:26 PM Log write latency thresholds: (average: 10 msec/write, maximum: 200 msec/write).
9/14/2018 9:17:27 PM Operation mix: Sessions 32, Inserts 40%, Deletes 20%, Renlaces 5%, Reads 35%, Lazy Commits 70%.
9/14/2018 9:17:27 PM Performance logging started (interval: 15000 ms)
9/14/2018 9:17:27 PM Attaining mereaujisites:
9/14/2018 9:17:37 PM WSExchance Database/JetstressWin/\Database Cache Size, Last: 1983541000.0 (Jower bound: 1932735000.0, upper bound: none)
9/15/2018 9:17:38 PM Performance Logging has ended
91/5/2018 9-17-38 PM - Jethteron back transaction stats: 2511907 2511907 2511907 2511906 2511906 2511906 and 2511906
(15/2018 - 17:38 PM - Distatching transactions and starts), 201901, 201901, 201900,
(15/018.0-17.38 DM) - Shutting during during and the same
915/2018 51.1.00 FM = Onuming with Gaudianes Justance\$096.2 (complete) Instance\$096.3 (complete) Instance\$096.4 (complete) Instance\$096.5 (compl
9157018 /1740 PM - Cluberto Alphoisteroto ResultStress (2018, 0.14.2), 17.26 Jacks 2574 complex), insureco 505 (complex), i
// 5/2016 5/1740 PTM - Creating test report
015/018 / 17 / 18 / Clouds was report 015/018 / 18 / 018/02 Mu InstanceStope I has 1 5 for I/O Database Beads Average Latency
015/018-018/018/018/018/018/018/018/018/018/018/
71.572016 7.16.27 FM ~ Insumecoryot, mas as for to Copy winds Average Lanciety.
A 1 2 2 1 0 7 1 0 2 7 1 1 - Manufectory 1. Into a 2 10 10 Log reals Participe Lancevy
7/15/2016 7/16-27 FM = Instance-09/02 into 10 for Defaultations (Reads Average Lancer).
71 (12010 7.15)27 FM = InstanceOr902 and 5.3 TO DO LOG WING APPENDENT.
9/13/2016 3/16.27 FM ™ Instance.0790.27 Inst 3/5 100 FV Log Redus Average Latensy.
71.172010 , $1.0.27$ FM \approx Instance-070.2 in a 1.2 for two Datatoxie Reads Average Latency.
9/13/2016 9/16/29 FM ← InstanceO90-25 has 2.6 for 1/0 Log writes Average Latency.
7/1/2010 7/16/27 FM = Instance/070/25 inst 2/2 for 10/ Log Redus Average Latensy.
7/12/016 7:16/27 FM = InstanceOr90.4 http://to.into.into.into.into.into.into.into.in
9/13/2016 9/16/29 FM ~ InstanceOv90.4 ras 2,5 for 1/0 Log writes Average Latency.
9/13/2018 9:10:20 PM - IIISallice.09/04 http://doi.org/iceaus/iverage_latence/
9/13/2016 9/16/29 PM Instance/09/02/18a 14 for 1/0 Database Reads Average Latency, 0/16/2018 0/18/20 DM Instance/09/02/18 has 20 for a balancies Reads Average Latency,
9/15/2018 9:18:29 FM = Instance:090.5 Inte 2.0 Tot I/O Log Writes Average Latency.
9/13/2018 71.822 PM Instance:09/9.5 nas. 20 for 1/0 Log Reads Average Latency.
$9(13)2018$ $9(13)20$ FM \rightarrow Instance 509(5) that 1.5 for 1/O balanciae Reaus Average Latency.
$9/157/2018$ $9/18/20$ PM \rightarrow instance 50/96.05 nas 3.5 for 1/0 Log Writes Average Latency.
$9/1572018$ 21.8229 PM \rightarrow instance 3090.50 nas 3.5 for 1/0 Log Reads Average Latency.
9/13/2018 9:18:29 FM ~ Instance3090, has 1.3 for 1/0 balancies Reaus Average Latency.
$9/157/2018$ $9/18/20$ PM \rightarrow Instance 20/96.7 has 2.2 for 1/O Log Writes Average Latency.
9/13/2018 9:18:29 PM ~ InstanceS090./ has 2.2 for I/O Log Reads Average Latency.
9/13/2018 9:18:29 FM = Instance:090.8 mai 1.7 for 1/O Datatoise Reaus Average Latency.
$9/157/2018$ $9/18/20$ PM \rightarrow Instance 50/96.8 has 3.4 for 1/0 Log writes Average Latency.
9/12/2016 9/16/20 PM Instance/2090.6 nais 5.4 for 1/0 Log (Reads Average Latency. 0/16/2018 0/16/20 PM That have 0/keniumer Database Data Beall Reads
9/13/2016 9/16/20 PM test nas 0. Maximum Database rage Fault Stall/Sec.
$9/(5/2018)^{1/3}(5/2)^{1/3} = 1$ in the test has 0 Database rage raun statistics camples higher than 0.
9/15/2010 9/16/29 FM → <u>CAUSESSAUDINEINGAUT USSAUDVERKESMUSSUESS_2010 - 7 19 21 17 20.2011</u> nas 5755 samples queried.

Test Result Report

Checksum Statistics - All

Database	Seen pages	Bad pages	Correctable pages	Wrong page-number pages	File length / seconds taken
C:\EXDB\DB1\Jetstress001001.edb	9584384	0	0	0	299512 MB/2694 sec
C:\EXDB\DB2\Jetstress002001.edb	9583872	0	0	0	299496 MB/1943 sec
C:\EXDB\DB3\Jetstress003001.edb	9583616	0	0	0	299488 MB/2159 sec
C:\EXDB\DB4\Jetstress004001.edb	9585664	0	0	0	299552 MB/1818 sec
C:\EXDB\DB5\Jetstress005001.edb	9584128	0	0	0	299504 MB/1890 sec
C:\EXDB\DB6\Jetstress006001.edb	9583360	0	0	0	299480 MB/2685 sec
C:\EXDB\DB7\Jetstress007001.edb	9582592	0	0	0	299456 MB/2000 sec
C:\EXDB\DB8\Jetstress008001.edb	9587200	0	0	0	299600 MB/2708 sec
(Sum)	76674816	0	0	0	2396088 MB/2708 sec

Disk Subsystem Performance (of checksum)

