

# VMmark 3.0 Results

**Vendor and Hardware Platform: HPE ProLiant DL380 Gen10**  
**Virtualization Platform: VMware ESXi 6.7 EP 03 Build 9484548**  
**VMware vCenter Server : VMware vCenter Server 6.7 U1 Build 10244745**

**VMmark 3.0 Score =**  
**8.36 @ 9 Tiles**

**Number of Hosts: 4**

**Uniform Hosts [yes/no]: yes**

**Total sockets/cores/threads in test: 8/176/352**

**Tested By: World Wide Technology**

**Test Date: 01-26-2019**

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## Performance

	weathervane			weathervaneE			dvdstoreA			dvdstoreB			dvdstoreC			
<b>TILE_0</b>	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	GM
<b>p0</b>	3600.82	1.00	0.54   0.00	570.30	1.00	0.98   0.64	872.17	1.19	1026.83	604.23	1.21	1203.33	410.25	1.18	1378.71	1.11
<b>p1</b>	3599.89	1.00	0.55   0.02	572.87	1.00	0.73   0.53	842.90	1.15	1140.70	594.65	1.19	1346.51	430.23	1.24	1515.10	1.11
<b>p2</b>	3603.37	1.00	0.53   0.00	572.23	1.00	0.60   0.60	870.12	1.18	1049.87	591.85	1.18	1266.38	402.12	1.16	1443.41	1.10
<b>TILE_1</b>	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	GM
<b>p0</b>	3601.28	1.00	0.48   0.00	571.82	1.00	0.90   0.60	895.60	1.22	953.75	649.12	1.30	1105.38	450.25	1.30	1258.48	1.15
<b>p1</b>	3601.04	1.00	0.51   0.00	573.82	1.00	0.76   0.45	867.92	1.18	1080.12	592.27	1.18	1275.90	422.55	1.22	1454.30	1.11
<b>p2</b>	3594.68	1.00	0.49   0.00	573.59	1.00	0.68   0.51	890.85	1.21	980.98	611.73	1.22	1167.21	418.50	1.21	1340.05	1.12
<b>TILE_2</b>	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	GM
<b>p0</b>	3602.81	1.00	0.46   0.02	572.33	1.00	0.85   0.45	818.83	1.12	1216.81	575.75	1.15	1421.77	415.38	1.20	1604.88	1.09
<b>p1</b>	3601.70	1.00	0.46   0.00	572.18	1.00	0.65   0.37	843.90	1.15	1131.61	570.70	1.14	1342.74	393.77	1.14	1509.08	1.08
<b>p2</b>	3597.79	1.00	0.43   0.00	572.65	1.00	0.67   0.58	778.73	1.06	1380.36	541.58	1.08	1636.48	370.20	1.07	1842.59	1.04
<b>TILE_3</b>	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	GM
<b>p0</b>	3600.42	1.00	0.46   0.03	571.59	1.00	0.96   0.56	812.92	1.11	1298.52	537.33	1.07	1556.10	384.68	1.11	1760.42	1.06
<b>p1</b>	3594.88	1.00	0.45   0.00	572.62	1.00	0.88   0.65	822.30	1.12	1246.04	549.42	1.10	1505.92	374.20	1.08	1687.17	1.06
<b>p2</b>	3598.69	1.00	0.47   0.00	572.07	1.00	0.68   0.53	773.65	1.05	1442.33	529.60	1.06	1736.20	375.73	1.08	1981.93	1.04
<b>TILE_4</b>	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	GM

