

VMMARK VIRTUALIZATION PERFORMANCE OF THE LENOVO THINKSERVER RD630

Lenovo® ThinkServer® RD630 excellent performance for virtualized environments

with a VMware VMmark® score of

11.17

@10 tiles



Corporate data centers increasingly rely on virtualization technologies to decrease management costs and increase flexibility and efficiency. As your company embraces these technologies, it only makes sense to select servers that can deliver top virtualized performance. To measure the virtualization performance of the Lenovo ThinkServer RD630, Principled Technologies used the VMmark virtualization benchmark in our labs. VMmark calculates its score by showing the number of tiles a server can support as well as how each tile performed. A tile consists of eight virtual machines (VMs) that include database servers, Web servers, a mail server, and an idle server. Two Lenovo ThinkServer RD630 servers, paired with Dot Hill AssuredSAN™ Pro 5720 tiered storage, ran 10 VMmark tiles for a total of 80 running VMs, and achieved a score of 11.17@10 tiles.¹ This placed the Lenovo ThinkServer RD630 in the top 8 percent of posted VMmark results² for the 32-total-core server configurations as of June 11, 2013.

¹ The official results are online at <http://www.vmware.com/a/assets/vmmark/pdf/2013-06-11-PrincipledTechnologies-LenovoRD630.pdf> and a copy appears in [Appendix C](#).

² www.vmware.com/a/vmmark/1/core/32/



ABOUT LENOVO THINKSERVER RD630

According to Lenovo, the ThinkServer RD630 is “a highly scalable, powerful 2U rack server solution that’s ideal for business process or decision support deployments. The RD630 features sophisticated hardware RAID standard on every model — providing your managed networks and user groups vault-safe data protection and lightning-fast data performance. Plus, with outstanding remote manageability, an array of network adapter choices, and rich I /O, the RD630 server handles heavy workloads and robust bandwidth with energy efficient design innovation.”

Learn more about the Lenovo ThinkServer RD630 at www.lenovo.com/products/us/server/rd630.html

ABOUT DOT HILL STORAGE

The Dot Hill AssuredSAN Pro 5000 series storage is an auto-tiering storage that uses high capacity SAS drives along with faster SSD drives. The storage uses RealTier algorithms continually and dynamically to identify hot data and moves it to the SSD drives, while moving less used data to the higher capacity SAS drives. This process provides fast response on your key data when you need it.

Learn more about Dot Hill storage at www.dothill.com.

ABOUT EXTREME NETWORK SWITCHES

Extreme Networks designed its top-of-rack Summit X670 series switches to support emerging 10 Gigabit Ethernet-enabled servers in enterprise and cloud data centers. Currently available in two models, the Summit X670 series of switches help optimize new server deployments with optional 40 GbE uplinks to start the transition to the new virtualized environment. These stackable switches are high density, low latency.

Learn more about the Summit X670 series from Extreme Networks at www.extremenetworks.com/products/summit-x670.aspx#tab4n.

ABOUT VMMARK

VMmark is a benchmarking tool that measures the performance and scalability of applications running in virtualized environments. With it you can measure virtual datacenter performance accurately and reliably, and view and compare the performance of different hardware and virtualization platforms.

According to the VMmark Web site, “State-of-the-art server consolidation typically collects several diverse workloads onto a virtualization platform - a collection of physical servers accessing shared storage and network resources. Traditional single-workload performance and scalability benchmarks for non-virtualized environments

were developed with neither virtual machines nor server consolidation in mind. Even previous virtualization benchmarks have not fully captured the complexities of today's virtualized datacenters. VMmark 2.5, the industry's first multi-server datacenter virtualization benchmark, addresses this gap by including as part of the benchmark a variety of common platform-level workloads such as live migration of virtual machines, cloning and deploying of virtual machines, and automatic virtual machine load balancing across the datacenter."

OUR TESTING

To carry out the VMmark testing, we downloaded the benchmark from <http://www.vmware.com/products/vmmark/>. We followed the test directions in the VMware VMmark Benchmarking Guide (VMmark_Benchmarking_Guide_2.5-20121120.pdf), included with the download of VMmark 2.5 and revised on November 20, 2012. We used the guide's instructions to build the mail server, standby, and deploy template VMs from scratch. For the Oliodb, OlioWeb, DS2DB, and DS2Web VMs, we used the VMmark prebuilt templates.