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Read
C:\EXDB\DB1	0.029	0.000	1758.422	0.000	65536.000
C:\EXDB\DB2	0.017	0.000	2444.076	0.000	65536.000
C:\EXDB\DB3	0.021	0.000	2159.138	0.000	65536.000
C:\EXDB\DB4	0.015	0.000	2613.938	0.000	65536.000
C:\EXDB\DB5	0.016	0.000	2528.915	0.000	65536.000
C:\EXDB\DB6	0.029	0.000	1776.334	0.000	65536.000
C:\EXDB\DB7	0.018	0.000	2357.682	0.000	65536.000
C:\EXDB\DB8	0.036	0.000	1730.112	0.000	65536.000

Memory System Performance (of checksum)

Counter	Average	Minimum	Maximum
% Processor Time	8.302	5.625	13.691
Available MBytes	61468.633	61460.000	61483.000
Free System Page Table Entries	12304010.444	12303420.000	12304664.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	136326030.222	136224768.000	136400896.000
Pool Paged Bytes	314867211.378	314724352.000	315170816.000

- Tart Log
9/14/2018 9:17:09 PM Preparing for testing
9/14/2018 9:17:17 PM Attaching databases
9/14/2018 9:17:17 PM Preparations for testing are complete.
9/14/2018 9:17:17 PM Starting transaction dispatch
9/14/2018 9:17:17 PM Database cache settings: (minimum: 256.0 MB. maximum: 2.0 GB)
9/14/2018 9:17:17 PM - Database flush thresholds; (start: 20.5 MB, stop: 40.9 MB)
9/14/2018 9:17:26 PM Database read latency thresholds: (average: 20 msec/read, maximum: 200 msec/read).
9/14/2018 9:17:26 PM Log write latency thresholds: (average: 10 msec/write maximum: 200 msec/write)
9/14/2018 917-27 PM - Operation mix: Sessions 32 Inserts 40% Deletes 20% Realages 5% Reads 35% Lazy Commits 70%
914/2013 (113) TH - Deformance leaving started (interval : 1500 ms)
914/018 911727 DM - Attaining personalisies
919/2010 5.17.27 FM — Attaining protogramates
91 4/2016 9:17:37 FM = WisDaxChange Database/Jeduces with/Database Cache Size, Last. 1963341000.0 (lower bound: 1922/35000.0, upper bound: 1000)
9/15/2018 9:17:35 FM - Performance logging has ended.
9/15/2018 9:17:38 PM - Jetimetrop batch transaction stats: 2511907, 2511907, 2511907, 2511906, 2511906 and 2511906.
9/15/2018 9:17:38 PM Dispatching transactions ends.
9/15/2018 9:17:38 PM Shutting down databases
9/15/2018 9:17:40 PM Instance5096.1 (complete), Instance5096.2 (complete), Instance5096.3 (complete), Instance5096.4 (complete), Instance5096.5 (complete), Instance5096.6 (complete), Instance5096.7 (complete) and Instance5096.8 (complete)
9/15/2018 9:17:40 PM C:\Users\Administrator\Desktop\UtResult\Stress_2018_9_14_21_17_26.blg has 5754 samples.
9/15/2018 9:17:40 PM Creating test report
9/15/2018 9:18:29 PM Instance5096.1 has 1.5 for I/O Database Reads Average Latency.
9/15/2018 9:18:29 PM Instance5096.1 has 2.2 for I/O Log Writes Average Latency.
9/15/2018 9:18:29 PM Instance5096.1 has 2.2 for I/O Log Reads Average Latency.
9/15/2018 9:18:29 PM Instance5096.2 has 1.6 for I/O Database Reads Average Latency.
9/15/2018 9:18:29 PM Instance5096.2 has 3.3 for I/O Log Writes Average Latency.
9/15/2018 9:18:29 PM Instance5096.2 has 3.3 for I/O Log Reads Average Latency.
9/15/2018 9:18:29 PM Instance5096.3 has 1.5 for I/O Database Reads Average Latency.
9/15/2018 9:18:29 PM - Instance5096 3 has 2.2 for I/O Log Writes Average Latency.
9/15/2018 9:18-29 PM Instance5096 3 has 2.2 for I/O Loo Reads Average Latency
91/5/01.918/29 PM Instance/006 has 1.6 for 1/0 Database Brads Average Latency
015/0015 (10:02) TH - Instance 05/97 Has 10 for 1/0 Jun Write Autorna Latency.
91.5/016 9:10:29 FM = InstanceOrgo A tag 2.5:10 FO Log writes Average Latency.
91.5/2019 5.10.25 FM = Instance.0504 Has 2.5 101 FO Edg Reads Average Latency.
9/15/2018 5:18:29 FM Instance:0990,5 has 1.4 for I/O Latabase Reads Average Latency.
9/15/2018 9:16:29 PM Instance:0905.1 as 2.0 for 1/0 Log Writes Average Latency.
9/15/2018 9:18:29 PM Instance5096.5 has 2.0 for I/O Log Keads Average Latency.
9/15/2018 9:18:29 PM Instance5096.6 has 1.5 for I/O Database Reads Average Latency.
9/15/2018 9:18:29 PM – Instance5096.6 has 3.5 for I/O Log Writes Average Latency.
9/15/2018 9:18:29 PM Instance5096.6 has 3.5 for I/O Log Reads Average Latency.
9/15/2018 9:18:29 PM Instance5096.7 has 1.5 for I/O Database Reads Average Latency.
9/15/2018 9:18:29 PM Instance5096.7 has 2.2 for I/O Log Writes Average Latency.
9/15/2018 9:18:29 PM Instance5096.7 has 2.2 for I/O Log Reads Average Latency.
9/15/2018 9:18:29 PM Instance5096.8 has 1.7 for I/O Database Reads Average Latency.
9/15/2018 9:18:29 PM Instance5096.8 has 3.4 for I/O Log Writes Average Latency.
9/15/2018 9:18:29 PM Instance5096.8 has 3.4 for I/O Log Reads Average Latency.
9/15/2018 9:18:29 PM Test has 0 Maximum Database Page Fault Stalls/sec.
9/15/2018 9:18:29 PM The test has 0 Database Page Fault Stalls/sec samples higher than 0.
9/15/2018 9:18:29 PM C:\Users\Administrator\Desktop\JetResult\Stress 2018 9 14 21 17 26 xml has 5753 samples queried.
9/15/2018 9:18:29 PM C:\Users\Administrator\Desktor\VetResult\Stress 2018 9:14 21 17 26.html was saved.
9/15/2018 9:18:29 PM Performance logging started (interval: 30000 ms).
9/15/2018 9:18:20 PM Verifying database checksums
9/15/2018 10:03-38 PM
(100% moressed) and CAEXDRUBE (100% moressed)
(100 m processes) and standard for a processes)
71-2/2010 10/02-30 FM ** Fellomance organizations in the second s
7/13/2010 10.03.30 rm = 0.1000050000000000000000000000000000000

Appendix B—Performance Test Result Report

This section provides the 2-hour performance test results on one of the test virtual machines. All the other test results are comparable to one another.

