VMmark® 3.0 Results

Vendor and Hardware Platform: HPE ProLiant DL380 Gen9 Virtualization Platform: VMware ESXi 6.5.0 Build 4564106 VMware vCenter Server : VMware vCenter Server 6.5.0 Build 4602587	VMmark 3.0 Score = 5.88 @ 6 Tiles

Number of Hosts: 2	Uniform Hosts [yes/no]: yes	Total sockets/cores/threads in test: 4/88/176

Tested By: Hewlett Packard Enterprise	Test Date: 06-15-2017

Performance Section Performance	Configuration Section Configuration	Notes Section Notes for Workload

Performance

	weathervane			weathervaneE			dvdstoreA			dvdstoreB			dvdstoreC			
TILE_0	Actual	Ratio	QoS(nRT|MaxPctF)	Actual	Ratio	QoS(nRT|MaxPctF)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	GM
p0	3595.50	1.00	0.49 | 0.00	571.89	1.00	1.18 | 0.89	919.95	1.25	922.57	637.95	1.27	1099.80	461.15	1.33	1234.22	1.16
p1	3598.13	1.00	0.46 | 0.00	571.61	1.00	1.05 | 0.86	934.42	1.27	891.33	648.50	1.30	1044.05	447.05	1.29	1195.32	1.16
p2	3592.92	1.00	0.48 | 0.00	571.82	1.00	1.12 | 0.84	923.98	1.26	909.53	667.25	1.33	1065.23	484.62	1.40	1191.15	1.19
TILE_1	Actual	Ratio	QoS(nRT|MaxPctF)	Actual	Ratio	QoS(nRT|MaxPctF)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	GM
p0	3594.14	1.00	0.46 | 0.00	572.44	1.00	1.19 | 0.86	931.55	1.27	909.95	636.15	1.27	1110.95	432.60	1.25	1293.28	1.15
p1	3596.79	1.00	0.47 | 0.00	571.58	1.00	1.07 | 0.94	925.55	1.26	910.89	666.35	1.33	1065.37	462.32	1.33	1214.43	1.17
p2	3597.89	1.00	0.44 | 0.00	572.30	1.00	0.96 | 0.88	929.00	1.27	913.08	638.02	1.27	1104.60	456.55	1.32	1256.07	1.16
TILE_2	Actual	Ratio	QoS(nRT|MaxPctF)	Actual	Ratio	QoS(nRT|MaxPctF)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	GM
p0	3594.21	1.00	0.40 | 0.00	571.06	1.00	1.18 | 0.83	939.67	1.28	867.77	649.05	1.30	1027.24	447.93	1.29	1165.83	1.16
p1	3596.68	1.00	0.42 | 0.00	570.53	1.00	1.01 | 0.85	919.88	1.25	918.30	660.73	1.32	1081.39	485.68	1.40	1194.59	1.18
p2	3598.57	1.00	0.39 | 0.00	572.66	1.00	0.98 | 0.83	925.75	1.26	897.57	643.25	1.29	1061.58	443.70	1.28	1211.62	1.16
TILE_3	Actual	Ratio	QoS(nRT|MaxPctF)	Actual	Ratio	QoS(nRT|MaxPctF)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	GM
p0	3603.38	1.00	0.48 | 0.00	571.35	1.00	1.17 | 0.92	932.88	1.27	879.98	673.38	1.35	1023.18	469.48	1.35	1163.81	1.18
p1	3597.29	1.00	0.48 | 0.00	571.75	1.00	1.03 | 0.76	926.02	1.26	897.98	641.67	1.28	1065.86	468.32	1.35	1189.01	1.17
p2	3590.90	1.00	0.50 | 0.00	571.69	1.00	0.89 | 0.98	933.58	1.27	883.52	645.95	1.29	1054.96	447.12	1.29	1197.43	1.16
TILE_4	Actual	Ratio	QoS(nRT|MaxPctF)	Actual	Ratio	QoS(nRT|MaxPctF)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	GM
p0	3598.31	1.00	0.47 | 0.00	572.76	1.00	1.10 | 0.75	923.73	1.26	911.00	693.45	1.39	1050.26	490.05	1.41	1166.15	1.20
p1	3594.23	1.00	0.50 | 0.00	571.42	1.00	1.01 | 0.80	941.20	1.28	854.98	632.75	1.26	1016.18	452.12	1.30	1145.62	1.16
p2	3592.89	1.00	0.48 | 0.00	572.15	1.00	1.22 | 0.77	928.02	1.26	892.98	671.08	1.34	1040.22	468.20	1.35	1179.96	1.18
TILE_5	Actual	Ratio	QoS(nRT|MaxPctF)	Actual	Ratio	QoS(nRT|MaxPctF)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	GM
p0	3602.41	1.00	0.43 | 0.00	570.42	1.00	1.18 | 0.83	930.70	1.27	903.66	662.08	1.32	1077.90	463.60	1.34	1207.71	1.17
p1	3594.67	1.00	0.43 | 0.00	571.42	1.00	0.99 | 0.87	935.52	1.27	874.12	628.20	1.26	1053.33	447.73	1.29	1182.52	1.16
p2	3596.52	1.00	0.46 | 0.00	572.05	1.00	0.99 | 0.96	916.65	1.25	934.50	657.35	1.31	1082.46	485.68	1.40	1194.76	1.18