Learn more about VMmark at

www.vmware.com/products/vmmark/overview.html

CONCLUSION

Virtualization is an increasingly critical part of data center computing. Selecting a server that excels at virtualization makes good business sense. Two Lenovo ThinkServer RD630 servers, paired with Dot Hill AssuredSAN Pro5720 tiered storage, ran 10 VMmark tiles for a total of 80 running VMs and achieved a score of [11.17@10 tiles](http://www.vmware.com/a/assets/vmmark/pdf/2013-06-11-PrincipledTechnologies-LenovoRD630.pdf) (<http://www.vmware.com/a/assets/vmmark/pdf/2013-06-11-PrincipledTechnologies-LenovoRD630.pdf>), placing it in the top 8 percent of the 32-core server configurations. This makes the Lenovo ThinkServer RD630 an excellent choice for any enterprise that uses virtualization.

APPENDIX A – SYSTEM CONFIGURATION

Figure 1 provides configuration information about the servers we used in our tests. We used two Lenovo ThinkServer RD630s as systems under test. We used five Lenovo ThinkServer RD530 as clients. See [Appendix B](#) for a detailed test bed configuration.

System	Lenovo ThinkServer RD630	Lenovo ThinkServer RD530
General		
Number of processor packages	2	2
Number of cores per processor	8	6
Number of hardware threads per core	2	2
CPU		
Vendor	Intel®	Intel
Name	Xeon®	Xeon
Model number	E5-2690	E5-2640
Socket type	LGA2011	LGA2011
Core frequency (GHz)	2.90	2.50
Bus frequency	8.0 GT/s	6.4 GT/s
L1 cache	32 KB + 32 KB	32 KB + 32 KB
L2 cache	256 KB (per core)	256 KB (per core)
L3 cache	20 MB	15 MB
Platform		
Vendor and model	Lenovo ThinkServer RD630	Lenovo ThinkServer RD530
BIOS name and version	2.10	2.05
BIOS Settings	C6 cache disabled, Maximum C state set to C0.	Default
Memory module(s)		
Total RAM in system (GB)	256	64
Vendor and model number	Hynix HMT42GR7MFR4C-PB	Hynix HMT31GR7CFR4C-PB
Type	PC3-12800R	PC3-12800R
Speed (MHz)	1,600	1,600
Speed running in the system (MHz)	1,600	1,333
Size (GB)	16	8
Number of RAM module(s)	16	8
Rank	Dual	Dual
OS/hypervisor		
Name	VMware ESX 5.1.0	VMware ESX 5.1.0
Build number	1021289	1021289
File system	VMFS	VMFS
Language	English	English

System	Lenovo ThinkServer RD630	Lenovo ThinkServer RD530
RAID controller		
Vendor and model number	LSI™ MegaRAID® SAS 9260-8i	LSI MegaRAID SAS 9260-8i
Firmware version	2.120.183-1415	2.120.183-1415
Hard drives		
Vendor and model number	Seagate® ST9300653SS	Seagate ST9300653SS
Number of drives	2	2
Size (GB)	300	300
Type	SAS	SAS
Fibre adapter		
Vendor and model number	Emulex® LPe12002	N/A
Number of ports	2	N/A
Type	PCI Express	N/A
Ethernet adapter (onboard)		
Vendor and model number	Intel I350 Gigabit Network Controller	Intel I350 Gigabit Network Controller
Number of ports	2	2
Type	Integrated	Integrated
Ethernet adapter (onboard, shared)		
Vendor and model number	Intel 82574L Gigabit Network Controller	Intel 82574L Gigabit Network Controller
Number of ports	1	1
Type	Integrated	Integrated
Ethernet adapter (additional)		
Vendor and model number	Intel X540-T2 Network Controller	N/A
Number of ports	2	N/A
Type	PCI Express	N/A

Figure 1: System configuration information for our test servers.

