

| | | |
|---|--|---|
| VMmark® 3.1.1 Results | | |
| Server Vendor & Model: Huawei FusionServer 2288H V5 Storage Vendor & Model: VMware vSAN 7.0.0 Hypervisor: VMware ESXi 7.0.0 Build 15843807 Datacenter Management Software: VMware vCenter 7.0.0 Build 15952498 | | Non-Compliant |
| Number of Hosts: 4 | Uniform Hosts [yes/no]: yes | Total sockets/cores/threads in test: 8/192/384 |
| Tested By: Huawei | | Test Date: 12-19-2020 |
| Performance Section Performance | Configuration Section Configuration | Notes Section Notes for Workload |

It has been determined that this result was not in compliance with the VMmark Run and Reporting Rules. Specifically, this result used an unsupported configuration and therefore was not in compliance with section 3.2.8 of the Run and Reporting Rules.

Performance -- all data has been removed = NC

| | 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 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | | |
| TILE_6 | Actual | Ratio | QoS(nRTlMaxPctF) | Actual | Ratio | QoS(nRTlMaxPctF) | Actual | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | GM | |
| p0 | | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | | |
| TILE_7 | Actual | Ratio | QoS(nRTlMaxPctF) | Actual | Ratio | QoS(nRTlMaxPctF) | Actual | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | GM | |
| p0 | | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | | |
| TILE_8 | Actual | Ratio | QoS(nRTlMaxPctF) | Actual | Ratio | QoS(nRTlMaxPctF) | Actual | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | Actual | Ratio | QoS(ms) | GM | |
| p0 | | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | | |
| p0_score: | NC | | | | | | | | | | | | | | | | |
| p1_score: | NC | | | | | | | | | | | | | | | | |
| p2_score: | NC | | | | | | | | | | | | | | | | |
| Infrastructure_Operations_Scores: | | | | | | | vMotion | | SVMotion | | XVMotion | | Deploy | | | | |
| Completed_Ops_PerHour | | | | | | | NC | | NC | | NC | | NC | | | | |
| Avg_Seconds_To_Complete | | | | | | | NC | | NC | | NC | | NC | | | | |
| Failures | | | | | | | NC | | NC | | NC | | NC | | | | |
| Ratio | | | | | | | NC | | NC | | NC | | NC | | | | |
| Number_Of_Threads | | | | | | | NC | | NC | | NC | | NC | | | | |
| Summary | | | | | | | NC | | | | | | Turbo_Setting:0 | | | | |
| | | | | | | | Number_Of_Compliance_Issues(NC)* | | | | | | Median_Phase(NC) | | | | |
| Unreviewed_VMmark3_Applications_Score | | | | | | | NC | | | | | | | | | | |
| Unreviewed_VMmark3_Infrastructure_Score | | | | | | | NC | | | | | | | | | | |
| Unreviewed_VMmark3_Score | | | | | | | NC | | | | | | | | | | |

Configuration

| | |
|---|---|
| Virtualization Software | |
| Hypervisor Vendor, Product, Version, and Build / | VMware ESXi 7.0.0 Build 15843807 / 04-02-2020 |

| | |
|---|--|
| Availability Date (MM-DD-YYYY) | |
| Datacenter Management Software Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY) | VMware vCenter 7.0.0 Build 15952498 / 04-02-2020 |
| Supplemental Software | None |
| Servers | |
| Number of Servers in System Under Test (all subsequent fields in this section are per server) | 4 |
| Server Manufacturer and Model | Huawei FusionServer 2288H V5 |
| Processor Vendor and Model | Intel Xeon Gold 6252 |
| Processor Speed (GHz) / Turbo Boost Speed (GHz) | 2.1 / 3.7 |
| Total Sockets/Total Cores/Total Threads | 2 Sockets / 48 Cores / 96 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 | 35.75MB I+D on chip per chip |
| BIOS Version | 7.73(U47) |
| Memory Size (in GB, Number of DIMMs) | 640 GB (8*16GB+4*128GB) |
| Memory Type and Speed | 16GB,2666MHz,2Rank(1G*8bit), 128GB,2666MHz,DCPMM |
| Disk Subsystem Type | VMware vSAN ,NFS |
| Number of Disk Controllers | 1 |
| Disk Controller Vendors and Models | LSI SAS3004 |
| Total Number of Physical Disks for Hypervisor | 2 |
| Disk Vendors, Models, Capacities, and Speeds | SSSTC ER2-GD480,480GB,6Gb/S |
| Number of Host Bus Adapters | 0 |
| Host Bus Adapter Vendors and Models | none |
| Number of Network Controllers | 2 |

