

# VMmark® 3.0 Results

Vendor and Hardware Platform: Fujitsu Server PRIMERGY CX2560 M4  
 Virtualization Platform: VMware ESXi 6.7.0 EP 02a Build 9214924  
 VMware vCenter Server : VMware vCenter Server 6.7.0d Build 9451876

**VMmark 3.0 Score =  
11.45 @ 11 Tiles**

Number of Hosts: 4

Uniform Hosts [yes/no]: yes

Total sockets/cores/threads in test: 8/208/416

Tested By: Fujitsu

Test Date: 09-10-2018

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## 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     | 3601.70     | 1.00  | 0.26   0.00      | 571.59       | 1.00  | 0.90   0.66      | 1042.65   | 1.42  | 593.69  | 761.70    | 1.52  | 713.07  | 536.65    | 1.55  | 813.54  | 1.27 |
| p1     | 3594.14     | 1.00  | 0.27   0.00      | 571.88       | 1.00  | 0.81   0.48      | 1036.38   | 1.41  | 602.82  | 731.08    | 1.46  | 738.49  | 532.70    | 1.54  | 829.26  | 1.26 |
| p2     | 3596.87     | 1.00  | 0.26   0.00      | 573.26       | 1.00  | 0.82   0.59      | 1048.67   | 1.43  | 583.40  | 737.42    | 1.47  | 713.67  | 512.80    | 1.48  | 819.86  | 1.26 |
| 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     | 3596.46     | 1.00  | 0.33   0.00      | 573.55       | 1.00  | 0.91   0.60      | 956.65    | 1.30  | 798.33  | 696.95    | 1.39  | 919.70  | 509.02    | 1.47  | 1050.53 | 1.22 |
| p1     | 3599.99     | 1.00  | 0.34   0.00      | 572.19       | 1.00  | 0.94   0.58      | 964.00    | 1.31  | 789.88  | 641.42    | 1.28  | 956.22  | 462.98    | 1.33  | 1080.96 | 1.18 |
| p2     | 3598.18     | 1.00  | 0.35   0.00      | 574.36       | 1.00  | 1.07   0.88      | 991.65    | 1.35  | 700.63  | 732.48    | 1.46  | 808.67  | 514.00    | 1.48  | 914.54  | 1.24 |
| 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     | 3602.13     | 1.00  | 0.32   0.00      | 572.06       | 1.00  | 1.08   0.81      | 999.67    | 1.36  | 692.22  | 728.17    | 1.45  | 810.40  | 536.42    | 1.55  | 910.23  | 1.25 |
| p1     | 3598.39     | 1.00  | 0.31   0.00      | 571.10       | 1.00  | 0.92   0.57      | 1011.88   | 1.38  | 664.90  | 712.95    | 1.42  | 791.80  | 496.65    | 1.43  | 900.52  | 1.23 |
| p2     | 3598.74     | 1.00  | 0.33   0.01      | 571.33       | 1.00  | 0.95   0.69      | 999.35    | 1.36  | 696.87  | 729.10    | 1.46  | 809.89  | 512.60    | 1.48  | 920.60  | 1.24 |
| 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     | 3595.45     | 1.00  | 0.31   0.00      | 573.17       | 1.00  | 0.84   0.66      | 1089.53   | 1.48  | 494.45  | 785.00    | 1.57  | 570.01  | 586.23    | 1.69  | 621.68  | 1.32 |
| p1     | 3596.86     | 1.00  | 0.32   0.00      | 571.77       | 1.00  | 0.73   0.50      | 1085.65   | 1.48  | 500.76  | 784.50    | 1.57  | 572.11  | 551.98    | 1.59  | 640.71  | 1.30 |
| p2     | 3599.16     | 1.00  | 0.33   0.00      | 571.95       | 1.00  | 1.00   0.92      | 1068.45   | 1.46  | 530.81  | 800.85    | 1.60  | 602.27  | 599.73    | 1.73  | 663.24  | 1.32 |
| 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     | 3595.26     | 1.00  | 0.27   0.00      | 573.45       | 1.00  | 0.75   0.43      | 1022.33   | 1.39  | 645.97  | 714.50    | 1.43  | 785.16  | 519.00    | 1.50  | 892.04  | 1.24 |
| p1     | 3599.44     | 1.00  | 0.27   0.00      | 572.54       | 1.00  | 0.84   0.54      | 1024.38   | 1.39  | 646.23  | 718.40    | 1.44  | 782.29  | 491.95    | 1.42  | 912.70  | 1.23 |
| p2     | 3592.50     | 1.00  | 0.26   0.00      | 570.85       | 1.00  | 0.73   0.49      | 1012.90   | 1.38  | 657.85  | 713.62    | 1.43  | 783.52  | 515.08    | 1.49  | 894.80  | 1.24 |
| 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     | 3603.57     | 1.00  | 0.36   0.00      | 572.06       | 1.00  | 0.66   0.29      | 977.30    | 1.33  | 749.77  | 680.85    | 1.36  | 886.78  | 476.07    | 1.37  | 1005.05 | 1.20 |
| p1     | 3595.16     | 1.00  | 0.42   0.01      | 572.14       | 1.00  | 0.69   0.30      | 964.00    | 1.31  | 784.69  | 698.00    | 1.39  | 913.27  | 492.50    | 1.42  | 1017.61 | 1.21 |
| p2     | 3601.34     | 1.00  | 0.37   0.00      | 569.90       | 1.00  | 0.70   0.44      | 1010.17   | 1.38  | 658.40  | 718.33    | 1.44  | 768.50  | 525.20    | 1.51  | 855.02  | 1.24 |