- Test Summary	
Overall Test Result	Pass
Machine Name	EX01
Test Description	
Test Start Time	9/14/2018 6:29:24 PM
Test End Time	9/14/2018 8:29:56 PM
Collection Start Time	e 9/14/2018 6:29:57 PM
Collection End Time	9/14/2018 8:29:49 PM
Jetstress Version	15.01.1019.000
ESE Version	15.01.1531.003
Operating System	Windows Server 2016 Datacenter (6.2.9200.0)
Performance Log	C:\Users\Administrator\Desktop\JetResult\Performance_2018_9_14_18_29_41.blg

Database Sizing and Throughput	
Achieved Transactional I/O per Second	11508.804
Capacity Percentage	100%
Throughput Percentage	100%
Initial Database Size (bytes)	2198217949184
Final Database Size (bytes)	2223660597248
Database Files (Count)	8

- Jetstress System Parameters

Thread Count	32
Minimum Database Cache	256.0 MB
Maximum Database Cache	2048.0 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 Conference
- Database Configuration -
Instance5096.1 Log path: CAEXDB\DB1\Logs Database: CAEXDB\DB1\Letstress001001.edb
Instance5096.2 Log path: C:\EXDB\DB2U.ogs Database: C:\EXDB\DB2Uetstress002001.edb
Instance5096.3 Log path: C:XEXDB\DB3\Logs Database: C:XEXDB\DB3\Jetstress003001.edb
Instance5096.4 Log path: C:\EXDB\DB4\Logs Database: C:\EXDB\DB4\Jetstress004001.edb
Instance5096.5 Log path: C:AEXDB\DB5\Logs Database: C:AEXDB\DB5\Jetstress005001.edb
Instance5096.6 Log path: C:AEXDB\DB6\Logs Database: C:AEXDB\DB6\Jetstress006001.edb
Instance5096.7 Log path: C:\EXDB\DB7\Logs Database: C:\EXDB\DB7\Jetstress007001.edb
Instance5096.8 Log path: CAEXDB\D88\Logs Database: CAEXDB\D88\Jetstress008001.edb

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
Instance5096.1	1.440	4.732	881.671	557.574	32803.625	34744.255	0.000	2.332	0.000	126.465	0.000	15421.763
Instance5096.2	1.531	5.509	884.824	552.530	32804.996	34791.320	0.000	3.002	0.000	121.945	0.000	16100.593
Instance5096.3	1.528	4.766	890.590	559.479	32803.235	34752.075	0.000	2.306	0.000	127.973	0.000	15294.974
Instance5096.4	1.539	4.820	882.542	557.678	32803.434	34703.548	0.000	2.360	0.000	127.434	0.000	15348.851
Instance5096.5	1.323	4.579	886.962	563.518	32804.764	34720.599	0.000	2.097	0.000	128.456	0.000	15273.063
Instance5096.6	1.518	5.330	879.048	551.988	32802.948	34771.037	0.000	2.766	0.000	123.984	0.000	15794.807
Instance5096.7	1.523	5.012	880.817	558.961	32802.225	34757.689	0.000	2.333	0.000	127.935	0.000	15303.287
Instance5096.8	1.654	6.272	874.188	546.433	32802.944	34793.828	0.000	3.451	0.000	119.273	0.000	16520.502
Instance5096.2 Instance5096.3 Instance5096.4 Instance5096.6 Instance5096.7 Instance5096.8	1.531 1.528 1.539 1.323 1.518 1.523 1.654	5.509 4.766 4.820 4.579 5.330 5.012 6.272	884.824 890.590 882.542 886.962 879.048 880.817 874.188	552.530 559.479 557.678 563.518 551.988 558.961 546.433	32804.996 32803.235 32803.434 32804.764 32802.948 32802.225 32802.944	34791.320 34752.075 34703.548 34720.599 34771.037 34757.689 34793.828	0.000 0.000 0.000 0.000 0.000 0.000 0.000	3.002 2.306 2.360 2.097 2.766 2.333 3.451	0.000 0.000 0.000 0.000 0.000 0.000 0.000	121.945 127.973 127.434 128.456 123.984 127.935 119.273	0.000 0.000 0.000 0.000 0.000 0.000 0.000	16100.593 15294.974 15348.851 15273.063 15794.807 15303.287 16520.502

Background Database Maintenance I/O renormance										
MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes								
Instance5096.1	9.019	260818.040								
Instance5096.2	9.017	260833.828								
Instance5096.3	9.020	260795.031								
Instance5096.4	9.022	260676.298								
Instance5096.5	9.023	260821.337								
Instance5096.6	9.016	260851.467								
Instance5096.7	9.023	260792.539								
Instance5096.8	9.014	260710.042								

-Log Replication I/O Performance -

Mala

MSExchange Database ==> Instances	I/O Log Reads/sec	I/O Log Reads Average Bytes
Instance5096.1	4.357	209714.870
Instance5096.2	4.370	209715.398
Instance5096.3	4.368	209715.584
Instance5096.4	4.365	209715.254
Instance5096.5	4.373	209715.266
Instance5096.6	4.370	209715.200
Instance5096.7	4.368	209715.300
Instance5096.8	4.386	209715.569