Figure 2 provides configuration information about the Dot Hill AssuredSAN Pro 5720 storage we used in our tests. There were 600GB 10K SAS and 1TB 7K nearline SAS drives installed in the array, but these drives were not configured. We configured the SSD drives into eight two disks RAID 1 vdisks. We configured the eight vdisks into two four vdisks storage pools. One storage pool per controller. We created volumes on the two storage pools as outlined in the VMmark result file in Appendix C.

Storage array	Dot Hill AssuredSAN Pro 5720
Number of storage shelves	3 x 24 disks enclosures
Number of active storage controllers	2
Number of active storage ports	4 x 8GB Fibre (2 per controller)
Firmware revision	CS100P002-02
Disk vendor and model number	16 x Hitachi MUSML4040ASS600
Disk size (GB)	400
Disk type	SAS SSD

Figure 2: Detailed configuration information for the storage arrays.

APPENDIX B – TEST BED CONFIGURATION

Figure 3 shows our test bed setup. The two Lenovo ThinkServer RD630 servers were configured in an ESX cluster as required by VMmark run rules. The Dot Hill Pro5000 storage was connected to the RD630 servers through a dual-port Fibre host bus adapter (HBA) installed in each server. The RD630 servers connected to the test clients through two dual-port 10 GbE network controllers, for a total of four 10 GbE connections on each server.

We used six Lenovo ThinkServer RD530 servers for the client test bed. One RD530 was used for the non-virtualized VMmark controller. The other five RD530 servers ran two virtual client VMs running Windows Server 2008 R2 inside each one. All virtual clients had a single 1GbE network connection. One of the RD530 servers ran vCenter Server inside a virtual machine with a single 10 GbE connection.