| TILE_6  | Actual  | Ratio | QoS(nRT MaxPctF) | Actual | Ratio | QoS(nRT MaxPctF) | Actual  | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | GM   |
|---------|---------|-------|------------------|--------|-------|------------------|---------|-------|---------|--------|-------|---------|--------|-------|---------|------|
| p0      | 3596.50 | 1.00  | 0.32   0.00      | 571.28 | 1.00  | 0.82   0.50      | 1012.05 | 1.38  | 664.96  | 691.73 | 1.38  | 784.45  | 497.18 | 1.43  | 895.49  | 1.22 |
| p1      | 3605.55 | 1.00  | 0.32   0.00      | 572.65 | 1.00  | 0.91   0.54      | 1000.48 | 1.36  | 680.30  | 731.45 | 1.46  | 796.58  | 544.38 | 1.57  | 883.56  | 1.26 |
| p2      | 3604.65 | 1.00  | 0.30   0.00      | 572.19 | 1.00  | 0.84   0.56      | 1012.58 | 1.38  | 662.98  | 710.02 | 1.42  | 787.03  | 498.43 | 1.44  | 888.42  | 1.23 |
| TILE_7  | Actual  | Ratio | QoS(nRT MaxPctF) | Actual | Ratio | QoS(nRT MaxPctF) | Actual  | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | GM   |
| p0      | 3595.92 | 1.00  | 0.30   0.00      | 573.61 | 1.00  | 0.55   0.38      | 1016.08 | 1.38  | 645.87  | 731.15 | 1.46  | 736.82  | 504.52 | 1.45  | 844.80  | 1.24 |
| p1      | 3598.61 | 1.00  | 0.32   0.00      | 571.16 | 1.00  | 0.67   0.46      | 1018.55 | 1.39  | 647.75  | 745.75 | 1.49  | 756.18  | 547.90 | 1.58  | 858.04  | 1.27 |
| p2      | 3601.68 | 1.00  | 0.38   0.00      | 569.10 | 0.99  | 0.76   0.68      | 1022.12 | 1.39  | 638.95  | 728.75 | 1.46  | 740.03  | 483.10 | 1.39  | 848.74  | 1.23 |
| TILE_8  | Actual  | Ratio | QoS(nRT MaxPctF) | Actual | Ratio | QoS(nRT MaxPctF) | Actual  | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | GM   |
| p0      | 3598.94 | 1.00  | 0.31   0.00      | 570.56 | 1.00  | 0.74   0.44      | 1012.75 | 1.38  | 670.13  | 737.02 | 1.47  | 789.90  | 516.83 | 1.49  | 900.17  | 1.25 |
| p1      | 3603.95 | 1.00  | 0.30   0.00      | 571.24 | 1.00  | 0.82   0.49      | 1013.40 | 1.38  | 665.55  | 710.73 | 1.42  | 786.97  | 518.35 | 1.49  | 888.44  | 1.24 |
| p2      | 3601.08 | 1.00  | 0.27   0.00      | 571.87 | 1.00  | 0.82   0.53      | 1012.92 | 1.38  | 670.33  | 714.52 | 1.43  | 800.48  | 491.43 | 1.42  | 922.10  | 1.23 |
| TILE_9  | Actual  | Ratio | QoS(nRT MaxPctF) | Actual | Ratio | QoS(nRT MaxPctF) | Actual  | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | GM   |
| p0      | 3602.78 | 1.00  | 0.31   0.00      | 572.48 | 1.00  | 0.90   0.62      | 1015.83 | 1.38  | 652.44  | 751.27 | 1.50  | 745.11  | 541.92 | 1.56  | 880.47  | 1.27 |
| p1      | 3599.06 | 1.00  | 0.33   0.00      | 573.72 | 1.00  | 1.04   0.74      | 1022.85 | 1.39  | 636.30  | 696.98 | 1.39  | 760.44  | 497.62 | 1.43  | 881.09  | 1.23 |
| p2      | 3596.45 | 1.00  | 0.33   0.00      | 572.87 | 1.00  | 0.86   0.71      | 1015.65 | 1.38  | 652.60  | 743.95 | 1.49  | 764.53  | 519.77 | 1.50  | 881.64  | 1.25 |
| TILE_10 | Actual  | Ratio | QoS(nRT MaxPctF) | Actual | Ratio | QoS(nRT MaxPctF) | Actual  | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | GM   |
| p0      | 3599.45 | 1.00  | 0.31   0.00      | 573.43 | 1.00  | 0.94   0.67      | 951.25  | 1.30  | 816.34  | 680.90 | 1.36  | 982.23  | 497.95 | 1.44  | 1109.32 | 1.20 |
| p1      | 3593.24 | 1.00  | 0.31   0.00      | 571.59 | 1.00  | 0.92   0.70      | 961.08  | 1.31  | 802.50  | 666.73 | 1.33  | 963.13  | 452.20 | 1.30  | 1125.33 | 1.18 |
| p2      | 3598.86 | 1.00  | 0.34   0.00      | 572.18 | 1.00  | 0.86   0.61      | 944.83  | 1.29  | 847.42  | 680.55 | 1.36  | 988.68  | 469.82 | 1.35  | 1135.45 | 1.19 |

