

# 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

**VMmark 3.1.1 Score =**  
**7.91 @ 8 Tiles**

Number of Hosts: 4	Uniform Hosts [yes/no]: yes	Total sockets/cores/threads in test: 8/160/320
Tested By: Huawei		Test Date: 12-15-2020
Performance Section <a href="#">Performance</a>	Configuration Section <a href="#">Configuration</a>	Notes Section <a href="#">Notes for Workload</a>

## 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	3569.71	0.99	0.23   0.00	562.96	0.98	0.48   0.27	944.90	1.29	838.76	678.65	1.36	992.40	464.93	1.34	1160.79	1.18
p1	3559.87	0.99	0.25   0.00	559.22	0.98	0.44   0.21	949.40	1.29	816.08	654.30	1.31	994.49	464.45	1.34	1150.90	1.17
p2	3552.86	0.99	0.25   0.00	560.72	0.98	0.55   0.28	943.55	1.28	844.40	653.75	1.31	1005.42	439.18	1.27	1188.56	1.16
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	3579.98	1.00	0.23   0.00	564.92	0.99	0.48   0.22	950.88	1.29	836.79	680.17	1.36	982.39	489.93	1.41	1140.74	1.20
p1	3566.13	0.99	0.24   0.00	564.10	0.99	0.56   0.34	960.40	1.31	792.36	667.95	1.33	951.90	450.43	1.30	1130.15	1.17
p2	3553.18	0.99	0.25   0.00	559.21	0.98	0.58   0.30	951.12	1.30	822.00	687.77	1.37	968.87	468.10	1.35	1148.21	1.18
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	3583.13	1.00	0.22   0.00	565.93	0.99	1.00   0.72	957.55	1.30	814.60	659.20	1.32	982.38	468.30	1.35	1134.09	1.18
p1	3571.63	0.99	0.22   0.00	561.74	0.98	0.36   0.11	961.62	1.31	796.88	662.33	1.32	968.94	445.60	1.28	1143.36	1.17
p2	3560.06	0.99	0.23   0.00	558.57	0.98	0.61   0.37	958.52	1.31	792.62	684.05	1.37	953.91	500.23	1.44	1077.65	1.20
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	3578.87	0.99	0.29   0.00	565.74	0.99	0.43   0.30	925.88	1.26	897.69	634.65	1.27	1087.54	423.55	1.22	1309.67	1.14
p1	3566.76	0.99	0.27   0.00	560.31	0.98	0.68   0.38	924.52	1.26	908.36	659.67	1.32	1073.30	448.62	1.29	1254.92	1.16
p2	3554.34	0.99	0.28   0.00	556.24	0.97	0.43   0.19	936.52	1.28	875.26	640.80	1.28	1070.14	452.45	1.30	1240.65	1.15
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	3581.31	1.00	0.23   0.00	567.00	0.99	0.74   0.40	966.02	1.32	776.02	669.55	1.34	927.69	453.88	1.31	1086.99	1.18
p1	3564.45	0.99	0.23   0.00	562.54	0.98	0.68   0.44	938.00	1.28	848.39	671.55	1.34	1004.12	487.88	1.41	1135.56	1.19
p2	3550.32	0.99	0.35   0.11	555.11	0.97	0.59   0.30	953.25	1.30	821.98	653.35	1.31	995.60	444.45	1.28	1154.32	1.16
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	3586.37	1.00	0.22   0.00	567.22	0.99	0.82   0.56	948.25	1.29	821.85	679.33	1.36	976.26	468.07	1.35	1123.19	1.19

<b>p1</b>	3576.10	0.99	0.22   0.00	565.01	0.99	0.48   0.38	953.15	1.30	806.66	652.15	1.30	986.07	472.60	1.36	1107.90	1.18
<b>p2</b>	3563.11	0.99	0.22   0.00	562.53	0.98	0.56   0.27	957.65	1.30	802.67	657.58	1.31	968.62	451.23	1.30	1108.30	1.17
<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>	3578.47	0.99	0.23   0.00	563.82	0.99	0.46   0.28	945.17	1.29	834.66	678.70	1.36	985.12	488.62	1.41	1139.07	1.19
<b>p1</b>	3565.05	0.99	0.26   0.02	562.68	0.98	0.51   0.32	952.98	1.30	815.23	628.30	1.26	1003.51	442.02	1.27	1164.73	1.15
<b>p2</b>	3558.28	0.99	0.23   0.00	561.92	0.98	0.61   0.33	947.33	1.29	822.77	677.50	1.35	984.27	464.45	1.34	1142.11	1.18
<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>	3581.74	1.00	0.27   0.00	568.67	0.99	1.15   0.85	914.95	1.25	927.52	646.67	1.29	1114.21	439.68	1.27	1300.69	1.15
<b>p1</b>	3573.82	0.99	0.35   0.08	566.42	0.99	0.57   0.33	935.60	1.27	865.25	619.98	1.24	1032.55	432.32	1.25	1215.39	1.14
<b>p2</b>	3566.60	0.99	0.29   0.10	565.39	0.99	0.41   0.18	924.60	1.26	888.92	659.10	1.32	1050.41	477.73	1.38	1204.07	1.17
<b>p0_score:</b>	9.40															
<b>p1_score:</b>	9.32															
<b>p2_score:</b>	9.37															