Total I/O Performance												
Total DO Terrormane												
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
Instance5096.1	1.440	4.732	890.691	557.574	35112.496	34744.255	2.311	2.332	4.357	126.465	209714.870	15421.763
Instance5096.2	1.531	5.509	893.841	552.530	35105.379	34791.320	2.236	3.002	4.370	121.945	209715.398	16100.593
Instance5096.3	1.528	4.766	899.610	559.479	35089.129	34752.075	2.220	2.306	4.368	127.973	209715.584	15294.974
Instance5096.4	1.539	4.820	891.564	557.678	35109.252	34703.548	2.315	2.360	4.365	127.434	209715.254	15348.851
Instance5096.5	1.323	4.579	895.985	563.518	35100.969	34720.599	1.991	2.097	4.373	128.456	209715.266	15273.063
Instance5096.6	1.518	5.330	888.064	551.988	35118.245	34771.037	2.180	2.766	4.370	123.984	209715.200	15794.807
Instance5096.7	1.523	5.012	889.840	558.961	35114.128	34757.689	2.242	2.333	4.368	127.935	209715.300	15303.287
Instance5096.8	1.654	6.272	883.202	546.433	35128.970	34793.828	2.355	3.451	4.386	119.273	209715.569	16520.502

Host System Performance			
Host System Ferformance			
Counter	Average	Minimum	Maximum
% Processor Time	9.194	6.166	12.747
Available MBytes	59540.450	59517.000	59609.000
Free System Page Table Entries	12304107.867	12303765.000	12304619.000
Transition Pages RePurposed/se	c 0.000	0.000	0.000
Pool Nonpaged Bytes	139412727.467	139300864.000	139558912.000
Pool Paged Bytes	298522496.000	297840640.000	299028480.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Test Log

-Test Log
9/14/2018 (6:29:24 PM - Preparing for testing ...
9/14/2018 (6:29:32 PM - Attaching databases ...
9/14/2018 (6:29:32 PM - Preparations for testing are complete.
9/14/2018 (6:29:32 PM - Database cache settings; (minimum: 26.0 MB, maximum: 20.0 GB)
9/14/2018 (6:29:32 PM - Database fush thresholds: (start 20: SMB, stop; 40.9 MB)
9/14/2018 (6:29:32 PM - Database fush thresholds: (start 20: SMB, stop; 40.9 MB)
9/14/2018 (6:29:32 PM - Database fush thresholds: (start 20: SMB, stop; 40.9 MB)
9/14/2018 (6:29:41 PM - Database read latency thresholds: (start 20: SMB, stop; 40.9 MB)
9/14/2018 (6:29:42 PM - Operation mix: Sessions 32, Inserts 44%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
9/14/2018 (6:29:42 PM - Operation mix: Sessions 32, Inserts 44%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
9/14/2018 (6:29:42 PM - Operation mix: Sessions 32, Inserts 44%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
9/14/2018 (6:29:42 PM - Operamace logging started (interval: 1500 ms).
9/14/2018 (6:29:42 PM - MStixchange Database(Lestress Win)/Database Cache Size, Last: 1980621000.0 (lower bound: 1932735000.0, upper bound: none)
9/14/2018 (6:29:55 PM - Ferformance logging ins ended.
9/14/2018 8:29:55 FM - Jethterop batch transaction stats: 225986, 225986, 225986, 225986, 225986, 225985, 225986, 225986, 225986, 225986, 225986, 225986, 225986, 225986, 225985, 225985, 225985, 225985, 225985, 225986, 9/14/2018 8:29:55 PM - Shurting down databases ...
9/14/2018 8:29:56 PM - Instance5096.1 (complete), Instance5096.2 (complete), Instance5096.3 (complete), Instance5096.4 (complete), 19/14/2018 8:29:56 PM - Crating test report ...
9/14/2018 8:29:56 PM - Crating test report ...
9/14/2018 8:20:02 PM - Instance5096.1 has 1.4 for I/O Database Reads Average Latency.
9/14/2018 8:20:02 PM - Instance5096.1 has 1.2 a for I/O Log Writes Average Latency.
9/14/2018 8:20:02 PM - Instance5096.1 has 1.3 for I/O Log Writes Average Latency.
9/14/2018 8:30:02 PM - Instance5096.1 has 2.3 for I/O Log Writes Average Latency.
9/14/2018 8:30:02 PM - Instance5096.2 has 1.5 for I/O Log Reads Average Latency.
9/14/2018 8:30:02 PM - Instance5096.2 has 1.5 for I/O Log Reads Average Latency.
9/14/2018 8:30:02 PM - Instance5096.3 has 2.3 for I/O Log Reads Average Latency.
9/14/2018 8:30:02 PM - Instance5096.3 has 2.3 for I/O Log Reads Average Latency.
9/14/2018 8:30:02 PM - Instance5096.4 has 1.5 for I/O Database Reads Average Latency.
9/14/2018 8:30:02 PM - Instance5096.4 has 1.5 for I/O Database Reads Average Latency.
9/14/2018 8:30:02 PM - Instance5096.4 has 2.1 for I/O Log Reads Average Latency.
9/14/2018 8:30:02 PM - Instance5096.5 has 2.1 for I/O Log Writes Average Latency.
9/14/2018 8:30:02 PM - Instance5096.5 has 2.1 for I/O Log Writes Average Latency.
9/14/2018 8:30:02 PM - Instance5096.5 has 2.1 for I/O Log Writes Average Latency.
9/14/2018 8:30:02 PM - Instance5096.5 has 2.1 for I/O Log Writes Average Latency.
9/14/2018 8:30:02 PM - Instance5096.5 has 2.1 for I/O Log Writes Average Latency.
9/14/2018 8:30:02 PM - Instance5096.5 has 2.1 for I/O Log Reads Average Latency.
9/14/2018 8:30:02 PM - Instance5096.5 has 2.1 for I/O Log Reads Average Latency.
9/14/2018 8:30:02 PM - Instance5096.5 has 2.1 for I/O Log Reads Average Latency.
<l

_	- Checksum Statistics - All-								
	Database	Seen pages	Bad pages	Correctable pages	Wrong page-number pages	File length / seconds taken			
	C:\EXDB\DB1\Jetstress001001.edb	8482304	0	0	0	265072 MB/2348 sec			
	C:\EXDB\DB2\Jetstress002001.edb	8482560	0	0	0	265080 MB/1690 sec			
	C:\EXDB\DB3\Jetstress003001.edb	8482560	0	0	0	265080 MB/1880 sec			
	C:\EXDB\DB4\Jetstress004001.edb	8482560	0	0	0	265080 MB/1566 sec			
	C:\EXDB\DB5\Jetstress005001.edb	8482304	0	0	0	265072 MB/1653 sec			
	C:\EXDB\DB6\Jetstress006001.edb	8482560	0	0	0	265080 MB/2339 sec			
	C:\EXDB\DB7\Jetstress007001.edb	8482560	0	0	0	265080 MB/1752 sec			
	C:\EXDB\DB8\Jetstress008001.edb	8483328	0	0	0	265104 MB/2361 sec			
	(Sum)	67860736	0	0	0	2120648 MB/2362 sec			