<b>p0</b>	3608.96	1.00	0.50   0.00	573.28	1.00	1.14   0.85	879.52	1.20	1000.08	603.12	1.21	1191.33	412.23	1.19	1357.26	1.12
<b>p1</b>	3594.21	1.00	0.57   0.13	572.70	1.00	0.92   0.65	862.90	1.18	1050.73	617.48	1.23	1224.36	428.12	1.23	1376.09	1.12
<b>p2</b>	3600.65	1.00	0.51   0.00	572.03	1.00	0.72   0.70	857.77	1.17	1081.19	584.85	1.17	1279.95	421.68	1.22	1442.26	1.11
<b>TILE_5</b>	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	GM
<b>p0</b>	3601.88	1.00	0.47   0.00	572.85	1.00	0.89   0.54	896.98	1.22	951.45	595.42	1.19	1127.76	420.93	1.21	1288.02	1.12
<b>p1</b>	3600.53	1.00	0.50   0.00	571.78	1.00	0.78   0.64	853.12	1.16	1096.65	608.77	1.22	1279.98	437.93	1.26	1456.92	1.12
<b>p2</b>	3602.39	1.00	0.49   0.10	571.11	1.00	0.57   0.55	867.25	1.18	1050.58	596.17	1.19	1250.68	406.07	1.17	1433.17	1.10
<b>TILE_6</b>	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	GM
<b>p0</b>	3600.66	1.00	0.51   0.00	572.55	1.00	0.89   0.51	851.85	1.16	1092.45	603.27	1.21	1285.74	421.02	1.21	1436.59	1.11
<b>p1</b>	3598.90	1.00	0.48   0.00	571.70	1.00	0.68   0.44	872.58	1.19	1004.78	601.67	1.20	1187.31	435.70	1.26	1328.74	1.12
<b>p2</b>	3595.75	1.00	0.48   0.00	572.52	1.00	0.58   0.36	870.35	1.19	1034.25	592.55	1.18	1235.81	409.10	1.18	1381.12	1.11
<b>TILE_7</b>	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	GM
<b>p0</b>	3600.60	1.00	0.49   0.00	571.28	1.00	0.97   0.62	843.77	1.15	1114.92	625.25	1.25	1287.03	437.18	1.26	1447.13	1.13
<b>p1</b>	3596.90	1.00	0.50   0.01	571.24	1.00	0.74   0.47	893.62	1.22	953.64	592.95	1.18	1139.20	424.48	1.22	1282.90	1.12
<b>p2</b>	3601.50	1.00	0.53   0.00	571.82	1.00	0.63   0.57	863.80	1.18	1047.35	617.65	1.23	1217.60	429.48	1.24	1372.20	1.12
<b>TILE_8</b>	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(nRT MaxPctF)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	Actual	Ratio	QoS(ms)	GM
<b>p0</b>	3603.06	1.00	0.52   0.00	570.59	1.00	1.04   0.75	825.08	1.12	1211.20	575.83	1.15	1454.75	398.88	1.15	1625.04	1.08
<b>p1</b>	3604.03	1.00	0.53   0.00	572.19	1.00	1.02   0.88	850.50	1.16	1104.85	559.12	1.12	1318.79	395.88	1.14	1512.03	1.08
<b>p2</b>	3604.61	1.00	0.51   0.09	573.62	1.00	0.73   0.76	787.05	1.07	1382.55	546.05	1.09	1630.49	393.02	1.13	1830.41	1.06
<b>p0_score:</b>	9.97															
<b>p1_score:</b>	9.94															
<b>p2_score:</b>	9.81															

<b>Infrastructure_Operations_Scores:</b>	vMotion	SVMotion	XVMotion	Deploy
<b>Completed_Ops_PerHour</b>	50.00	38.00	34.00	18.00
<b>Avg_Seconds_To_Complete</b>	17.74	149.17	168.01	365.62
<b>Failures</b>	0.00	0.00	0.00	0.00
<b>Ratio</b>	1.92	2.11	1.89	2.25
<b>Number_Of_Threads</b>	2	2	2	2

<b>Summary</b>	Run_Is_Compliant	Turbo_Setting:0
	Number_Of_Compliance_Issues(0)*	Median_Phase(p1)
<b>Unreviewed_VMmark3_Applications_Score</b>	9.94	

<b>Unreviewed_VMmark3_Infrastructure_Score</b>	2.04
<b>Unreviewed_VMmark3_Score</b>	8.36

