VMmark® 3.1.1 Results

Server Vendor & Model: xFusion Digital Technologies Co.,Ltd 2288H V6 **Storage Vendor & Model: VMware vSAN 7.0 U3 - All Flash** **Hypervisor: VMware ESXi 7.0 U3c Build 19193900** **Datacenter Management Software: VMware vCenter 7.0 U3c Build 19234570**	**VMmark 3.1.1 Score = 10.27 @ 9 Tiles**

Number of Hosts: 4	**Uniform Hosts [yes/no]: yes**	**Total sockets/cores/threads in test: 8/144/288**
Tested By: xFusion Digital Technologies Co.,Ltd	**Test Date: 08-17-2022**	

Performance Section	**Configuration Section**	**Notes Section**
Performance	Configuration	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	3574.36	0.99	0.24 | 0.00	563.12	0.98	0.22 | 0.00	1155.58	1.57	357.49	875.02	1.75	406.64	631.25	1.82	444.02	1.37
p1	3552.54	0.99	0.23 | 0.00	560.04	0.98	0.28 | 0.00	1157.00	1.58	352.61	842.38	1.68	406.16	633.08	1.83	440.23	1.36
p2	3536.46	0.98	0.23 | 0.00	559.67	0.98	0.22 | 0.00	1162.60	1.58	352.95	847.17	1.69	403.97	605.88	1.75	440.59	1.35
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	3588.77	1.00	0.23 | 0.00	569.05	0.99	0.24 | 0.01	1131.00	1.54	403.33	850.88	1.70	460.24	611.55	1.76	510.93	1.36
p1	3568.26	0.99	0.23 | 0.00	564.49	0.99	0.26 | 0.01	1142.95	1.56	381.50	826.52	1.65	438.79	620.85	1.79	477.83	1.35
p2	3545.56	0.99	0.23 | 0.00	562.05	0.98	0.25 | 0.00	1146.38	1.56	383.44	830.88	1.66	439.41	592.80	1.71	482.20	1.34
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	3572.23	0.99	0.24 | 0.00	567.50	0.99	0.27 | 0.00	1168.85	1.59	335.78	885.67	1.77	377.68	642.48	1.85	416.06	1.39
p1	3568.74	0.99	0.25 | 0.00	563.19	0.98	0.29 | 0.06	1169.55	1.59	334.21	856.00	1.71	378.67	643.95	1.86	411.72	1.38
p2	3540.99	0.98	0.24 | 0.00	561.37	0.98	0.21 | 0.01	1170.97	1.59	332.63	858.08	1.71	374.16	616.52	1.78	405.42	1.36
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	3582.30	1.00	0.26 | 0.00	570.68	1.00	0.25 | 0.00	1154.78	1.57	361.48	870.05	1.74	412.14	632.00	1.82	453.18	1.38
p1	3564.44	0.99	0.24 | 0.00	566.43	0.99	0.22 | 0.00	1162.72	1.58	350.15	847.30	1.69	404.94	636.12	1.83	441.54	1.37
p2	3553.65	0.99	0.24 | 0.00	561.00	0.98	0.25 | 0.02	1158.15	1.58	351.67	845.98	1.69	402.24	607.00	1.75	449.99	1.35
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	3585.65	1.00	0.26 | 0.00	572.68	1.00	0.34 | 0.01	1150.85	1.57	361.07	868.60	1.74	408.68	629.73	1.82	451.20	1.38
p1	3570.27	0.99	0.24 | 0.00	568.80	0.99	0.31 | 0.01	1153.72	1.57	360.48	837.70	1.67	414.63	629.88	1.82	457.04	1.36
p2	3559.78	0.99	0.24 | 0.00	559.47	0.98	0.25 | 0.02	1154.45	1.57	359.49	839.35	1.68	415.16	595.30	1.72	467.17	1.34
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	3583.52	1.00	0.23 | 0.00	566.31	0.99	0.20 | 0.01	1120.53	1.53	420.57	842.08	1.68	473.47	604.45	1.74	528.67	1.35
p1	3566.24	0.99	0.24 | 0.00	564.88	0.99	0.23 | 0.02	1143.40	1.56	374.11	833.12	1.66	430.87	595.45	1.72	477.89	1.34

p2	3556.71	0.99	0.22 | 0.00	561.03	0.98	0.20 | 0.00	1138.38	1.55	386.22	834.67	1.67	432.70	621.08	1.79	479.75	1.35
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	3576.44	0.99	0.23 | 0.00	563.13	0.98	0.23 | 0.00	1171.30	1.60	332.69	916.73	1.83	370.56	671.45	1.94	411.69	1.41
p1	3565.00	0.99	0.23 | 0.00	560.43	0.98	0.27 | 0.02	1169.85	1.59	333.56	827.05	1.65	382.24	612.33	1.77	421.72	1.35
p2	3554.61	0.99	0.23 | 0.00	562.62	0.98	0.22 | 0.00	1169.60	1.59	336.32	886.85	1.77	374.21	643.70	1.86	409.29	1.38
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	3588.12	1.00	0.27 | 0.00	566.24	0.99	0.31 | 0.00	1135.85	1.55	393.16	852.77	1.70	450.20	647.92	1.87	493.97	1.37
p1	3572.98	0.99	0.27 | 0.00	561.52	0.98	0.23 | 0.00	1154.45	1.57	359.72	843.15	1.68	414.74	602.25	1.74	462.07	1.35
p2	3557.51	0.99	0.26 | 0.00	563.10	0.98	0.26 | 0.01	1159.33	1.58	357.92	871.58	1.74	404.88	631.90	1.82	451.39	1.37
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	3585.32	1.00	0.23 | 0.00	565.78	0.99	0.23 | 0.01	1161.20	1.58	350.18	877.88	1.75	394.64	665.38	1.92	433.76	1.39
p1	3572.66	0.99	0.23 | 0.00	563.80	0.99	0.24 | 0.01	1159.28	1.58	352.84	844.75	1.69	405.12	605.75	1.75	449.07	1.35
p2	3561.46	0.99	0.23 | 0.00	559.07	0.98	0.23 | 0.01	1168.17	1.59	343.10	879.90	1.76	388.68	640.12	1.85	423.31	1.38