| | |
|--|--|
| Network Controller Vendors and Models | Huawei LOM X722 2*10GE+2*GE, Huawei SM380 2*25GE SFP+ |
| Other Hardware | none |
| Other Software | none |
| Hardware Availability Date (MM-DD-YYYY) | 04-02-2019 |
| BIOS Availability Date (MM-DD-YYYY) | 09-21-2020 |
| Software Availability Date (MM-DD-YYYY) | 04-02-2020 |
| Network | |
| Network Switch Vendors and Models | Huawei CE6865-48S8CQ-EI *2 Huawei CE6855-48S6Q-HI Huawei CE5855-48T4S2Q-EI |
| Network Speed | 2*10GE+2*GE+2*25G |
| Primary Storage | |
| Storage Category | vSAN |
| Storage Vendors, Models, and Firmware Versions | 4*Huawei FusionServer 2288H V5 |
| Storage Configuration Summary | VMware vSAN(caching tier):Intel Optane SSD DC P4800x Series SSDPE21K375GA(375GB 2.5"), VMware vSAN(capacity tier):Intel DC P4510 SSDPE2KX020T8 (2TB 2.5") |
| Datacenter Management Server | |
| System Model | Huawei FusionServer 1288H V5 |
| Processor Vendor and Model | Intel Xeon Gold 6226R |
| Processor Speed (GHz) | 2.9 |
| Total Sockets/Total Cores/Total Threads | 2 Sockets / 32Cores / 64Threads |
| Memory Size (in GB, Number of DIMMs) | 384GB,12*32GB |
| Network Controller(s) Vendors and Models | Huawei LOM X722 2*10GE+2*GE |
| Operating System, Version, Bitness, and Service Pack | VMware ESXi 7.0.0 Build 15843807 |
| Virtual Center VM Number of vCPUs | 8 |
| Virtual Center VM Virtual Memory (in GB) | 28 |

| Virtual Center VM Operating System, Version, Bitness, and Service Pack | VMware vCenter 7.0.0 Build 15952498 | | | | | |
|--|---|--------------|----------------------------|-----------------|------|----------|
| Other Hardware | none | | | | | |
| Other Software | none | | | | | |
| Clients | | | | | | |
| Total Number of Virtual Clients / Virtual Client Hosts | 10 / 3 | | | | | |
| System Model(s) | Huawei FusionServer 2288H V5 | | | | | |
| Processor Vendor(s) and Model(s) | Intel Xeon Gold 6226R | | | | | |
| Processor Speed(s) (GHz) | 2.9 | | | | | |
| Total Sockets/Total Cores/Total Threads | 2 Sockets / 32Cores /64 Threads | | | | | |
| Memory per Virtual Client Host | 384GB,12*32GB | | | | | |
| Network Controller(s) Vendors and Models | Huawei LOM X722 2*10GE+2*GE, Huawei SM380 2*25GE SFP+ | | | | | |
| Virtual Client Networking Notes | All management traffic and workload traffic running on one vmnic0 and vSAN traffic running on one vmnic4. | | | | | |
| Virtual Client Storage Notes | All clients stored on vSAN datastore | | | | | |
| Other Hardware | none | | | | | |
| Other Software | VMware ESXi 7.0.0 Build 15843807 | | | | | |
| Security Mitigations | | | | | | |
| Vulnerability | CVE | Exploit Name | Public Vulnerability Name | Mitigated | | |
| | | | | Server Firmware | ESXi | Guest OS |
| Spectre | 2017-5753 | Variant 1 | Bounds Check Bypass | N/A | Yes | Yes |
| Spectre | 2017-5715 | Variant 2 | Branch Target Injection | Yes | Yes | Yes |
| Meltdown | 2017-5754 | Variant 3 | Rogue Data Cache Load | N/A | Yes | Yes |
| Spectre-NG | 2018-3640 | Variant 3a | Rogue System Register Read | Yes | N/A | N/A |
| Spectre-NG | 2018-3639 | Variant 4 | Speculative Store Bypass | N/A | Yes | Yes |
| Foreshadow | 2018-3615 | Variant 5 | L1 Terminal Fault - SGX | N/A | N/A | N/A |
| Foreshadow-NG | 2018-3620 | Variant 5 | L1 Terminal Fault - OS | N/A | N/A | Yes |
| Foreshadow-NG | 2018-3646 | Variant 5 | L1 Terminal Fault - VMM | N/A | Yes | N/A |