## Configuration

<b>Virtualization Software</b>	
Hypervisor Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY)	VMware ESXi 6.7 EP03 Build 9484548 / 08-14-2018
Datacenter Management Software Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY)	VMware vCenter Server 6.7 U1 Build 10244745 / 10-16-2018
Supplemental Software	None
<b>Servers</b>	
Number of Servers in System Under Test (all subsequent fields in this section are per server)	4
Server Manufacturer and Model	HPE ProLiant DL380 Gen10
Processor Vendor and Model	Intel(R) Xeon(R) Gold 6152
Processor Speed (GHz)	2.1
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	1MB I+D on chip per core
Other CPU Cache	30.25MB I+D on chip per chip
BIOS Version	U30 v1.42
Memory Size (in GB, Number of DIMMs)	512, 16
Memory Type and Speed	32GB 2Rx4 DDR4 2666MHz RDIMM
Disk Subsystem Type	vSAN
Number of Disk Controllers	1
Disk Controller Vendors and Models	HPE Smart Array P408i-a SR Gen10
Total Number of Physical Disks for Hypervisor	1
Disk Vendors, Models, Capacities, and Speeds	HPE 480GB SATA RI SFF SC DS SSD (1) HPE 375GB NVME X4 WI SFF SCN DS SSD (4) HPE 2TB NVME X4 RI SFF SCN DS SSD (4)

Number of Host Bus Adapters	None
Host Bus Adapter Vendors and Models	None
Number of Network Controllers	4
Network Controller Vendors and Models	HPE Ethernet 10GB 2-Port 562SFP+ Adapter HPE Ethernet 10/25GB 2-Port 640SFP28 Adapter HPE Ethernet 10GB 2-Port 562FLR-SFP+ Adapter HPE 1Gb Ethernet 4-Port 331i Adapter
Other Hardware	None
Other Software	None
Hardware Availability Date (MM-DD-YYYY)	07-11-2017
BIOS Availability Date (MM-DD-YYYY)	09-27-2018
Software Availability Date (MM-DD-YYYY)	10-16-2018
<b>Network</b>	
Network Switch Vendors and Models	Cisco Catalyst 4948 10G Uplink Switch
Network Speed	48 x 10GbE ports
<b>Storage</b>	
Array Vendors, Models, and Firmware Versions	HPE ProLiant DL380 Gen10
Fibre Channel Switch Vendors and Models	None
Disk Space Used	29.11TB (VMware vSAN)
Array Cache Size	6TB (VMware vSAN)
Total Number of Physical Disks Used	Internal (OS): 4 Internal (VMware vSAN): 32
Total Number of Enclosures/Pods/Shelves Used	4
Number of Physical Disks Used per Enclosure/Pod/Shelf	10
Total Number of Storage Groups Used	0
Number of LUNs Used	0
LUN Size and Number of Disks Per LUN	LUNs used for NFS Storage - 1 x 475 GB LUN - 1 x 190 GB LUN
RAID Type	VMware vSAN: RAID 1 (default vSAN storage policy)
Number of Members per RAID Set	0
Disk Vendors, Models, and Speeds	OS: HPE 480GB SATA RI SFF SC DS SSD (P/N: 877746-B21) VMware vSAN (caching tier): HPE 375GB NVME X4 WI SFF SCN DS SSD (P/N: 878014-B21)

VMware vSAN (capacity tier): HPE 2TB NVME X4 RI SFF SCN DS SSD (P/N: 877986-B21)

### Datacenter Management Server

System Model	Dell PowerEdge R730
Processor Vendor and Model	Intel(R) Xeon(R) E5-2660 v3
Processor Speed (GHz)	2.6
Total Sockets/Total Cores/Total Threads	2 Sockets / 20 Cores / 40 Threads
Memory Size (in GB, Number of DIMMs)	3072,48
Network Controller(s) Vendors and Models	Intel X710 Dual Port 10Gb SFP+
Operating System, Version, Bitness, and Service Pack	VMware ESXi 6.7
Virtual Center VM Number of vCPUs	4
Virtual Center VM Virtual Memory (in GB)	16
Virtual Center VM Operating System, Version, Bitness, and Service Pack	VMware vCenter Server Appliance 6.7 U1, Build 10244857
Other Hardware	None
Other Software	None

### Clients

Total Number of Virtual Clients / Virtual Client Hosts	10 / 1
System Model(s)	Dell PowerEdge R940xa
Processor Vendor(s) and Model(s)	Intel(R) Xeon(R) Gold 6152
Processor Speed(s) (GHz)	2.1
Total Sockets/Total Cores/Total Threads	4 Sockets / 88 Cores / 176 Threads
Memory per Virtual Client Host	3072 GB
Network Controller(s) Vendors and Models	Intel Corporation 82599EB dual port 10-Gigabit SFI/SFP+ Network Adapter
Virtual Client Networking Notes	Intel 2P X520 / 2P I350 rDNC
Virtual Client Storage Notes	PERC H730
Other Hardware	None
Other Software	VMware ESXi 6.7 U1 Build 10302608