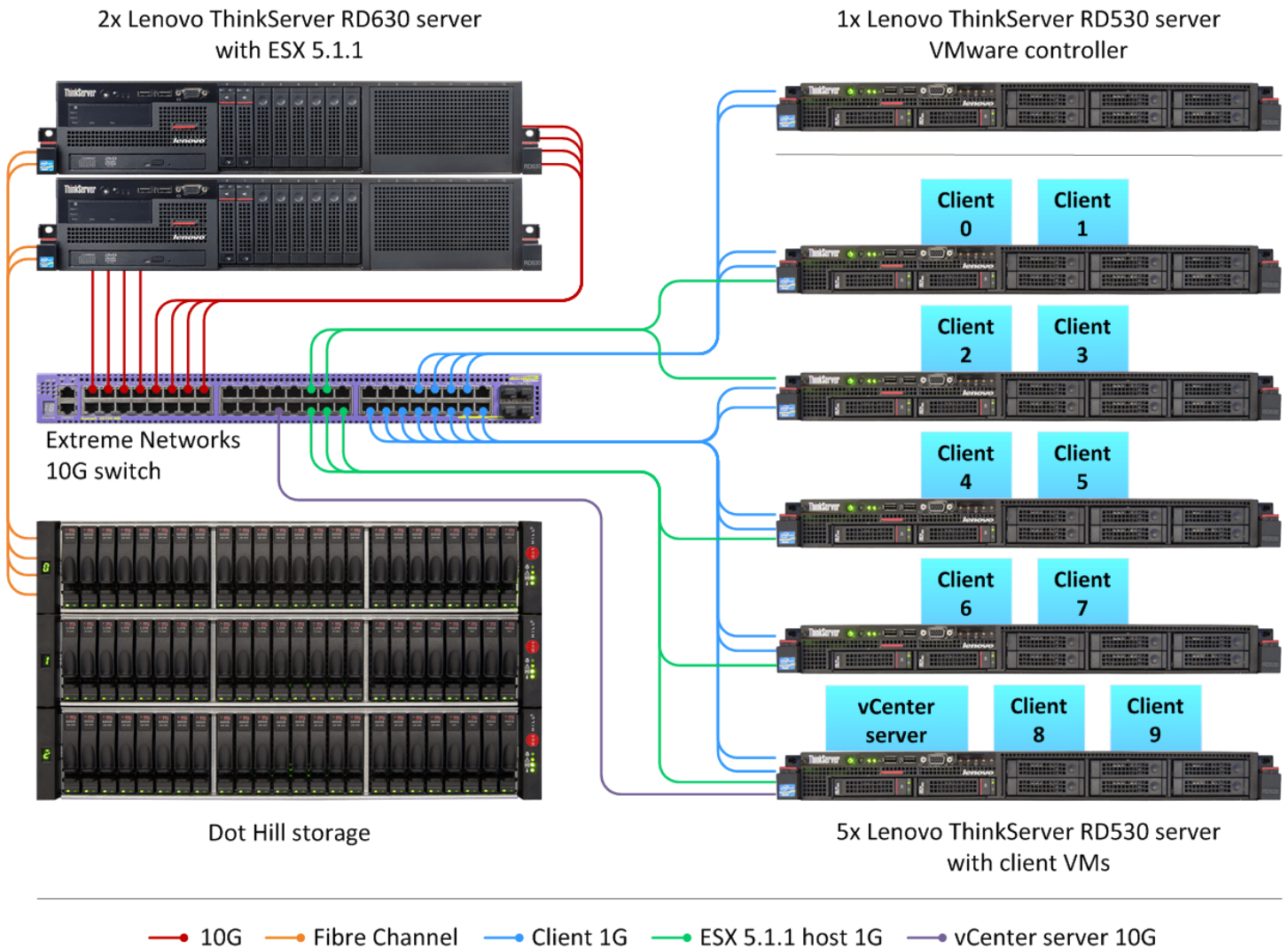


Figure 3: Our test bed setup.

APPENDIX C – VMWARE VMMARK V2.5 RESULT FILE

One the following pages we have included a copy of the official VMware VMmark V2.5 result file. The original is online at the following location: <http://www.vmware.com/a/assets/vmmark/pdf/2013-06-11-PrincipledTechnologies-LenovoRD630.pdf>

VMware® VMmark® V2.5 Results

Vendor and Hardware Platform: Lenovo ThinkServer RD630
 Virtualization Platform: VMware ESXi 5.1.0 Build 1021289
 VMware vCenter Server : VMware vCenter Server 5.1.0 Build 947673

VMmark V2.5 Score =
11.17 @ 10 Tiles

Number of Hosts: 2	Uniform Hosts [yes/no]: yes	Total sockets/cores/threads in test: 4/32/64
Tested By: Principled Technologies, Inc.		Test Date: [06-05-2013]
Performance Section Performance	Configuration Section Configuration	Notes Section Notes for Workload

Performance

TILE_0	mailserver			olio			dvdstoreA			dvdstoreB			dvdstoreC			GM
	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	
p0	329.90	1.00	91.50	4749.75	1.02	91.76	3674.90	1.67	79.57	2680.55	1.77	62.64	2020.55	1.91	49.70	1.42
p1	324.73	0.98	94.00	4717.98	1.02	110.50	3559.00	1.62	85.39	2569.53	1.69	68.50	1855.85	1.75	51.73	1.37
p2	323.95	0.98	104.40	4711.85	1.02	136.14	3455.28	1.57	91.23	2560.18	1.69	75.67	1927.70	1.82	61.58	1.37
TILE_1	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	GM
p0	326.80	0.99	63.73	4739.65	1.02	79.02	3502.70	1.59	90.34	2435.78	1.60	75.87	1712.72	1.62	59.83	1.33
p1	323.30	0.98	64.00	4748.38	1.02	95.18	3429.47	1.56	94.07	2490.15	1.64	80.39	1766.53	1.67	64.16	1.34
p2	326.20	0.99	64.97	4721.25	1.02	116.20	3440.50	1.56	94.43	2378.35	1.57	80.03	1732.47	1.64	66.33	1.32
TILE_2	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	GM
p0	328.15	0.99	74.00	4765.68	1.03	84.22	3637.90	1.65	82.40	2578.80	1.70	67.67	1845.22	1.74	52.06	1.38
p1	328.10	0.99	74.00	4751.88	1.02	100.61	3415.30	1.55	94.86	2489.93	1.64	80.72	1868.67	1.77	66.03	1.36
p2	327.95	0.99	79.00	4717.55	1.02	119.28	3278.03	1.49	105.41	2319.75	1.53	92.70	1650.50	1.56	73.60	1.29
TILE_3	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	GM
p0	327.27	0.99	77.50	4762.70	1.03	83.32	3494.97	1.59	90.00	2553.68	1.68	76.41	1821.42	1.72	60.43	1.36
p1	319.45	0.97	74.00	4751.50	1.02	102.73	3479.55	1.58	90.96	2431.00	1.60	76.03	1810.40	1.71	61.02	1.34
p2	323.80	0.98	74.00	4726.93	1.02	111.55	3477.62	1.58	91.85	2493.15	1.64	80.41	1781.80	1.68	63.12	1.34
TILE_4	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	GM
p0	326.85	0.99	74.00	4738.45	1.02	88.41	3789.70	1.72	74.45	2779.57	1.83	64.24	2133.62	2.02	50.69	1.45
p1	325.98	0.99	74.00	4736.90	1.02	103.80	3723.88	1.69	77.93	2628.93	1.73	65.25	1984.38	1.88	51.74	1.41
p2	327.18	0.99	74.00	4716.50	1.02	113.73	3579.28	1.63	84.56	2586.32	1.70	74.42	1793.58	1.70	55.14	1.36
TILE_5	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	GM
p0	323.52	0.98	63.85	4729.23	1.02	104.55	3529.70	1.61	88.86	2440.85	1.61	75.77	1826.50	1.73	60.73	1.35