p0_score:	7.03
p1_score:	7.00

p2_score:	7.03

Infrastructure_Operations_Scores:	vMotion	SVMotion	XVMotion	Deploy
Completed_Ops_PerHour	28.00	28.00	21.00	11.50
Avg_Seconds_To_Complete	6.16	74.88	103.35	272.29
Failures	0.00	0.00	0.00	0.00
Ratio	1.08	1.56	1.17	1.44
Number_Of_Threads	1	1	1	1

Summary	Run_Is_Compliant		Turbo_Setting:0
	Number_Of_Compliance_Issues(0)*		Median_Phase(p2)
Unreviewed_VMmark3_Applications_Score	7.03		
Unreviewed_VMmark3_Infrastructure_Score	1.29		
Unreviewed_VMmark3_Score	5.88		

Configuration

Virtualization Software	
Hypervisor Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY)	VMware ESXi 6.5.0 Build 4564106/11-18-2016
Datacenter Management Software Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY)	VMware vCenter Server 6.5.0 Build 4602587/11-15-2016
Supplemental Software	none
Servers	
Number of Servers in System Under Test (all subsequent fields in this section are per server)	2
Server Manufacturer and Model	HPE ProLiant DL380 Gen9
Processor Vendor and Model	Intel Xeon E5-2699A v4
Processor Speed (GHz)	2.4
Total Sockets/Total Cores/Total Threads	2 Sockets / 44 Cores / 88 Threads
Primary CPU Cache	32KB I + 32KB D on chip per core
Secondary CPU Cache	256KB I + D on chip per core
Other CPU Cache	55MB I + D on chip per chip L3
BIOS Version	P89 v2.40 (02/17/2017)
Memory Size (in GB, Number of DIMMs)	512, 16
Memory Type and Speed	32GB 2Rx4 DDR4 2400MHz RDIMM
Disk Subsystem Type	FC SAN

Number of Disk Controllers	1
Disk Controller Vendors and Models	HPE Smart Array P440ar
Total Number of Physical Disks for Hypervisor	2
Disk Vendors, Models, Capacities, and Speeds	HPE VO0480JFDGT, 480GB SATA 6G SSD
Number of Host Bus Adapters	2
Host Bus Adapter Vendors and Models	HP StoreFabric SN1000Q 16Gb 2P FC HBA
Number of Network Controllers	2
Network Controller Vendors and Models	HPE Ethernet 10Gb 2-port 562SFP+ Adapter; HPE Ethernet 1Gb 4-port 366FLR Adapter
Other Hardware	none
Other Software	none
Hardware Availability Date (MM-DD-YYYY)	11/01/2016
BIOS Availability Date (MM-DD-YYYY)	02/17/2017
Software Availability Date (MM-DD-YYYY)	11/18/2016
Network	
Network Switch Vendors and Models	1 x HPE 5900AF 48XG 4QSFP+ switch
Network Speed	10Gb
Storage	
Array Vendors, Models, and Firmware Versions	SanDisk ION Data Accelerator FW 2.5.0
Fibre Channel Switch Vendors and Models	1 x HPE SN3000B 16Gb 24/24 Active FC switch 1 x HPE SN6000B 16Gb 48/48 Active FC switch
Disk Space Used	25,740 TB
Array Cache Size	N/A
Total Number of Physical Disks Used	14 (2 per SUT OS, 2 for Fusion ION OS per storage system), 15 x PCIe flash
Total Number of Enclosures/Pods/Shelves Used	5
Number of Physical Disks Used per Enclosure/Pod/Shelf	Internal: 2 Disk per host Enclosure: 2 disks and 3 x PCIe flash (5 total)
Total Number of Storage Groups Used	0
Number of LUNs Used	38
LUN Size and Number of Disks Per LUN	Details in note
RAID Type	RAID 1 for OS drives RAID 0 for enclosures
Number of Members per RAID Set	RAID 1: 2 RAID 0: 1
Disk Vendors, Models, and Speeds	10 x HP 450GB 15K RPM SAS SFF 4 x HPE 480GB SATA 6G SSD 15 x HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator
Datacenter Management Server	
System Model	HPE ProLiant DL360 Gen9
Processor Vendor and Model	Intel Xeon E5-2680 v3
Processor Speed (GHz)	2.5
Total Sockets/Total Cores/Total Threads	2 Sockets / 24 Cores / 48 Threads
Memory Size (in GB, Number of DIMMs)	256, 24