Disk Subsystem Performance (of checksum)

LogicalDisk	Avg. Disk sec/Read	Avg. Disk sec/Write	Disk Reads/sec	Disk Writes/sec	Avg. Disk Bytes/Read
C:\EXDB\DB1	0.029	0.000	1798.335	0.000	65536.000
C:\EXDB\DB2	0.017	0.000	2491.943	0.000	65536.000
C:\EXDB\DB3	0.021	0.000	2227.922	0.000	65536.000
C:\EXDB\DB4	0.015	0.000	2688.895	0.000	65536.000
C:\EXDB\DB5	0.016	0.000	2553.947	0.000	65536.000
C:\EXDB\DB6	0.029	0.000	1783.973	0.000	65536.000
C:\EXDB\DB7	0.018	0.000	2394.185	0.000	65536.000
C:\EXDB\DB8	0.036	0.000	1692.487	0.000	65536.000

- Memory System Performance (of checksum) -

	7		
Counter	Average	Minimum	Maximum
% Processor Time	8.996	5.488	14.064
Available MBytes	61639.987	61581.000	61654.000
Free System Page Table Entries	12304260.179	12303609.000	12304915.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	139978699.487	139841536.000	140099584.000
Pool Paged Bytes	299550299.897	299429888.000	299765760.000

1	r Test Log	
L	0/14/2018 6/20/24 DM Depending for Latring	
L	714/2010 0.27.24 FM = 1 repaints (0. testing	
L	714/2010 0.27.22 FM = Attaching tradeouses	
L	y14/2016 0.257.22 FM => replarations for testing are complete.	
L	9/14/2010 0.297.22 PM Starting transaction dispatch	
L	914/201602922 PM = Database cache settings; (minimum: 2000 MB, maximum: 2000)	
L	9/14/2018 0:29:22 PM = Database nush niresholasi (start: 20.5 MB, stop: 40.9 MB) 0/14/2018 6:20:41 DM. Database nush hiresholasi (start: 20.5 MB, stop: 40.9 MB)	
L	9/14/2016 0.25/91 PM Database read natericly interstolous; (average: 20 mee/read), 100 mee/read).	
L	9/14/2018 0:29/41 PM == Log White latency unresholds: (average: 10 msec/white), msec/white).	
L	9/14/2016 0.25/42 FM Operation Intx: Sessions 22, inserts 40%, befores 20%, Reduces 5%, Reduces 5%, Lazy Commits 70%.	
L	9/14/2016 0:29:42 PM Periormance logging stated (interval: 15000 ms).	
L	7/14/2010 0.27.42 FM == Autaning preciduates. 0/14/0016 5-00.54 PM == Autaning preciduates. Weiking Cashe Size Lett 1080621000 0 Januar Januari 102725000 0 Januari Ja	
L	914/2016 0.25/34 PM Wichtchange Database(Jestress Wil)(Database Cache Size, Last: 1980/21000.0 (lower bound: 1952/55000.0, upper bound: noie)	
L	9/14/2016 5/27:33 FM == Performance (ogging mas ended.	
L	71 4/2016 6.27.33 FM => Jeumetup batch transaction stats. 22.3760, 22.3760, 22.3760, 22.3760, 22.3760, 22.3763 and 22.3763.	
L	914/2016 8/29/30 PM Displacing trainsactions ends.	
L	9/14/2016 5/27:30 FM = Situating down databases	06.9 (complete)
L	914/2018 8:25:30 FM Instance 3090.1 (complete), instance 3090.2 (complete), instance 300.4 (complete), instance 300.6 (complet	90.8 (complete)
L	914/2016 5:27:50 FM - C-VOSESVAUIIIIIISTATA DESKTOPUERESUITEROTTIAILE 2016 9 14 - 18 29 41.09 ins 460 samples.	
L	9/14/2016 5/27:30 PM Creating test report 0/14/2018 5/2010 PM Listenas Store Line 1.4 feet I/O Database Bands Avances Latenay	
L	9/14/2016 5:00/02 FM == Instance:09/01 Has 1.4 101 D/D Database Reads Average Latency.	
L	9/14/2018 6:50/02 PM Instance:090.1 has 2.5 for I/O Log Whites Avertage Latency.	
L	714/2016 5:00/02 FM == Instance:0/90.1 Has 2.5 101 PO Log Redus Average Latency.	
L	71 a/2016 0.50 02 FM = Instance.070.6 abox 3 to 100 Database Keaus Average Latenty.	
L	714/2016 5.50/02 FM = Instance.070/2 ins 5.5 for I/O Log Writes Average Latency.	
L	714/2016 0.50/02 FM = Instance.070/2 fm 5 35 f0 1/O Log Reads Average Latency.	
L	714/2016 0.50/02 FM = Instance/0705 Into 1 to 100 Database Keaus Average Learney.	
L	714/2016 0.50/02 FM = Instance 070.5 Ins 2.5 IO I/O Log White A Wetage Latency.	
L	9/14/2016 0:50/02 FM = Instance:090.5 Ints 2.5 IO 1/O Log Reads Average Latency	
L	71-9/2016 0.5/0/02 FM == Instance.0/9/9/Has 1.5 10 FO Database Keaus Average Letterity.	
L	21/4/2016 5:002 FM - Instance/09/97 Hat 2:4 f0 FO Log THRes Are lage Latency.	
L	71 a/2016 0.50/02 FM = Instance.090/F Has 2.4 f0 FO FOg Reads Average Latency.	
L	714/2016 0.50/02 FM = Instance.070/5 Ins 1.5 for J/O Loadback Reads Average Latency.	
L	9/14/2016 0.5/0/2 FM Instance 0/0/0 F has 2.1 for I/O Log Write Arvedage Latency.	
L	91/4/2016 0.5/0/2 FM = Instance/0905/in 82.1 for JO Edg Reads Average Laterky. 0/14/2018 3/0/02 PM = Instance/0906 for a 15 for JO Database Banda Auguran Latercy.	
L	21/4/2018 8:30:02 FM - Instance/30/30 6 has 2 Stor 1/0 Loa Weites Australia Latenty.	
L	9/14/2016 0.5/0/2 FM Instance 0/0/0 f bas 2 & for I/O Log Write Arvelage Latency.	
L	9/14/2018 8:30:02 PM Instance 5096 7 has 1.5 for I/O Database Reads Average Latency	
L	9/14/2018 8:30/12 PM Instance5096 7 bas 2.3 for I/O Log Virtes Average Latency.	
L	9/14/2018 8:30:02 PM Instance 5096 7 bas 2.3 for I/O Log Read Average Latency	
L	9/14/2018 8:30:02 PM	
L	9/14/2018 8:30/12 PM Instance 5096 kb as 3 5 for I/O Log Virtes Average Latency.	
L	9/14/2018 8:30:02 PM Instance5096 8 has 3 5 for 1/01 to Reads Average Latency	
L	9/14/2018 8:30/12 PM Test has O Maximum Database Page Fault Stalls/sec.	
L	9/14/2018 8:30:02 PM The test has 0 Database Page Fault Stalls/sec samples higher than 0	
L	9/14/2018 8:30/02 PM CAlisersAdministratorDestonDetResultPerformance 2018 9 14 18 29 41 xml has 479 samples queried	
L	9/14/2018 8:30:02 PM CAUsers/Administrator/Desktor/VetResult/Performance 2018 9 14 18 29 41.html was saved.	
L	9/14/2018 8:30:02 PM Performance logging started (interval: 30000 ms).	
	9/14/2018 8:30:02 PM Verifying database checksums	
	9/14/2018 9:09:24 PM - C/EXDB\DB1 (100% processed), C/EXDB\DB2 (100% processed), C/EXDB\DB3 (100% processed), C/EXDB\DB4 (100% processed), C/EXDB\DB5 (100% processed), C/EXDB\D5 (100% processed), C/E	C:\EXDB\DB7
	(100% processed) and CAEXDBUDBS (100% processed)	,
	9/14/2018 9:09:24 PM Performance logging has ended.	
	9/14/2018 9:09:24 PM C/Users/Administrator/Desktop/JetResult/DBChecksum 2018 9 14 20 30 2.blg has 78 samples.	
L		