|           |       |
|-----------|-------|
| p0_score: | 13.68 |
| p1_score: | 13.57 |
| p2_score: | 13.67 |

| Infrastructure_Operations_Scores: | vMotion | SVMotion | XVMotion | Deploy |
|-----------------------------------|---------|----------|----------|--------|
| Completed_Ops_PerHour             | 57.00   | 54.00    | 42.00    | 23.00  |
| Avg_Seconds_To_Complete           | 6.25    | 79.94    | 101.47   | 276.42 |
| Failures                          | 0.00    | 0.00     | 0.00     | 0.00   |
| Ratio                             | 2.19    | 3.00     | 2.33     | 2.88   |
| Number_Of_Threads                 | 2       | 2        | 2        | 2      |

| Summary                                 | Run_Is_Compliant                | Turbo_Setting:0  |
|---|---------------------------------|------------------|
|   | Number_Of_Compliance_Issues(0)* | Median_Phase(p2) |
| Unreviewed_VMmark3_Applications_Score   | 13.67                           |                  |
| Unreviewed_VMmark3_Infrastructure_Score | 2.58                            |                  |
| Unreviewed_VMmark3_Score                | 11.45                           |                  |

## Configuration

| <b>Virtualization Software</b>  |   |
|---|---|
| Hypervisor Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY)                     | VMware ESXi 6.7.0 EP 02a, Build 9214924 / 7-26-2018   |
| Datacenter Management Software Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY) | VMware vCenter Server 6.7.0d, Build 9451876 / 8-14-2018   |
| 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   | Fujitsu Server PRIMERGY CX2560 M4   |
| Processor Vendor and Model  | Intel Xeon Platinum 8164  |
| Processor Speed (GHz)   | 2.0   |
| Total Sockets/Total Cores/Total Threads   | 2 Sockets / 52 Cores / 104 Threads  |
| Primary CPU Cache   | 32 KB I + 32 KB D on chip per core  |
| Secondary CPU Cache   | 1 MB I+D on chip per core   |
| Other CPU Cache   | 35.75 MB I+D on chip per chip   |
| BIOS Version  | V1.0.0.0 R1.32.0 for D3854-A1x  |
| Memory Size (in GB, Number of DIMMs)  | 768, 12   |
| Memory Type and Speed   | 64GB 4Rx4 DDR4 2666MHz RDIMM 3DS  |
| Disk Subsystem Type   | FC SAN  |
| Number of Disk Controllers  | 0   |
| Disk Controller Vendors and Models  | None  |
| Total Number of Physical Disks for Hypervisor   | 1   |
| Disk Vendors, Models, Capacities, and Speeds  | INTEL, DC S3520, 480GB, SATA 3.0 6Gb/S  |
| Number of Host Bus Adapters   | 1   |
| Host Bus Adapter Vendors and Models   | Emulex LightPulse LPe31002-M6 2-Port 16Gb   |
| Number of Network Controllers   | 2   |
| Network Controller Vendors and Models   | Emulex OneConnect Oce14000 Dual Port 10GbE Adapter<br>Intel Corporation I210 Gigabit Network Connection |
| Other Hardware  | None  |
| Other Software  | None  |
| Hardware Availability Date (MM-DD-YYYY)   | 04-24-2018  |
| BIOS Availability Date (MM-DD-YYYY)   | 06-26-2018  |
| Software Availability Date (MM-DD-YYYY)   | 08-31-2018  |
| <b>Network</b>  |   |
| Network Switch Vendors and Models   | 1 x Fujitsu SR-X340TR1<br>1 x Fujitsu ET-7648BFERA-FOS  |