Network Controller(s) Vendors and Models	HPE Ethernet 10Gb 2-port 562SFP+ Adapter; HPE Ethernet 1Gb 4-port 366FLR Adapter
Operating System, Version, Bitness, and Service Pack	VMware ESXi 6.5.0 Build 4564106
Virtual Center VM Number of vCPUs	8
Virtual Center VM Virtual Memory (in GB)	24
Virtual Center VM Operating System, Version, Bitness, and Service Pack	VMware vCenter Server Appliance 6.5 Build 4602587
Other Hardware	none
Other Software	none

Clients	
Total Number of Virtual Clients / Virtual Client Hosts	7/4
System Model(s)	HPE ProLiant DL360 Gen9
Processor Vendor(s) and Model(s)	Intel Xeon E5-2680 v3
Processor Speed(s) (GHz)	2.5
Total Sockets/Total Cores/Total Threads	2 Sockets / 24 Cores / 48 Threads
Memory per Virtual Client Host	256
Network Controller(s) Vendors and Models	HPE Ethernet 10Gb 2-port 562SFP+ Adapter
Virtual Client Networking Notes	1 virtual adapter for management, 1 virtual adapter for workload traffic
Virtual Client Storage Notes	1 x HPE MSA 2040 SAN Storage contains 2 x MO0400JFFCF 400GB SSD SAS 12Gbps and 20 x EH0600JEDHE 600GB SAS 15K HDD Configured 2 LUNs 2.73TB each
Other Hardware	HP StoreFabric SN1000Q 16Gb 2P FC HBA
Other Software	VMware ESXi 6.5.0 Build 4564106

Notes for Workload

Virtualization Software Notes

- Logging was disabled for all VMs (default enabled)

- CD & floppy devices were removed on all VMs (default enabled)

- Logical CPU layout changed for all multi-cpu VMs to 1 socket with multiple cores. (default Single core per socket)

- All DS3DB VMs had CPU and memory share set to High (default Normal)

- All memory reserved for DS3DB VMs

- Cluster DRS Automation Level set to Fully Automated, DrsMigrationThreshold set to level 2

Advanced Settings:

- Config.HostAgent.log.level = warning (default info)
- ESXi CPU power policy set to static

Server Notes

Server BIOS settings:

- HP Power Profile set to Maximum Performance (default: Balanced Power and Performance)

- Thermal Configuration set to Maximum Cooling (default: Optimal Cooling)

- Intel Turbo Boost Enabled (frequency boost to 3.6 GHz) (default: Enabled)

Networking Notes

- vSwitch Configuration:

    o vSwitch0 for the Service Console on vmnic0 at 1Gb/s

    o vSwitch1 defined as vmkernel vMotion connection on vmnic4 at 10Gb/s, 9000 MTU

    o vSwitch2 for the DS3 and standby workload on vmnic5 at 10Gb/s

    o vSwitch3 for the Auction workload on vmnic6 at 10Gb/s

    o vSwitch4 for the Elastic workload on vmnic7 at 10Gb/s

- Assignment of VMs:

    o vSwitch2: all DS3 workload VMs

    o vSwitch3: all Auction workload VMs

    o vSwitch4: all Elastic workload VMs

Storage Notes

- ION OS was installed on two disks configured as RAID1 in the internal server storage bay

- All LUNs were configured as block devices and no system memory was used for write caching

- Storage box #1

    o Hardware Configuration

        ▪ HP ProLiant DL380p Gen9

            ▪ 2 x Intel Xeon E5-2660 2.0 GHz processors

            ▪ 256GB Memory (16 x 16 GB DIMMs dual rank 2400MHz DDR4)