<b>Infrastructure_Operations_Scores:</b>							vMotion	SVMotion	XVMotion	Deploy
<b>Completed_Ops_PerHour</b>							56.00	42.00	36.00	14.00
<b>Avg_Seconds_To_Complete</b>							6.77	136.80	159.39	467.93
<b>Failures</b>							0.00	0.00	0.00	0.00
<b>Ratio</b>							2.15	2.33	2.00	1.75
<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(p2)
<b>Unreviewed_VMmark3_Applications_Score</b>							9.37			
<b>Unreviewed_VMmark3_Infrastructure_Score</b>							2.05			
<b>Unreviewed_VMmark3_Score</b>							7.91			

## Configuration

Virtualization Software	
Hypervisor Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY)	VMware ESXi 7.0.0 Build 15843807 / 04-02-2020
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
<b>Servers</b>	
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 6230
Processor Speed (GHz) / Turbo Boost Speed (GHz)	2.1 / 3.9
Total Sockets/Total Cores/Total Threads	2 Sockets / 40 Cores / 80 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	27.5MB I+D on chip per chip
BIOS Version	7.73(U47)
Memory Size (in GB, Number of DIMMs)	384GB,12*32GB
Memory Type and Speed	32GB,288pin,2933000KHz,2Rank(2G*8bit)
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
<b>Network</b>	
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
<b>Primary Storage</b>	
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")
<b>Datacenter Management Server</b>	
System Model	Huawei FusionServer 2288H V5
Processor Vendor and Model	Intel Xeon Gold 6240
Processor Speed (GHz)	2.6
Total Sockets/Total Cores/Total Threads	2 Sockets / 36 Cores / 72 Threads
Memory Size (in GB, Number of DIMMs)	768GB,24*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
<b>Clients</b>	
Total Number of Virtual Clients / Virtual Client Hosts	9 / 3
System Model(s)	Huawei FusionServer 2288H V5

Processor Vendor(s) and Model(s)	Intel Xeon Gold 6242R
Processor Speed(s) (GHz)	3.10
Total Sockets/Total Cores/Total Threads	2 Sockets / 40Cores /80 Threads
Memory per Virtual Client Host	256GB,8*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 vmnic1 and vSAN traffic running on 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 500GB 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\*, DS3DB\*, ElasticDB\* 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.

- **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/SuppressShellWarning = 1 (default : 0)
- 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 6230 CPU @ 2.10GHz
- o 12 x samsung 32GB 2933 DIMM
- 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 6226R CPU @ 2.90GHz
- ◆ 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-GD480
- ◆ LSI SAS3004

o Firmware:

- ◆ BIOS - 7.73 (U47)
- ◆ BMC - 5.12 (U4282)
- ◆ X722 - 3.33
- ◆ SM380 - 14.22.1002
- ◆ 2TB P4510 (SSDPE2KX020T8) - VDV10152
- ◆ SSSTC ER2-GD480 - E4N6404

o Software:

- ◆ CentOS-7-x86\_64-DVD-1810/ Updates as of 06/20/2019

o Configuration:

- ◆ Disks installed into Bays 2,3,4,5,6,7,8,9,10,11,14,15
- ◆ 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

- vmnic4 and its associated vSAN vSwitch were set to MTU of 9000.
- 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/SuppressShellWarning = 1 (default : 0)
- o /adv/UserVars/HostClientSessionTimeout = 0 (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 ES3600P V3 3.2T for caching and 1 x ES3600P V3 3.2T for capacity.
- o vSAN Default Storage Policy used.

o vsanDatastore contains the following Client VMs:

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

## Other Notes

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

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