Appendix C—Database Backup Test Result Report

This section provides the database backup test results on one of the test virtual machine. All the other test results are comparable to one another.

	- Database Contiguration
I	Database Configuration
	Instance4776.1 Log path: C:\EXDB\DB1\Logs
	Database: C:\EXDB\DB1\Jetstress001001.edb
	Instance4776.2 Log path: C:\EXDB\DB2\Logs
	Database: C:\EXDB\DB2\Jetstress002001.edb
	Instance4776.3 Log path: C:\EXDB\DB3\Logs
	Database: C:\EXDB\DB3\Jetstress003001.edb
	Instance4776.4 Log path: C:\EXDB\DB4\Logs
	Database: C:\EXDB\DB4\Jetstress004001.edb
	Instance4776.5 Log path: C:\EXDB\DB5\Logs
	Database: C:\EXDB\DB5\Jetstress005001.edb
	Instance4776.6 Log path: C:\EXDB\DB6\Logs
	Database: C:\EXDB\DB6\Jetstress006001.edb
	Instance4776.7 Log path: C:\EXDB\DB7\Logs
	Database: C:\EXDB\DB7\Jetstress007001.edb
	Instance4776.8 Log nath: C:\EXDB\DB8\Logs
	Database: C:\EXDB\DB8\Jetstress008001.edb
I	

Database backup Test Result Report

Database Backup	Statistics - All		
Database Instance	Database Size (MBytes)	Elapsed Backup Time	MBytes Transferred/sec
Instance4776.1	300544.03	00:19:21	258.73
Instance4776.2	300456.03	00:20:14	247.40
Instance4776.3	300440.03	00:20:09	248.44
Instance4776.4	300472.03	00:20:33	243.67
Instance4776.5	300424.03	00:19:19	259.19
Instance4776.6	300424.03	00:19:14	260.29
Instance4776.7	300440.03	00:19:40	254.57
Instance4776.8	300496.03	00:20:03	249.66
Avg			252.75
Sum			2021.96
- Intetrace System D	oromotore		

Jetsuess System Farameter	8
Thread Count	32
Minimum Database Cach	e 256.0 MB
Maximum Database Cach	1e 2048.0 MB
Insert Operations	40%
Delete Operations	20%
Replace Operations	5%
Read Operations	35%
Lazy Commits	70%

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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
Instance4776.1	1.569	0.000	1033.536	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance4776.2	1.730	0.000	984.409	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance4776.3	1.671	0.000	990.319	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance4776.4	1.721	0.000	974.422	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance4776.5	1.620	0.000	1039.179	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance4776.6	1.584	0.000	1041.369	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance4776.7	1.662	0.000	1016.322	0.000	262144.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Instance4776.8	1.693	0.000	998.422	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	6.466	2.131	7.440
Available MBytes	61648.634	61632.000	61695.000
Free System Page Table Entries	1579132421.146	12303710.000	4294967295.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	148715070.439	148688896.000	148758528.000
Pool Paged Bytes	326078663.805	325431296.000	338108416.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

-Test Log-

9/18/2018 9:49:05 AM -- Preparing for testing ...

9/18/2018 9:49:13 AM -- Attaching databases ...

9/18/2018 9:49:13 AM -- Preparations for testing are complete. 9/18/2018 9:49:22 AM -- Performance logging started (interval: 30000 ms).

9/18/2018 9:49:22 AM -- Performance logging started (interval: 5000 9/18/2018 9:49:22 AM -- Backing up databases ...

9/18/2018 9:49:22 AM -- Backing up databases ... 9/18/2018 10:09:55 AM -- Performance logging has ended.

9/18/2018 10:09:55 AM -- Instance4776.5 (100% processed), Instance4776.3 (100% processed), Instance4776.4 (100% processed), Instance4776.5 (100% processed), Instance

Instance4776.7 (100% processed) and Instance4776.8 (100% processed)

9/18/2018 10:09:55 AM -- C:\Users\Administrator\Desktop\JetResult\DatabaseBackup_2018_9_18_9_49_13.blg has 41 samples.

9/18/2018 10:09:55 AM -- Creating test report ...