            ▪ 3 x HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator

            ▪ 2 x HP SN1000Q 16Gb 2P FC HBA

            ▪ 1 x HPE Smart Array P440ar controller for ION OS

            ▪ 2 x 450GB 15K RPM SAS HDD SFF for ION OS

            ▪ SanDisk ION Accelerator version 2.5.5

    o Software Configuration

- Storage Pools were created using Direct Access storage profile
  - one storage pool per device
  - total of 3 storage pools
- RAID0 volume were created and used for each storage pool
  - Total: 6 volumes
  - each volume was exported as LUN
- HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator #1
  - Storage Pool #1, Volume #1, LUN #1
  - Storage Pool #1, Volume #2, LUN #2
- HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator #2
  - Storage Pool #2, Volume #3, LUN #3
  - Storage Pool #2, Volume #4, LUN #4
- HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator #3
  - Storage Pool #3, Volume #5, LUN #5
  - Storage Pool #3, Volume #6, LUN #6
- LUN/VM layout
  - LUN1: DS3DB1 VM
  - LUN2: DS3DB2 VM
  - LUN3: DS3DB3 VM
  - LUN4: DS3DB4 VM
  - LUN5: DS3DB5 VM
  - LUN6: vmmark3-template-053117
- Storage box #2
  - Hardware Configuration
    - HP ProLiant DL380p Gen9
      - 2 x Intel Xeon E5-2660 2.0 GHz processors
      - 256GB Memory (16 x 16GB DIMMs dual rank 2400MHz DDR4)
      - 3 x HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator
      - 2 x HP SN1000Q 16Gb 2P FC HBA

- 1 x HPE Smart Array P440ar controller for ION OS
- 2 x 450GB 15K RPM SAS HDD SFF for ION OS
- SanDisk ION Accelerator version 2.5.5

o Software Configuration

- Storage Pools were created using Direct Access storage profile
  - one storage pool per device
  - total of 3 storage pools
- RAID0 volumes were created and used for each storage pool
  - Total: 12 volumes
  - each volume was exported as LUN
- HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator #1
  - Storage Pool #1, Volume #1, LUN #1
  - Storage Pool #1, Volume #2, LUN #2
  - Storage Pool #1, Volume #3, LUN #3
- HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator #2
  - Storage Pool #2, Volume #4, LUN #4
  - Storage Pool #2, Volume #5, LUN #5
  - Storage Pool #2, Volume #6, LUN #6
  - Storage Pool #2, Volume #7, LUN #7
- HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator #3
  - Storage Pool #3, Volume #8, LUN #8
  - Storage Pool #2, Volume #9, LUN #9
  - Storage Pool #2, Volume #10, LUN #10
  - Storage Pool #3, Volume #11, LUN #11
  - Storage Pool #3, Volume #12, LUN #12

o LUN/VM layout

- LUN1: DS3DB0
- LUN2: DS3Web* for tile0, tile1, tile2, tile3
- LUN3: SVmotion

- LUN4: AuctionLB*, AuctionWeb*, AuctionApp* for tile0, tile1

- LUN5: AuctionMSQ for tile0-tile5

- LUN6: AuctionNoSQL0

- LUN7: Deploy LUN

- LUN8: AuctionDB for tile0-tile5

- LUN9: ElasticDB0

- LUN10: ElasticLB0, ElasticWeb*, ElasticApp* for tile0

- LUN11: Standby for tile0-tile5

- LUN12: XVmotion

- Storage box #3

  - Hardware Configuration

    - HP ProLiant DL380p Gen9

      - 2 x Intel Xeon E5-2660 2.0 GHz processors

      - 128GB Memory (16 x 8GB DIMMs dual rank 2133MHz DDR4)