p1	324.85	0.98	64.00	4708.57	1.01	112.19	3485.25	1.58	90.78	2434.12	1.60	76.12	1722.40	1.63	59.35	1.33
p2	328.23	0.99	68.75	4702.93	1.01	124.40	3397.57	1.54	95.02	2594.53	1.71	81.58	1862.90	1.76	65.81	1.36
TILE_6	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	GM
p0	331.12	1.00	74.00	4747.18	1.02	92.30	3757.47	1.71	77.35	2641.82	1.74	64.62	1866.38	1.76	50.84	1.40
p1	325.73	0.99	74.00	4765.50	1.03	100.03	3612.20	1.64	84.63	2621.88	1.73	73.05	1866.15	1.76	58.08	1.38
p2	327.57	0.99	74.00	4738.00	1.02	105.51	3485.50	1.58	91.72	2508.72	1.65	79.19	1873.85	1.77	65.37	1.36
TILE_7	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	GM
p0	328.88	1.00	403.10	4754.15	1.02	82.48	3529.85	1.61	89.19	2419.93	1.59	76.86	1704.08	1.61	60.19	1.33
p1	327.70	0.99	244.93	4737.15	1.02	93.70	3443.82	1.57	93.67	2557.15	1.68	83.61	1834.15	1.73	67.46	1.36
p2	323.48	0.98	159.62	4731.25	1.02	116.18	3369.12	1.53	98.13	2327.43	1.53	83.10	1701.08	1.61	68.72	1.30
TILE_8	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	GM
p0	320.20	0.97	85.45	4736.32	1.02	97.11	3776.35	1.72	75.83	2836.68	1.87	67.83	2111.80	2.00	51.87	1.45
p1	323.10	0.98	84.00	4734.50	1.02	101.73	3681.30	1.67	81.13	2561.55	1.69	69.00	1938.50	1.83	54.30	1.39
p2	327.57	0.99	84.00	4711.18	1.02	125.54	3595.75	1.64	85.58	2472.90	1.63	73.86	1773.67	1.68	56.16	1.35
TILE_9	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	Actual	Ratio	QoS	GM
p0	329.27	1.00	88.12	4748.60	1.02	82.62	3865.10	1.76	71.82	2910.68	1.92	58.74	2199.80	2.08	47.74	1.48
p1	323.88	0.98	83.75	4747.12	1.02	93.15	3664.15	1.67	80.94	2616.30	1.72	65.97	1871.15	1.77	50.89	1.38
p2	327.45	0.99	84.00	4726.70	1.02	121.83	3298.62	1.50	104.88	2366.80	1.56	91.47	1680.97	1.59	73.33	1.30
p0_score:	13.95															
p1_score:	13.65															
p2_score:	13.37															
Infrastructure_Operations_Scores:										vmotion		svmotion		deploy		
Completed_Ops_PerHour										18.50		12.00		5.00		
Avg_Seconds_To_Complete										14.84		15.87		309.95		
Failures										0.00		1.00		0.00		
Ratio										1.16		1.33		1.25		
Number_Of_Threads										1		1		1		
Summary								Run_Is_Compliant				Turbo_Setting:0				
								Number_Of_Compliance_Issues(0)*				Median_Phase(p1)				
Unreviewed_VMmark2_Applications_Score								13.65								
Unreviewed_VMmark2_Infrastructure_Score								1.24								
Unreviewed_VMmark2_Score								11.17								