Appendix D—Soft Recovery Test Result Report

Database Instance	Log files replayed	Elapsed seconds
Instance5096.1	507	48.6094717
Instance5096.2	508	48.0782217
Instance5096.3	501	47.8125961
Instance5096.4	505	48.6094717
Instance5096.5	505	47.5469728
Instance5096.6	511	48.6094717
Instance5096.7	508	47.5469728
Instance5096.8	502	49.4063511
Avg	505	48.277
Sum	4047	386.2195296

	Database Configuration
atabase Configuration stance5096.1 Log path: C:\EXDB\DB1\Logs Database: C:\EXDB\DB1\letstress001001.edb	Instance5096.1 Log path: C:\EXDB\DF Database: C:\EXDB\DF
stance5096.2 Log path: C:\EXDB\DB2\Logs	Instance5096.2 Log path: C:\EXDB\DE
Database: C:\EXDB\DB2\Jetstress002001.edb	Database: C:\EXDB\DE
stance5096.3 Log path: C:\EXDB\DB3\Logs	Instance5096.3 Log path: C:\EXDB\DE
Database: C:\EXDB\DB3\Jetstress003001.edb	Database: C:\EXDB\DF
stance5096.4 Log path: C:\EXDB\DB4\Logs	Instance5096.4 Log path: C:\EXDB\DE
Database: C:\EXDB\DB4\Jetstress004001.edb	Database: C:\EXDB\DF
stance5096.5 Log path: C:\EXDB\DB5\Logs	Instance5096.5 Log path: C:\EXDB\DE
Database: C:\EXDB\DB5\Jetstress005001.edb	Database: C:\EXDB\DF
stance5096.6 Log path: C:\EXDB\DB6\Logs	Instance5096.6 Log path: C:\EXDB\DE
Database: C:\EXDB\DB6\Jetstress006001.edb	Database: C:\EXDB\DF
stance5096.7 Log path: C:\EXDB\DB7\Logs	Instance5096.7 Log path: C:\EXDB\DE
Database: C:\EXDB\DB7\Jetstress007001.edb	Database: C:\EXDB\DF
astance5096.8 Log path: C\EXDB\DB8\Logs	Instance5096.8 Log path: C:\EXDB\DE
Database: C\EXDB\DB8\Jetstress008001.edb	Database: C:\EXDB\DE

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- 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
Instance5096.1	1.033	1.144	4880.513	76.501	36608.311	95344.960	1.205	0.000	52.848	0.000	209715.200	0.000
Instance5096.2	1.050	1.121	4833.320	75.834	36408.844	94827.633	1.225	0.000	53.152	0.000	209715.200	0.000
Instance5096.3	1.028	1.092	4874.231	74.513	36594.562	94657.534	1.203	0.000	52.529	0.000	209714.607	0.000
Instance5096.4	1.022	1.077	4861.002	73.851	36623.021	94816.566	1.209	0.000	52.508	0.000	209715.200	0.000
Instance5096.5	0.895	1.081	4936.917	74.040	36471.685	95967.840	1.068	0.000	53.027	0.000	209715.200	0.000
Instance5096.6	1.037	1.126	4854.819	75.277	36532.662	94091.097	1.203	0.000	53.074	0.000	209715.200	0.000
Instance5096.7	1.038	1.109	4891.662	75.134	36529.333	95577.964	1.213	0.000	53.774	0.000	209715.493	0.000
Instance5096.8	1.208	1.140	4623.520	72.155	36399.100	93605.557	1.340	0.000	50.788	0.000	209809.133	0.000

Host System Performance -

Counter	Average	Minimum	Maximum
% Processor Time	46.892	44.163	50.243
Available MBytes	59183.833	59107.000	59395.000
Free System Page Table Entries	12303453.333	12303211.000	12303706.000
Transition Pages RePurposed/sec	0.000	0.000	0.000
Pool Nonpaged Bytes	142914218.667	142843904.000	143060992.000
Pool Paged Bytes	330897066.667	330231808.000	337858560.000
Database Page Fault Stalls/sec	0.000	0.000	0.000

Transactional I/O Performance												
Transactional 1/0 T ci												
MSExchange	I/O Database Reads	I/O Database Writes	I/O	I/O	I/O Database	I/O Database	I/O Log Reads	I/O Log Writes	I/O Log	I/O Log	I/O Log Reads	I/O Log Writes
Database ==>	Average Latency	Average Latency	Database	Database	Reads Average	Writes Average	Average Latency	Average Latency	Reads/sec	Writes/sec	Average Bytes	Average Bytes
Instances	(meac)	(msec)	Reads/sec	Writes/sec	Bytes	Bytes	(meac)	(meac)	110000.000		in en age Dynes	in en age Dytes
Instances	(Insec)	(insec)	Reaus/see	Willes/see	Dytes	Dytes	(msec)	(msec)				
Instance5096.1	1.033	1.144	4880.513	76.501	36608.311	95344.960	1.205	0.000	52.848	0.000	209715.200	0.000
Instance5096.2	1.050	1.121	4833.320	75.834	36408.844	94827.633	1.225	0.000	53.152	0.000	209715.200	0.000
Instance5096.3	1.028	1.092	4874.231	74.513	36594.562	94657.534	1.203	0.000	52.529	0.000	209714.607	0.000
Instance5096.4	1.022	1.077	4861.002	73.851	36623.021	94816.566	1.209	0.000	52.508	0.000	209715.200	0.000
Instance5096.5	0.895	1.081	4936.917	74.040	36471.685	95967.840	1.068	0.000	53.027	0.000	209715.200	0.000
Instance5096.6	1.037	1.126	4854.819	75.277	36532.662	94091.097	1.203	0.000	53.074	0.000	209715.200	0.000
Instance5096.7	1.038	1.109	4891.662	75.134	36529.333	95577.964	1.213	0.000	53.774	0.000	209715.493	0.000
Instance5096.8	1.208	1.140	4623.520	72.155	36399.100	93605.557	1.340	0.000	50.788	0.000	209809.133	0.000

Background Database Maintenance I/O	Performance	
MSExchange Database ==> Instances	Database Maintenance IO Reads/sec	Database Maintenance IO Reads Average Bytes
Instance5096.1	0.000	0.000
Instance5096.2	0.000	0.000
Instance5096.3	0.000	0.000
Instance5096.4	0.000	0.000
Instance5096.5	0.000	0.000
Instance5096.6	0.000	0.000
Instance5096.7	0.000	0.000
Instance5096.8	0.000	0.000