|  |  |  |
|--|--|--|
| Network Speed  | 1Gbps for SUT management, 10Gbps for VMotion, Clients and VMs  |  |
| <b>Storage</b>   |  |  |
| Array Vendors, Models, and Firmware Versions                           | 3 x Fujitsu Server PRIMERGY RX2540 M2, Firmware V5.0.0.11 R1.13.0 for D3289-B1x<br>1 x Fujitsu Server PRIMEQUEST 2800E3, Firmware 1.36                         |  |
| Fibre Channel Switch Vendors and Models                                | Brocade 6510   |  |
| Disk Space Used  | 21.6TB   |  |
| Array Cache Size   | 1GB for storage server OS; no cache used for SUT datastores  |  |
| Total Number of Physical Disks Used                                    | 1 x SAS-SSD(PRIMEQUEST 2800E3 OS), 3 x SAS-SSD(1 per PRIMERGY RX2540M2 OS), 2 x SAS-SSD(for Template), 15 x PCIe-SSD   |  |
| Total Number of Enclosures/Pods/Shelves Used                           | 4  |  |
| Number of Physical Disks Used per Enclosure/Pod/Shelf                  | 3 x Enclosure(PRIMERGY RX2540 M2): 1 x SAS-SSD and 4 x PCIe-SSD<br>1 x Enclosure(PRIMEQUEST 2800E3): 3 x SAS-SSD and 3 x PCIe-SSD                              |  |
| Total Number of Storage Groups Used                                    | 0  |  |
| Number of LUNs Used  | 52   |  |
| LUN Size and Number of Disks Per LUN                                   | Details in section Storage Notes   |  |
| RAID Type  | RAID 0 for OS drives and Template drives   |  |
| Number of Members per RAID Set   | 1  |  |
| Disk Vendors, Models, and Speeds                                       | 6 x Toshiba PX02SMF040 400GB SAS SSD<br>3 x Fusion ioMemory PX600 1.3TB PCIe SSD<br>9 x Fusion ioMemory PX600 2.6TB PCIe SSD<br>3 x Intel P3700 800GB PCIe SSD |  |
| <b>Datacenter Management Server</b>                                    |  |  |
| System Model   | Fujitsu Server PRIMERGY RX2530 M2  |  |
| Processor Vendor and Model   | Intel Xeon E5-2698 v4  |  |
| Processor Speed (GHz)  | 2.2  |  |
| Total Sockets/Total Cores/Total Threads                                | 1 Sockets / 20 Cores / 40 Threads  |  |
| Memory Size (in GB, Number of DIMMs)                                   | Hypervisor: 64GB, 8  |  |
| Network Controller(s) Vendors and Models                               | Emulex OneConnect Oce14000 1GbE Dual Port Adapter  |  |
| Operating System, Version, Bitness, and Service Pack                   | Hypervisor: VMware ESXi 6.0.0 U2 Build 3620759   |  |
| Virtual Center VM Number of vCPUs                                      | 8  |  |
| Virtual Center VM Virtual Memory (in GB)                               | 32   |  |
| Virtual Center VM Operating System, Version, Bitness, and Service Pack | Microsoft Windows Server 2012 R2 Standard (64-bit)<br>VMware vCenter Server 6.7.0d (Build 9451876)   |  |
| Other Hardware   | None   |  |
| Other Software   | Microsoft SQL Server 2012 Enterprise sp1 (64-bit)  |  |
| <b>Clients</b>   |  |  |
| Total Number of Virtual Clients / Virtual Client Hosts                 | 12 / 4   |  |
| System Model(s)  | Fujitsu PRIMERGY RX2530 M2   |  |
| Processor Vendor(s) and Model(s)                                       | ClientHost1-2: Intel Xeon E5-2699 v4<br>ClientHost3-4: Intel Xeon E5-2699A v4  |  |
| Processor Speed(s) (GHz)   | ClientHost1-2: 2.2<br>ClientHost3-4: 2.4   |  |