Configuration

Virtualization Software	
Hypervisor Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY)	VMware ESXi 5.1.0 Build 1021289 / 03-07-2013
Datacenter Management Software Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY)	VMware vCenter Server 5.1.0 Build 947673/ 12-20-2012
Supplemental Software	None
Servers	
Quantity	2
Server Manufacturer and Model	Lenovo ThinkServer RD630
Processor Vendor and Model	Intel Xeon E5-2690
Processor Speed (GHz)	2.9
Total Sockets/Total Cores/Total Threads	2 Sockets / 16 Cores / 32 Threads
Primary Cache	32KB I+ 32KB D on chip per core
Secondary Cache	256KB I+D on chip per core
Other Cache	20MB I+D on chip per chip L3
BIOS Version	2.10
Memory Size (in GB, Number of DIMMs)	256GB, 16
Memory Type and Speed	16GB DIMMs 2Rx4 DDR3-1600MHz Registered ECC
Disk Subsystem Type	FC SAN
Number of Disk Controllers	1
Disk Controller Vendors and Models	LSI MegaRAID SAS 9260-8i
Number of Host Bus Adapters	1 dual-port
Host Bus Adapter Vendors and Models	Emulex LPe12002 8Gbps FC HBA
Number of Network Controllers	4
Network Controller Vendors and Models	Intel 1Gbps dual-port I350 adapter (embedded), Intel 1Gbps single-port 82574L adapter (embedded, shared management), 2 x Intel 10Gbps dual-port X540-T2 adapter
Other Hardware	None
Other Software	VMware ESXi 5.1 Driver for Emulex Fibre Channel HBAs and FCoE UCNAs version 8.2.4.146.59, ESXi 5.x driver package version 3.14.3 for Intel ixgbe

Hardware Availability Date (MM-DD-YYYY)	06-05-2012
Software Availability Date (MM-DD-YYYY)	03-07-2013
Network	
Network Switch Vendors and Models	1 x Extreme Networks Summit X670V-48t 48 Port 10 GbE Copper Switch
Network Speed	1Gbps for SUT management and clients, 10Gbps for all VMs, VMotion and vCenter Server
Storage	
Array Vendors, Models, and Firmware Versions	1 x Dot Hill AssuredSAN Pro 5720, Firmware version CS100P002-02
Fibre Channel Switch Vendors and Models	None
Disk Space Used	3193GB
Array Cache Size	8GB (4GB per controller)
Total Number of Physical Disks Used	20
Total Number of Enclosures/Pods/Shelves Used	3
Number of Physical Disks Used per Enclosure/Pod/Shelf	Two enclosures with 4 (200GB SSDs), One enclosure with 8 (200GB SSDs)
Total Number of Storage Groups Used	2
Number of LUNs Used	14
LUN Size and Number of Disks Per LUN	Details in section Storage Notes
RAID Type	Details in section Storage Notes
Number of Members per RAID Set	Details in section Storage Notes
Disk Vendors, Models, and Speeds	<ul style="list-style-type: none"> • 16 x Hitachi MUSML4040ASS600, SSD • 4 x Seagate ST9300653SS, 300GB 15k RPM SAS
Datacenter Management Server	
System Model	Lenovo ThinkServer RD530
Processor Vendor and Model	Intel Xeon E5-2640
Processor Speed (GHz)	2.50
Total Sockets/Total Cores/Total Threads	2 Sockets / 6 Cores / 12 Threads