## Notes for Workload

None

## Virtualization Software Notes

- vSphere DRS Migration Threshold set to Fully Automated level 1

- EVC mode was enabled on all the SUT hosts

## Server Notes

### Server BIOS Settings

- HPE Workload Profile set to 'Virtualization - Max Performance' (default: General Power Efficient Compute)
- Intel Turbo Boost Enabled (frequency boost to 3.7GHz) (default: Enabled)

## Networking Notes

### vSwitch configuration

- vSwitch0 (vmk0) on Active adapters (vmnic0, vmnic1) for Management Network (1Gb/s, 1500 MTU)
- VsanSelect-DVS (vmk1) on Active adapters (vmnic8, vmnic9) on Active uplinks (Uplink 3, Uplink4) for VSAN (10Gb/s, 9000 MTU)
- VsanSelect-DVS (vmk2) on Active adapters (vmnic6, vmnic7) on Active uplinks (Uplink 1, Uplink2) for VMotion (10Gb/s, 9000 MTU)
- vSwitch1 (vmk3) on Active adapter (vmnic5) for VMkernel (10Gb/s, 1500 MTU)

## Storage Notes

### OS storage (SUT hosts)

- VMware ESXi 6.7 was installed on 1 x 480GB disk in the internal server storage bay on each SUT

### VMware vSAN storage (SUT hosts)

- VMware vSAN 6.7
  - Capacity: 29.11 TB
  - Cache: 5.59 TB
- Hardware Configuration
  - Each host has two storage groups. Each storage group used:
    - Caching Tier: 4 x HPE 375GB NVMe X4 WI SFF SCN DS in internal drive bay
    - Capacity Tier: 4 x HPE 2TB NVMe X4 RI SFF SCN DS SSD in internal drive bay

### NetApp FAS800 Storage Array (used by SUT and client hosts)

- Virtual Configuration
  - Total SUT LUNs: 2
    - 1 LUN (475GB) used for SVMotion, XVMotion, Deploy target LUNs
    - 1 LUN (190GB) used for SVMotion, XVMotion, Deploy target LUNs

## Datacenter Management Server Notes

The vCenter was configured in a VM using VMware vCenter Server Appliance 6.7 build 8833179

- Number of vCPUs: 4
- Virtual Memory: 16
- vCenter VM

## Operating System Notes

- The VMware-FDM module was updated after the OS was installed.
- All hosts (SUTs) originally had VMware ESXi 6.7 build 8169922 using the HPE custom image download named "VMware-ESXi-6.7.0-8169922-HPE-Gen9plus-670.10.3.0.30-Jun2018.iso". Later, all hosts were upgraded to VMware ESXi 6.7 EP 03 Build 9484548 using HPE custom image downloaded named "VMware-ESXi-6.7.0-9484548-HPE-Gen9plus-670.10.3.5.6-Sep2018.iso"

## Software Notes

None

## Client Notes

Prime Client was deployed on one Dell Poweredge 940xa 14G server used for client host, where all the clients (0-8) were install on.

vSwitch configuration

- VsanSelect-DVS on Active adapters (vmnic2, vmnic3) for Management Network (1Gb/s)

## Other Notes

None

## Meltdown/Spectre Mitigations

CVE-2017-5754 (aka "Meltdown")

- ESXi: mitigation present (VMware ESXi 6.7 EP 03 Build 9484548)
- Guest OS: no mitigation present

CVE-2017-5753 (aka "Spectre variant 1")

- ESXi: mitigation present (VMware ESXi 6.7 EP 03 Build 9484548)
- Guest OS: no mitigation present

CVE-2017-5715 (aka "Spectre variant 2")

- Server Firmware: mitigation present (I42 v1.42 (06/20/2018))
- ESXi: mitigation present (VMware ESXi 6.7 EP 03 Build 9484548)
- Guest OS: no mitigation present

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