|  |   |
|--|---|
| Total Sockets/Total Cores/Total Threads  | 2 Sockets / 44 Cores / 88 Threads   |
| Memory per Virtual Client Host           | 256 GB  |
| Network Controller(s) Vendors and Models | Emulex OneConnect Oce14000 1GbE Dual Port Adapter<br>Emulex OneConnect Oce14000 10GbE Dual Port Adapter   |
| Virtual Client Networking Notes          | 1 virtual adapter for management, 1 virtual adapter for workload traffic  |
| Virtual Client Storage Notes             | 1 x 300GB SAS 10K TOSHIBA AL14SEB03EN HDD with RAID 0 for Client Host OS<br>2 x 400GB SAS 12G TOSHIBA PX02SMF040 SSD with RAID 0 for Client VMs |
| Other Hardware                           | None  |
| Other Software                           | VMware ESXi 6.5.0 U1 Build 5969303  |

## Notes for Workload

### Virtualization Software Notes

- CDROM removed for all VMs (default enabled)
- Config.HostAgent.log.level set to warning (default info)
- CPU and Memory shares set to high for all DS3DB VMs (default normal)
- Floppy removed for all VMs (default enabled)
- Logging disabled for all VMs (default enabled)
- Logical CPU configuration changed for multi-cpu VMs to 1 socket with multiple cores (default: Single core per socket)
- All memory reserved for DS3DB VMs (default non-reserved)
- Syslog.global.defaultSize set to 112 (default 1024)
- CPU shares set to low for all Standby VMs (default normal)
- vSphere DRS Migration Threshold set to Fully Automated level 2

Changes in esx.conf:

- /adv/Cpu/CreditAgePeriod = 1000 (default 3000)
- /adv/Cpu/HTWholeCoreThreshold = 0 (default 800)
- /adv/DataMover/HardwareAcceleratedInit = 0 (default 1)
- /adv/DataMover/HardwareAcceleratedMove = 0 (default 1)
- /adv/Mem/CtlMaxPercent = 0 (default 65)
- /adv/Mem/ShareScanGHz = 0 (default 4)
- /adv/Numa/LTermFairnessInterval = 0 (default 5)
- /adv/Numa/MigImbalanceThreshold = 57 (default 10)
- /adv/Numa/PageMigEnable = 0 (default 1)
- /adv/Numa/RebalancePeriod = 60000 (default 2000)
- /adv/Numa/SwapLoadEnable = 0 (default 1)
- /adv/Numa/SwapLocalityEnable = 0 (default 1)
- /adv/Disk/ReqCallThreshold = 1 (default 8)
- /adv/Disk/IdleCredit = 64 (default 32)
- /adv/Power/CpuPolicy = High Performance (default balanced)
- /adv/VMFS3/HardwareAcceleratedLocking = 0 (default 1)
- /adv/Mem/VMOverheadGrowthLimit = 0 (default 4294967295)

### Server Notes

- Server BIOS settings:
  - Power Technology: Custom (default Energy Efficient)
  - Turbo Boost Technology: Enabled (Intel Turbo Boost up to 3.7GHz, default Disabled)

- UPI Link Frequency Select: 10.4GT/s (default Auto)
- Sub NUMA Clustering: Enabled (default Auto)
- Stale AtoS: Enabled (default Disabled)
- LLC dead line alloc: Disabled (default Enabled)
- CPU C1E Support: Disabled (default Enabled)
- CPU C6 Report: Disabled (default Enabled)

## Networking Notes

- vSwitch Configuration:
  - vSwitch0 for Service Console on vmnic0 at 1Gb/s
  - vSwitch1 for all workload on vmnic1 at 10Gb/s
  - vSwitch2 for vMotion connection on vmnic2 at 10Gb/s