Memory	64GB
Network Controller(s) Vendors and Models	Intel 1Gbps dual port I350 adapter (embedded), Intel 1Gbps single port 82574L adapter (embedded, shared management), Intel 10Gbps dual port X540-T2 adapter
Operating System, Version, Bitness, and Service Pack	VMware ESXi 5.1.0 Build 1021289 (Windows Server 2008 R2 Enterprise 64-bit for VM)
Other Hardware	None
Other Software	None
Clients	
Total Number of Clients / Total Physical Clients / Total Virtual Client Hosts	11 / 1 / 5
System Model(s)	Lenovo ThinkServer RD530
Processor Vendor(s) and Model(s)	Intel Xeon E5-2640
Processor Speed(s) (GHz)	2.50
Total Sockets/Total Cores/Total Threads	2 Sockets / 6 Cores / 2 Threads
Memory per Physical Client	64GB
Network Controller(s) Vendors and Models	Intel 1Gbps dual port I350 adapter (embedded), Intel 1Gbps single port 82574L adapter (embedded, shared management), Intel 10Gbps dual port X540-T2 adapter (installed in only one client)
Operating System, Version, Bitness, and Service Pack	<ul style="list-style-type: none"> • Microsoft Windows Server 2008 R2 Enterprise 64-bit (prime client) • VMware ESXi 5.1.0 Build 1021289 (virtual client hosts) • Microsoft Windows Server 2008 R2 Enterprise 64-bit (virtual client)
Number of Virtual Clients	10
Number of vCPUs Per Virtual Client	4
Number of vMem (GB) Per Virtual Client	4GB
Virtual Client Networking Notes	All clients had a dedicated 1Gbps vSwitch
Virtual Client Storage Notes	All clients stored on virtual client hosts' two disk RAID 1 volume
Other Hardware	None
Other Software	None

Notes for Workload

Virtualization Software Notes

- Virtual hardware for all VMs was set to V9
- Ethernet adapter type set to vmxnet3 for all VMs (default vmxnet2)
- CD and floppy were removed from all VMs (default attached)
- Logging was disabled for all VMs (default enabled)
- All Linux and Mailserver VMs configured as single virtual socket with multiple cores (default one core per multiple virtual sockets)
- SCSI adapter type PVSCSI used for all Standby VMs (default LSI Logic parallel)
- SCSI adapter type PVSCSI used for all MailServer and Linux VMs (default LSI Logic SAS)
- Power management set to High performance in OS on Standby and Mailserver VMs (default balanced)
- Firewall was disabled in all console OS (default enabled)
- Old VMware tools installed on all OlioWeb-VMs (Build 9216 instead of 9217)
- /adv/Cpu/CoschedCrossCall = 0 (default 1)
- /adv/Cpu/HTWholeCoreThreshold = 0 (default 200)
- /adv/DataMover/HardwareAcceleratedInit = 0 (default 1)
- /adv/DataMover/HardwareAcceleratedMove = 0 (default 1)
- /adv/Mem/BalancePeriod = 0 (default 15)
- /adv/Mem/SamplePeriod = 0 (default 60)
- /adv/Mem/ShareScanGHz = 0 (default 4)
- /adv/Misc/TimerMaxHardPeriod = 4000 (default 100000)
- /adv/Misc/TimerMinHardPeriod = 2000 (default 30)
- /adv/Net/MaxNetifRxQueueLen = 500 (default 100)
- /adv/Net/MaxNetifTxQueueLen = 1000 (default 500)
- /adv/Net/NetTxCompletionWorldlet = 0 (default 1)
- /adv/Irq/IRQRebalancePeriod = 20000 (default 50)
- /adv/Irq/BestVcpuRouting = 1 (default 0)
- /adv/Numa/LTermFairnessInterval = 0 (default 5)
- /adv/Numa/PreferHT = 1 (default 0)
- /adv/Numa/MonMigEnable = 0 (default 1)
- /adv/Numa/PageMigEnable = 0 (default 1)
- /adv/Numa/RebalancePeriod = 60000 (default 2000)
- /adv/Numa/SwapLoadEnable = 0 (default 1)
- /adv/Numa/SwapLocalityEnable = 0 (default 1)
- /vmkernel/module/lpfc820.o/options = "lpfc_lun_queue_depth=64 lpfc_cr_count=3 lpfc_cr_delay=1" (default 30,1,0)
- /vmkernel/module/ixgbe/options = 'VMDQ=16,16,16,16 InterruptThrottleRate=2000,2000,2000,2000 InterruptType=2,2,2,2' (default 8,16000,2)