Notes for Workload

Template deployed with disk type: Thick

Virtualization Software Notes

- PrimeClient VM configured with a 300GB sized second disk and a 500GB sized third disk for scratch.
- Cluster DRS Automation level set to Fully Automated.
- DRS Migration threshold set to level 2.
- CPU shares of AuctionDB*, ElasticDB*, DS3DB*, Client* and PrimeClient were set to "high" (default: normal).
- Logging was disabled for all VMs (default: enabled).
- Logical CPU configuration changed for all multi-cpu VMs to 1 socket with multiple cores (default: Single core per socket).
- VMkernel.Boot.hyperthreadingMitigation = true set on all ESXi hosts (default: false).

Server Notes

- NUMA enabled(default).
- Intel Hyper Threading enabled(default).
- Power Management Setting:Performance.
- VMX enabled(default).
- SATA Controller disable.
- MONITOR/MWAIT enabled.
- Intel(R) Optane(TM) DC Persistent Memory Configuration: Memory Mode[%] = 100(default).

• ESXi settings of SUT hosts:

- o CPU performance policy = High Performance (default: balanced)
- o /adv/Irq/BestVcpuRouting = 1 (default : 0)
- o /adv/Irq/IRQRebalancePeriod = 20000 (default : 50)
- o /adv/Misc/TimerMaxHardPeriod = 4000 (default : 500000)
- o /adv/Net/MaxNetifTxQueueLen = 1000 (default : 2000)
- o /adv/Mem/ShareScanGHz = 0 (default : 4)
- o /adv/Mem/CtlMaxPercent = 0 (default : 65)
- o /adv/Cpu/CreditAgePeriod = 1000 (default : 3000)
- o /adv/Cpu/HTWholeCoreThreshold = 0 (default : 800)
- o /adv/Cpu/CoschedCrossCall = 0 (default : 1)
- o /adv/Numa/RebalancePeriod = 60000 (default : 2000)
- o /adv/Numa/SwapInterval = 1 (default : 3)
- o /adv/Numa/MigImbalanceThreshold = 57 (default : 10)
- o /adv/Numa/SwapLoadEnable = 0 (default : 1)
- o /adv/Numa/SwapLocalityEnable = 0 (default : 1)
- o /adv/Numa/MonMigEnable = 0 (default : 1)
- o /adv/Numa/PageMigEnable = 0 (default : 1)
- o /adv/Numa/LTermFairnessInterval = 0 (default : 5)
- o /adv/Numa/LargeInterleave = 0 (default : 1)
- o /adv/Numa/PreferHT = 1 (default : 0)
- o /adv/VMFS3/HardwareAcceleratedLocking = 0 (default : 1)
- o /adv/Virsto/DedupSpaceReclaim = 2 (default : 0)
- o /adv/DataMover/HardwareAcceleratedMove = 0 (default : 1)
- o /adv/DataMover/HardwareAcceleratedInit = 0 (default : 1)
- o /adv/UserVars/HostClientSessionTimeout = 7200 (default : 900)