## Storage Notes

- First Fujitsu Server PRIMERGY RX2540 M2 configured as a Fibre Channel Target:
  - Hardware details:
    - 2 x Intel Xeon E5-2667 v4@3.2GHz processors
    - 128GB RAM (8 x 16 GB dual rank PC4-19200 Registered DDR4 / 2400 MHz DIMMs)
    - 1 x QLogic QLE2672 Dual Port 16Gb FC HBA used as FC target controller
    - 1 x Fujitsu RAID SAS Controller with 1GB Cache (D3108)
    - 1 x 400GB SAS-SSD Toshiba PX02SMF040
    - 1 x Fusion ioMemory PX600 1.3TB PCIe SSD
    - 3 x Fusion ioMemory PX600 2.6TB PCIe SSD
  - Software details:
    - Operating System: SUSE Linux Enterprise Server 12 SP2 - 4.4.21-69-default (64-bit)
    - Fibre Channel Target SW: LIO (part of SUSE Linux Enterprise Server 12 SP2)

RAID configuration:

- SAS-SSD 1:
  - LUN 1: Storage system OS (400GB, this LUN is not counted in the Storage section)
- First PCIe-SSD:
  - LUN 1: DS3DB, DS3WebA, DS3WebB, DS3WebC for tiles 0 (600GB)
  - LUN 2: DS3DB, DS3WebA, DS3WebB, DS3WebC for tiles 9 (600GB)
  - LUN 3: AuctionNoSQL, ElasticDB for tiles 0 (400GB)
  - LUN 4: AuctionDB, ElasticLB for tiles 0 (400GB)
- Second PCIe-SSD:
  - LUN 1: AuctionWebA, AuctionWebB, AuctionAppA, AuctionAppB, AuctionLB, AuctionMSQ, Standby, ElasticWebA, ElasticWebB, ElasticAppA, ElasticAppB for tiles 0 (300GB)
  - LUN 2: AuctionWebA, AuctionWebB, AuctionAppA, AuctionAppB, AuctionLB, AuctionMSQ, Standby, ElasticWebA, ElasticWebB, ElasticAppA, ElasticAppB for tiles 6 (300GB)
  - LUN 3: Deploy Lun 1 (300GB)
  - LUN 4: XVMotion Target Lun 1 (100GB)
- Third PCIe-SSD:
  - LUN 1: DS3DB, DS3WebA, DS3WebB, DS3WebC for tiles 3 (600GB)
  - LUN 2: AuctionNoSQL, ElasticDB for tiles 3 (600GB)
  - LUN 3: AuctionDB, ElasticLB for tiles 3 (400GB)
  - LUN 4: AuctionNoSQL, ElasticDB for tiles 9 (400GB)

- Fourth PCIe-SSD:
  - LUN 1: DS3DB, DS3WebA, DS3WebB, DS3WebC for tiles 6 (600GB)
  - LUN 2: AuctionNoSQL, ElasticDB for tiles 6 (600GB)
  - LUN 3: AuctionDB, ElasticLB for tiles 6 (400GB)
  - LUN 4: AuctionDB, ElasticLB for tiles 9 (400GB)
- Second Fujitsu Server PRIMERGY RX2540 M2 configured as a Fibre Channel Target:
  - Hardware details:
    - 2 x Intel Xeon E5-2667 v4@3.2GHz processors
    - 128GB RAM (8 x 16 GB dual rank PC4-19200 Registered DDR4 / 2400 MHz DIMMs)
    - 1 x QLogic QLE2672 Dual Port 16Gb FC HBA used as FC target controller
    - 1 x Fujitsu RAID SAS Controller with 1GB Cache (D3108)
    - 1 x 400GB SAS-SSD Toshiba PX02SMF040
    - 1 x Fusion ioMemory PX600 1.3TB PCIe SSD
    - 3 x Fusion ioMemory PX600 2.6TB PCIe SSD
  - Software details:
    - Operating System: SUSE Linux Enterprise Server 12 SP2 - 4.4.21-69-default (64-bit)
    - Fibre Channel Target SW: LIO (part of SUSE Linux Enterprise Server 12 SP2)

RAID configuration:

- SAS-SSD 1:
  - LUN 1: Storage system OS (400GB, this LUN is not counted in the Storage section)
- First PCIe-SSD:
  - LUN 1: DS3DB, DS3WebA, DS3WebB, DS3WebC for tiles 1 (600GB)
  - LUN 2: DS3DB, DS3WebA, DS3WebB, DS3WebC for tiles 10 (600GB)
  - LUN 3: AuctionNoSQL, ElasticDB for tiles 1 (400GB)
  - LUN 4: AuctionDB, ElasticLB for tiles 1 (400GB)
- Second PCIe-SSD:
  - LUN 1: AuctionWebA, AuctionWebB, AuctionAppA, AuctionAppB, AuctionLB, AuctionMSQ, Standby, ElasticWebA, ElasticWebB, ElasticAppA, ElasticAppB for tiles 1 (300GB)
  - LUN 2: AuctionWebA, AuctionWebB, AuctionAppA, AuctionAppB, AuctionLB, AuctionMSQ, Standby, ElasticWebA, ElasticWebB, ElasticAppA, ElasticAppB for tiles 7 (300GB)
  - LUN 3: Deploy Lun 2 (300GB)
  - LUN 4: XVMotion Target Lun 2 (100GB)
- Third PCIe-SSD:
  - LUN 1: DS3DB, DS3WebA, DS3WebB, DS3WebC for tiles 4 (600GB)
  - LUN 2: AuctionNoSQL, ElasticDB for tiles 4 (600GB)
  - LUN 3: AuctionDB, ElasticLB for tiles 4 (400GB)
  - LUN 4: AuctionNoSQL, ElasticDB for tiles 10 (400GB)
- Fourth PCIe-SSD:
  - LUN 1: DS3DB, DS3WebA, DS3WebB, DS3WebC for tiles 7 (600GB)
  - LUN 2: AuctionNoSQL, ElasticDB for tiles 7 (600GB)
  - LUN 3: AuctionDB, ElasticLB for tiles 7 (400GB)
  - LUN 4: AuctionDB, ElasticLB for tiles 10 (400GB)
- Third Fujitsu Server PRIMERGY RX2540 M2 configured as a Fibre Channel Target:
  - Hardware details:
    - 2 x Intel Xeon E5-2667 v4@3.2GHz processors
    - 128GB RAM (8 x 16 GB dual rank PC4-19200 Registered DDR4 / 2400 MHz DIMMs)

- 1 x QLogic QLE2672 Dual Port 16Gb FC HBA used as FC target controller
  - 1 x Fujitsu RAID SAS Controller with 1GB Cache (D3108)
  - 1 x 400GB SAS-SSD Toshiba PX02SMF040
  - 1 x Fusion ioMemory PX600 1.3TB PCIe SSD
  - 3 x Fusion ioMemory PX600 2.6TB PCIe SSD
- Software details:
    - Operating System: SUSE Linux Enterprise Server 12 SP2 - 4.4.21-69-default (64-bit)
    - Fibre Channel Target SW: LIO (part of SUSE Linux Enterprise Server 12 SP2)

RAID configuration:

- SAS-SSD 1:
  - LUN 1: Storage system OS (400GB, this LUN is not counted in the Storage section)
- First PCIe-SSD:
  - LUN 1: DS3DB, DS3WebA, DS3WebB, DS3WebC for tiles 2 (600GB)
  - LUN 2: Not Used (600GB)
  - LUN 3: AuctionNoSQL, ElasticDB for tiles 2 (400GB)
  - LUN 4: AuctionDB, ElasticLB for tiles 2 (400GB)
- Second PCIe-SSD:
  - LUN 1: AuctionWebA, AuctionWebB, AuctionAppA, AuctionAppB, AuctionLB, AuctionMSQ, Standby, ElasticWebA, ElasticWebB, ElasticAppA, ElasticAppB for tiles 2 (300GB)
  - LUN 2: AuctionWebA, AuctionWebB, AuctionAppA, AuctionAppB, AuctionLB, AuctionMSQ, Standby, ElasticWebA, ElasticWebB, ElasticAppA, ElasticAppB for tiles 8 (300GB)
  - LUN 3: SVMotion Target Lun 1 (300GB)
  - LUN 4: SVMotion Target Lun 2 (100GB)
- Third PCIe-SSD:
  - LUN 1: DS3DB, DS3WebA, DS3WebB, DS3WebC for tiles 5 (600GB)
  - LUN 2: AuctionNoSQL, ElasticDB for tiles 5 (600GB)
  - LUN 3: AuctionDB, ElasticLB for tiles 5 (400GB)
  - LUN 4: Not Used (400GB)
- Fourth PCIe-SSD:
  - LUN 1: DS3DB, DS3WebA, DS3WebB, DS3WebC for tiles 8 (600GB)
  - LUN 2: AuctionNoSQL, ElasticDB for tiles 8 (600GB)
  - LUN 3: AuctionDB, ElasticLB for tiles 8 (400GB)
  - LUN 4: Not Used (400GB)
- Fourth Fujitsu Server PRIMEQUEST 2800E3 configured as a Fibre Channel Target:
  - Hardware details:
    - 2 x Intel Xeon E7-8890 v4@2.2GHz processors
    - 128GB RAM (4 x 32 GB dual rank PC4-19200 Registered DDR4 / 2400 MHz DIMMs)
    - 1 x QLogic QLE2672 Dual Port 16Gb FC HBA used as FC target controller
    - 1 x Fujitsu RAID SAS Controller with 1GB Cache (D3108)
    - 3 x Intel P3700 800GB PCIe SSD
    - 3 x 400GB SAS-SSD Toshiba PX02SMF040
  - Software details:
    - Operating System: SUSE Linux Enterprise Server 12 SP2 - 4.4.21-69-default (64-bit)
    - Fibre Channel Target SW: LIO (part of SUSE Linux Enterprise Server 12 SP2)