Server Notes

- CPU C6 Report disabled (default enabled)
- Package C state limit set to C0 (default no limit)

Networking Notes

- vSwitch Configuration:
- vSwitch0 on vmnic2 for Service Console (1Gb)
- vSwitch1 on vmnic3 (10Gb) for all Standby, Mail and Deploy VMs
- vSwitch2 on vmnic4 (10Gb) for all Olio VMs
- vSwitch3 on vmnic6 (10Gb) for all DS2 VMs
- vSwitch4 on vmnic5 (10Gb) for VMotion

Storage Notes

- ESX was installed on a two-disk RAID 1 volume from the internal 300GB SAS hard drives in each system under test
- The 16 SSDs were configured into eight two-disk RAID 1 vdisks
- The eight vdisks were configured into two storage pools (four vdisks per storage pool, with two SSDs per vdisk, for a total of 8 SSDs per storage pool)
- One storage pool was mapped to each controller (Storage pool 1 mapped to controller 1 and storage pool 2 mapped to controller 2)
- Storage pool 1 on controller 1:
 - 1 LUN at 10GB, for Deploy Template
 - 1 LUN at 55GB, containing all Standby VMs
 - 1 LUN at 90GB, containing OlioDB0, OlioDB1, OlioDB2, OlioDB3, OlioDB4 VMs
 - 1 LUN at 470GB, containing OlioWeb0 OlioWeb1 OlioWeb2 OlioWeb3 OlioWeb4 VMs
 - 1 LUN at 270GB, containing DS2DB0, DS2DB1, DS2DB2, DS2DB3, DS2DB4 VMs
 - 1 LUN at 270GB, containing DS2WebA,B,C0, DS2WebA,B,C1, DS2WebA,B,C2, DS2WebA,B,C3, DS2WebA,B,C4 VMs
 - 1 LUN at 445GB, containing Mailserver0, Mailserver1, Mailserver2, Mailserver3, Mailserver4 VMs
- Storage pool 2 on controller 2:
 - 1 LUN at 10GB, for Deploy Target
 - 1 LUN at 55GB, for Standby Source
 - 1 LUN at 90GB, containing OlioDB5, OlioDB6, OlioDB7, OlioDB8, OlioDB9 VMs
 - 1 LUN at 470GB, containing OlioWeb5 OlioWeb6 OlioWeb7 OlioWeb8 OlioWeb9 VMs
 - 1 LUN at 270GB, containing DS2DB5, DS2DB6, DS2DB7, DS2DB8, DS2DB9 VMs
 - 1 LUN at 270GB, containing DS2WebA,B,C5, DS2WebA,B,C6, DS2WebA,B,C7, DS2WebA,B,C8, DS2WebA,B,C9 VMs
 - 1 LUN at 445GB, containing Mailserver5, Mailserver6, Mailserver7, Mailserver8, Mailserver9 VMs

Datacenter Management Server Notes

The Datacenter Management Server was a virtual machine configured with 4 vCPU and 16GB RAM on physical client 6.

Operating System Notes

All Mailservers ran Microsoft Windows Server 2008 R2 Enterprise 64-bit

Software Notes

None

Client Notes

- Microsoft Windows Server 2008 R2 Enterprise 64-bit installed on client virtual machines and updated through Windows Update
- Prime client was running Microsoft Windows Server 2008 R2 Enterprise 64-bit and VMware vSphere PowerCLI 5.1.0 R2 build 1012425
- All clients ran as virtual machines that were each defined with 4 virtual CPUs, 4GB of memory, 1 vmxnet3 network, and 60GB of disk space
- Prime client ran on physical client 1
- Virtual clients 0, and 1 were hosted on physical client 2
- Virtual clients 2 and 3 were hosted on physical client 3
- Virtual clients 4 and 5 were hosted on physical client 4
- Virtual clients 6 and 7 were hosted on physical client 5
- Virtual clients 8 and 9 were hosted on physical client 6
- Clients ran with default ESX settings

Other Notes

None

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