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	- lest Log
	9/17/2018 9:41:09 AM Preparing for testing
	9/17/2018 9:41:17 AM Attaching databases
	9/17/2018 9:41:17 AM Preparations for testing are complete.
	9/17/2018 9:41:17 AM Starting transaction dispatch
	9/17/2018 9:41:17 AM Database cache settings: (minimum: 256.0 MB, maximum: 2.0 GB)
	9/17/2018 9:41:17 AM Database flush thresholds: (start: 20.5 MB, stop: 40.9 MB)
	9/17/2018 9:41:26 AM Database read latency thresholds: (average: 20 msec/read, maximum: 100 msec/read).
	9/17/2018 9:41:26 AM Log write latency thresholds: (average: 10 msec/write, maximum: 100 msec/write).
	9/17/2018 9:41:26 AM Operation mix: Sessions 32, Inserts 40%, Deletes 20%, Replaces 5%, Reads 35%, Lazy Commits 70%.
	9/17/2018 9:41:26 AM Performance logging started (interval: 15000 ms).
	9/17/2018 9:41:26 AM Generating log files
	9/17/2018 9:46:40 AM C:\EXDB\DB1\Logs (101.2% generated), C:\EXDB\DB2Logs (101.4% generated), C:\EXDB\DB3\Logs (100.2% generated), C:\EXDB\DB4\Logs (100.8% generated), C:\EXDB\DB5\Logs (101.0% generated),
	C:\EXDB\DB6\Logs (102.2% generated), C:\EXDB\DB7\Logs (101.4% generated) and C:\EXDB\DB8\Logs (100.2% generated)
	9/17/2018 9:46:40 AM Performance logging has ended.
	9/17/2018 9:46:40 AM JetInterop batch transaction stats: 18070, 1
	9/17/2018 9:46:40 AM Dispatching transactions ends.
	9/17/2018 9:46:41 AM Shutting down databases
	9/17/2018 9:46:41 AM Instance5096.1 (complete), Instance5096.2 (complete), Instance5096.3 (complete), Instance5096.4 (complete), Instance5096.5 (complete), Instance5096.6 (complete), Instance5096.7 (complete), Instance5096.8 (complete
	9/17/2018 9:46:41 AM C:\Users\Administrator\Desktop\JetResult\Performance_2018 9_17_9_41_26.blg has 20 samples.
	9/17/2018 9:46:41 AM Creating test report
	9/17/2018 9:46:42 AM Instance5096.1 has 1.1 for I/O Database Reads Average Latency.
	9/17/2018 9:46:42 AM Instance5096.1 has 1.8 for I/O Log Writes Average Latency.
	9/17/2018 9:46:42 AM Instance5096.1 has 1.8 for I/O Log Reads Average Latency.
	9/17/2018 9:46:42 AM Instance5096.2 has 1.1 for I/O Database Reads Average Latency.
	9/17/2018 9:46:42 AM Instance5096.2 has 1.7 for I/O Log Writes Average Latency.
	9/17/2018 9:40:42 AM Instance5096.2 has 1.1 for I/O Log Reads Average Latency.
	9/17/2018 9:40:42 AM Instance:090:5 has 1.1 for I/O Database Reads Average Latency.
	9/17/2018 9:40:42 AM Instance:090:5. has 1.7. for I/O Log Writes Average Latency.
	9/17/2018 9:40:42 AM Instance:0096.5 has 1.7 for I/O Log Reads Average Latency.
	9/17/2018 9:40:42 AM Instance:090:4 has 1.2 for I/O Database Reads Average Latency.
	9/17/2018 9:40:42 AM Instance0090.4 has 1.8 for I/O Log Writes Average Latency.
	9/17/2018 9:40:42 AM Instance2006 Fast 1.5 at 107 LOg Redus Average Latency.
	9/17/2018 9:40:42 AM InstanceS0905, http://doi.org/10.100/Database Reads Average Latency.
	9/17/2019 9/40/42 AM = Instance00/50.5 http://fib.org/
	9/17/2018 9:40:42 AM InstanceS090: https://doi.org/10.1016/0.001640014 AVERAGE Latency.
	9/17/2018 9:49/42 AM = InstanceS0906 has 1.2 10/10/Database Reals Average Latency.
	9/17/2010 9:40.42 AM = InstanceSould has 1.6 to 10 Log writes Average Latency.
	9/17/2018 9-40-42 AM = InstanceCord And Table 1 for (1/O Database And Earler Latency)
	9/17/010 9/40/42 AM - Instance/00/67 has 18 for 10/10 Jan Write Average Latency. 9/17/018 9/46/24 AM - Instance/00/67 has 18 for 10/10 Jan Write Average Latency.
	9/17/018 9/6/4/2 A M Instance/006/ The 18 for 1/0 Log Parte Average Latency
	9/17/018 9/6/42 A M Instance/006 B has 1 2 for 1/0 Database Reads Average Latency
	9/17/018 9/46/42 AM — Instance50/68 & has 1 9 for I/O Log Writes Average Latency
	9/17/018 9-0-64 A M = Instance/006 B as 1 9 for 1/0 Log Read Average Latency
	9/17/018 9/46/42 AM - Test has 0 Maximum Database Paoe Fault Stalls/sec
	9/17/2018 9/46/42 AM — The test has 0 Database Fault Stall/sec: samples higher than 0.
	9/17/2018 9:46:42 AM C:\Users\Administrator\Deskton\etResul\Performance_2018 9 17 9 41 26.xml has 19 samples queried.
	9/17/2018 9:46:42 AM - C:\Users\Administrator\Desktop\VetResul\Performance 2018 9 17 9 41 26.html was saved.
	9/17/2018 9:46:42 AM Performance logging started (interval: 4000 ms).
	9/17/2018 9:46:42 AM Recovering databases
	9/17/2018 9:47:32 AM Performance logging has ended.
	9/17/2018 9:47:32 AM Instance5096.1 (48,6094717), Instance5096.2 (48.0782217), Instance5096.3 (47.8125961), Instance5096.4 (48.6094717), Instance5096.5 (47.5469728), Instance5096.6 (48.6094717), Instance5096.7 (47.5469728) and
	Instance5096.8 (49.4063511)
	9/17/2018 9:47:32 AM C:\Users\Administrator\Desktop\JetResult\SoftRecovery_2018_9_17_9_46_42.blg has 12 samples.
	9/17/2018 9:47:32 AM Creating test report
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