      - 3 x HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator

      - 2 x HP SN1000Q 16Gb 2P FC HBA

      - 1 x HPE Smart Array P440ar controller for ION OS

      - 2 x 450GB 15K RPM SAS HDD SFF for ION OS

      - SanDisk ION Accelerator version 2.5.5

  - Software Configuration

    - Storage Pools were created using Direct Access storage profile

      - one storage pool per device

      - total of 3 storage pools

    - RAID0 volumes were created and used for each storage pool

      - Total: 12 volumes

      - each volume was exported as LUN

    - HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator #1

      - Storage Pool #1, Volume #1, LUN #1

      - Storage Pool #1, Volume #2, LUN #2

- Storage Pool #1, Volume #3, LUN #3
- HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator #2
  - Storage Pool #2, Volume #4, LUN #4
  - Storage Pool #2, Volume #5, LUN #5
  - Storage Pool #2, Volume #6, LUN #6
  - Storage Pool #2, Volume #7, LUN #7
  - Storage Pool #2, Volume #8, LUN #8
- HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator #3
  - Storage Pool #3, Volume #9, LUN #9
  - Storage Pool #3, Volume #10, LUN #10
  - Storage Pool #3, Volume #11, LUN #11
  - Storage Pool #3, Volume #12, LUN #12
- LUN/VM layout
  - LUN1: AuctionNoSQL1
  - LUN2: AuctionNoSQL4
  - LUN3: ElasticLB3
  - LUN4: AuctionNoSQL2
  - LUN5: AuctionNoSQL5
  - LUN6: ElasticWeb*, ElasticApp* for tile2 and tile3
  - LUN7: ElasticLB1
  - LUN8: ElasticLB4
  - LUN9: AuctionLB*, AuctionWeb*, AuctionApp* for tile2 and tile3
  - LUN10: AuctionNoSQL3
  - LUN11: ElasticLB2
  - LUN12: ElasticLB5
- Storage box #4
  - Hardware Configuration
    - HP ProLiant DL380p Gen9
      - 2 x Intel Xeon E5-2660 2.0 GHz processors

- 128GB Memory (16 x 8GB DIMMs dual rank 2133MHz DDR4)
- 3 x HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator
- 2 x HP SN1000Q 16Gb 2P FC HBA
- 1 x HPE Smart Array P440ar controller for ION OS
- 2 x 450GB 15K RPM SAS HDD SFF for ION OS
- SanDisk ION Accelerator version 2.5.5

- o Software Configuration
  - Storage Pool were created using Maximum Performance profile
    - one storage pool for all devices
  - RAID0 volumes were created and used
    - Total: 3 volumes
    - each volume was exported as LUN
    - Storage Pool #1, Volume #1, LUN #1
    - Storage Pool #1, Volume #2, LUN #2
    - Storage Pool #1, Volume #3, LUN #3

- o LUN/VM layout
  - LUN1: AuctionLB*, AuctionWeb*, AuctionApp* for tile4 and tile5
  - LUN2: Standby*, DS3Web*, DS3App* for tile4 and tile5
  - LUN3: ElasticLB*, ElasticWeb*, ElasticApp* for tile4 and tile5

- Storage box #5
  - o Hardware Configuration
    - HP ProLiant DL380p Gen9
      - 2 x Intel Xeon E5-2660 2.0 GHz processors
      - 128GB Memory (16 x 8GB DIMMs dual rank 2133MHz DDR4)
      - 3 x HP 2.6TB HH/HL Light Endurance (LE) PCIe Workload Accelerator
      - 2 x HP SN1000Q 16Gb 2P FC HBA
      - 1 x HPE Smart Array P440ar controller for ION OS
      - 2 x 450GB 15K RPM SAS HDD SFF for ION OS
      - SanDisk ION Accelerator version 2.5.5

- Software Configuration

  - Storage Pool were created using Maximum Performance profile

    - one storage pool for all devices

  - RAID0 volumes were created and used

    - Total: 5 volumes

    - each volume was exported as LUN

    - Storage Pool #1, Volume #1, LUN #1

    - Storage Pool #1, Volume #2, LUN #2

    - Storage Pool #1, Volume #3, LUN #3

    - Storage Pool #1, Volume #4, LUN #4

    - Storage Pool #1, Volume #5, LUN #5

- LUN/VM layout

  - LUN1: ElasticDB1

  - LUN2: ElasticDB2

  - LUN3: ElasticDB3

  - LUN4: ElasticDB4

  - LUN5: ElasticDB5

Datacenter Management Server Notes

- HPE ProLiant DL360 G9 running ESXi 6.5.0 with vCenter Server Appliance 6.5 for SUT and client hosts.

  - 8 vCPUs

  - 24GB virtual memory

  - vCenter Server 6.5.0 Build 4602587

Operating System Notes

VMware ESXi 6.5 Build 4564106 was installed using 'HPE Custom Image for VMware ESXi 6.5' named VMware-ESXi-6.5.0-OS-Release-4564106-HPE-650.9.6.0.28-Nov2016.iso

Software Notes

None

Client Notes

- PrimeClient was deployed on to one of the 4 x DL360 Gen9 used for client hosts

- Client host1: Client0, Client4

- Client host2: Client1, PrimeClient

- Client host3: Client2, Client5

- Client host4: Client3

Other Notes

This is a full disclosure report for a VMmark® benchmark result. All published VMmark results must be from fully-compliant tests for which a full disclosure report is publicly available.

For information about VMmark and the rules regarding its usage visit www.vmware.com/products/vmmark.

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