RAID configuration:



- SAS-SSD 1:
    - LUN 1: Storage system OS (350GB, this LUN is not counted in the Storage section)
  - SAS-SSD 2~3(RAID 0):
    - LUN 1: vmmark3-template-053117 (100GB)
    - LUN 2: vmmark3-template-053117-02 (100GB)
  - First PCIe-SSD:
    - LUN 1: AuctionWebA, AuctionWebB, AuctionAppA, AuctionAppB, AuctionLB, AuctionMSQ, Standby, ElasticWebA, ElasticWebB, ElasticAppA, ElasticAppB for tiles 3 (300GB)
    - LUN 2: AuctionWebA, AuctionWebB, AuctionAppA, AuctionAppB, AuctionLB, AuctionMSQ, Standby, ElasticWebA, ElasticWebB, ElasticAppA, ElasticAppB for tiles 9 (300GB)
  - Second PCIe-SSD:
    - LUN 1: AuctionWebA, AuctionWebB, AuctionAppA, AuctionAppB, AuctionLB, AuctionMSQ, Standby, ElasticWebA, ElasticWebB, ElasticAppA, ElasticAppB for tiles 4 (300GB)
    - LUN 2: AuctionWebA, AuctionWebB, AuctionAppA, AuctionAppB, AuctionLB, AuctionMSQ, Standby, ElasticWebA, ElasticWebB, ElasticAppA, ElasticAppB for tiles 10 (300GB)
  - Third PCIe-SSD:
    - LUN 1: AuctionWebA, AuctionWebB, AuctionAppA, AuctionAppB, AuctionLB, AuctionMSQ, Standby, ElasticWebA, ElasticWebB, ElasticAppA, ElasticAppB for tiles 5 (300GB)
    - LUN 2: Not Used (300GB)
- All LUNs were configured as block devices; no system memory was used for caching

### **Datacenter Management Server Notes**

- Virtual Center realized as a VM running on a dedicated Hypervisor system:
  - Number of vCPUs: 8 (One vSocket)
  - Size of vRAM: 32GB
  - Operating System: Windows Server 2012 R2 Standard 64-bit

### **Operating System Notes**

VMware ESXi 6.7.0 EP 02a Build 9214924 was installed using 'Fujitsu Custom Image for VMware ESXi 6.7.0 EP 02a' named VMware-ESXi-6.7.0-9214924-Fujitsu-v451-1.iso

### **Software Notes**

None

### **Client Notes**

Client Host1: Client0,Client4,PrimeClient  
 Client Host2: Client1,Client5,Client9  
 Client Host3: Client2,Client6,Client10  
 Client Host4: Client3,Client7,Client8

Changes in esx.conf:

- /adv/Power/CpuPolicy = "static" (default balanced)
- /adv/UserVars/SuppressShellWarning = 1 (default 0)

### **Other Notes**

None

### **Meltdown/Spectre Mitigations**

CVE-2017-5754 (aka "Meltdown")

- ESXi: mitigation present (ESXi 6.7.0 EP 02a Build 9214924)
- Guest OS: no mitigation present

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

- ESXi: mitigation present (ESXi 6.7.0 EP 02a Build 9214924)
- Guest OS: no mitigation present

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

- Server Firmware: mitigation present (BIOS version: V1.0.0.0 R1.32.0 for D3854-A1x)
- ESXi: mitigation present (ESXi 6.7.0 EP 02a Build 9214924)
- Guest OS: no mitigation present

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