- o /adv/UserVars/HostClientCEIPOptIn = 1 (default : 0)
- o /vmkernel/hyperthreadingMitigation = true (default : false)

Networking Notes

- MTU was set to 9000 for vmnic4 and vmnic5 (ConnectX-4 Lx), and MTU was set to 9000 for vSAN and vMotion vSwitches.
- Three Standard vSwitches were set up: vSwitch0, vSAN and vMotion.
- These three switches were backed by vmnic1,vmnic4 and vmnic5 respectively.
- vSwitch0 contains the following portgroups: VM Network,Management Network.
- vSAN contains the following portgroups: vSAN.
- vMotion contains the following portgroups: vMotion.
- All virtual machines used VM Network for traffic.
- All vSAN traffic is only run on vSAN on its only dedicated vSwitch.

Storage Notes

- All client server OS installed on a RAID1 of 2 m.2 drives via SSSTC ER2-GD480.
- All SUT hosts OS installed on a RAID1 of 2 m.2 drives via SSSTC ER2-GD480.

• NFS Folder configuration

- o All folders are backed by the same NFS server on a single striped zfs array, mounted storage device detailed in the "Secondary Storage section."
- o deploy1 datastore -> /data/deploy1
- o deploy2 datastore -> /data/deploy2
- o vmotion1 datastore -> /data/vmotion1
- o vmotion2 datastore -> /data/vmotion2

• System under Test configuration

- o 2 x Intel(R) Xeon(R) Gold 6252 CPU @ 2.10GHz
- o 8 x 16GB,2666MHz,2Rank(1G*8bit)
- o 4 x 128GB,2666MHz,DCPMM
- o 2 x Intel P4800x 375GB NVMe
- o 6 x Intel P4510 2TB NVMe
- o Huawei LOM X722 2*10GE+2*GE
- o Huawei SM380 2*25GE SFP+
- o 2x SSSTC ER2-GD480
- o LSI SAS3004

• Software configuration

- o All Flash vSAN.
- o Two diskgroups per host.
- o Each disk group contains 1 x Intel P4800x for caching and 3 x P4510 for capacity.
- o vSAN Default Storage Policy used.

• Virtual Machine LUN Distribution:

- o vsanDatastore contains the following workloads:

- ◆ AuctionAppA*
- ◆ AuctionAppB*
- ◆ AuctionDB*
- ◆ AuctionLB*
- ◆ AuctionMSQ*
- ◆ AuctionNoSQL*
- ◆ AuctionWebA*
- ◆ AuctionWebB*
- ◆ DS3DB*
- ◆ DS3WebB*
- ◆ DS3WebC*
- ◆ ElasticAppA*
- ◆ ElasticAppB*
- ◆ ElasticDB*
- ◆ ElasticLB*
- ◆ ElasticWebA*
- ◆ ElasticWebB*
- ◆ Standby*
- ◆ DS3WebA*

• **Secondary Shared Storage Device:**

o Hardware: Huawei FusionServer 2288H V5

- ◆ 2 x Intel(R) Xeon(R) Gold 8253 CPU @ 2.20GHz
- ◆ 12 x samsung 32GB 2933 DIMM
- ◆ Huawei LOM X722 2*10GE+2*GE
- ◆ Huawei SM380 2*25GE SFP+
- ◆ 12 x Intel P4510 2TB (SSDPE2KX020T8) NVMe SSD's
- ◆ 2 x SSSTC ER2-GD240
- ◆ LSI SAS3004

o Firmware:

- ◆ BIOS - 7.73 (U47)
- ◆ BMC - 5.12 (U4282)
- ◆ X722 - 3.33
- ◆ SM380 - 14.26.1040
- ◆ 2TB P4510 (SSDPE2KX020T8) - VDV10152
- ◆ SSSTC ER2-GD240 - E4M6404

o Software:

- ◆ CentOS-7-x86_64-DVD-1810/ Updates as of 06/20/2019

o Configuration:

- ◆ Disks installed into Bays 8,9,10,11,12,13,14,15,16,17,18,19
- ◆ All 12 disks mount to /data
- ◆ Huawei SM380 set to MTU 9000
- ◆ Huawei LOM X722 set to MTU 9000
- ◆ ufw disabled

- o Virtual Machine LUN Distribution:
 - ◆ vmotion1 contains the following workload: vmotion1
 - ◆ vmotion2 contains the following workload: vmotion2
 - ◆ deploy1 contains the following workload: deploy1
 - ◆ deploy2 contains the following workload: deploy2

Datacenter Management Server Notes

The datacenter management server was hosted on a separate vCenter Server Appliance from the Clients and SUT.

Operating System Notes

- none

Software Notes

- none

Client Notes

- Cluster DRS Automation level set to Fully Automated.
- DRS Migration threshold set to level 2.

• ESXi settings of Client hosts:

- o CPU performance policy = High Performance (default: balanced)
- o /adv/Irq/BestVcpuRouting = 1 (default : 0)
- o /adv/Irq/IRQRebalancePeriod = 20000 (default : 50)
- o /adv/Misc/TimerMaxHardPeriod = 4000 (default : 500000)
- o /adv/Net/MaxNetifTxQueueLen = 1000 (default : 2000)
- o /adv/Mem/ShareScanGHz = 0 (default : 4)
- o /adv/Mem/CtlMaxPercent = 0 (default : 65)
- o /adv/Cpu/CreditAgePeriod = 1000 (default : 3000)
- o /adv/Cpu/HTWholeCoreThreshold = 0 (default : 800)
- o /adv/Cpu/CoschedCrossCall = 0 (default : 1)
- o /adv/Numa/RebalancePeriod = 60000 (default : 2000)
- o /adv/Numa/SwapInterval = 1 (default : 3)
- o /adv/Numa/MigImbalanceThreshold = 57 (default : 10)
- o /adv/Numa/SwapLoadEnable = 0 (default : 1)
- o /adv/Numa/SwapLocalityEnable = 0 (default : 1)
- o /adv/Numa/MonMigEnable = 0 (default : 1)
- o /adv/Numa/PageMigEnable = 0 (default : 1)
- o /adv/Numa/LTermFairnessInterval = 0 (default : 5)
- o /adv/Numa/LargeInterleave = 0 (default : 1)
- o /adv/Numa/PreferHT = 1 (default : 0)
- o /adv/VMFS3/HardwareAcceleratedLocking = 0 (default : 1)
- o /adv/Virsto/DedupSpaceReclaim = 2 (default : 0)
- o /adv/DataMover/HardwareAcceleratedMove = 0 (default : 1)
- o /adv/DataMover/HardwareAcceleratedInit = 0 (default : 1)

- o /adv/UserVars/HostClientSessionTimeout = 7200 (default : 900)
- o /adv/UserVars/HostClientCEIPOptIn = 1 (default : 0)
- o /vmkernel/hyperthreadingMitigation = true (default : false)

• **vSAN configuration**

- o All Flash vSAN.
- o One diskgroup per host.
- o Each disk group contains 1 x P4610 1.6T for caching and 3 x P4610 1.6T for capacity.
- o vSAN Default Storage Policy used.

o **vsanDatastore contains the following Client VMs:**

- ◆ Client0
- ◆ Client1
- ◆ Client2
- ◆ Client3
- ◆ Client4
- ◆ Client5
- ◆ Client6
- ◆ Client7
- ◆ Client8
- ◆ PrimeClient

Other Notes

- VMmark3.properties - DebugLevel = 3
- VMmark3.properties - VCscratchDir = /root/VMmark3/results/scratch

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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