p0_score:	12.39
p1_score:	12.22
p2_score:	12.23

Infrastructure_Operations_Scores:	vMotion	SVMotion	XVMotion	Deploy
Completed_Ops_PerHour	57.00	50.00	40.00	20.00
Avg_Seconds_To_Complete	5.12	90.48	114.24	308.60
Failures	0.00	0.00	0.00	0.00
Ratio	2.19	2.78	2.22	2.50
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	12.23	
Unreviewed_VMmark3_Infrastructure_Score	2.41	
Unreviewed_VMmark3_Score	10.27	

Configuration

Virtualization Software	
Hypervisor Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY)	VMware ESXi 7.0 U3c Build 19193900 / 01-27-2022
Datacenter Management Software Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY)	VMware vCenter 7.0 U3c Build 19234570 / 01-27-2022
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	xFusion Digital Technologies Co.,Ltd 2288H V6
Processor Vendor and Model	Intel Xeon Gold 6354 CPU @ 3.00GHz
Processor Speed (GHz) / Turbo Boost Speed (GHz)	3.00 / 3.60
Total Sockets/Total Cores/Total Threads	2 Sockets / 36 Cores / 72 Threads
Primary CPU Cache	32KB I + 48KB D on chip per core
Secondary CPU Cache	1.25MB I+D on chip per core
Other CPU Cache	39MB I+D on chip per chip
BIOS Version	1.06 (U1007)
Memory Size (in GB, Number of DIMMs)	1024GB, 16*64GB
Memory Type and Speed	64GB, 3200MHz, DDR4, 2Rank (4G*4bit)
Disk Subsystem Type	VMware vSAN, NFS
Number of Disk Controllers	1
Disk Controller Vendors and Models	AVAGO SAS3408
Total Number of Physical Disks for Hypervisor	2
Disk Vendors, Models, Capacities, and Speeds	Intel S4510, 960GB, 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 SC382 2*25GE SFP+, Huawei SC382 2*25GE SFP+ (1 port used)
Other Hardware	none
Other Software	none
Hardware Availability Date (MM-DD-YYYY)	01-25-2022
BIOS Availability Date (MM-DD-YYYY)	06-20-2022
Software Availability Date (MM-DD-YYYY)	01-27-2022
Network	
Network Switch Vendors and Models	Huawei CE6865-48S8CQ-EI Huawei CE5855-48T4S2Q-EI
Network Speed	3*25GE
Primary Storage	
Storage Category	vSAN
Storage Vendors, Models, and Firmware Versions	4*xFusion Digital Technologies Co.,Ltd 2288H V6
Storage Configuration Summary	VMware vSAN (caching tier): Intel DC P4610 SSDPE2KE016TB (1.6TB 2.5"), VMware vSAN (capacity tier): Intel DC P4510 SSDPE2KX020T8 (2TB 2.5")

Datacenter Management Server	
System Model	xFusion Digital Technologies Co.,Ltd 2288H V5
Processor Vendor and Model	Intel Xeon Gold 6226 CPU @ 2.7GHz
Processor Speed (GHz)	2.7
Total Sockets/Total Cores/Total Threads	2 Sockets / 24 Cores / 48 Threads
Memory Size (in GB, Number of DIMMs)	384GB, 12*32GB, 2933MHz
Network Controller(s) Vendors and Models	Huawei LOM X722 2*10GE+2*1GE Huawei SM380 2*25GE SFP+
Operating System, Version, Bitness, and Service Pack	VMware ESXi 7.0 U3c Build 19193900
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 U3c Build 19234570
Other Hardware	none
Other Software	none

Clients	
Total Number of Virtual Clients / Virtual Client Hosts	10 / 3
System Model(s)	xFusion Digital Technologies Co.,Ltd 2288H V5
Processor Vendor(s) and Model(s)	Intel Xeon Gold 6252 CPU @ 2.10GHz
Processor Speed(s) (GHz)	2.10
Total Sockets/Total Cores/Total Threads	2 Sockets / 48 Cores / 96 Threads
Memory per Virtual Client Host	384GB, 12*32GB, 2933MHz
Network Controller(s) Vendors and Models	Huawei LOM X722 2*10GE+2*1GE (not used), Huawei SM380 2*25GE SFP+
Virtual Client Networking Notes	All management traffic and workload traffic running on one vmnic4 and vSAN traffic running on one vmnic5.
Virtual Client Storage Notes	All clients stored on vSAN datastore.
Other Hardware	none
Other Software	VMware ESXi 7.0 U3c Build 19193900

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: Thin

Virtualization Software Notes

- PrimeClient VM configured with a 500GB sized second disk and a 500GB sized third disk for scratch (default 200GB second disk, no third disk).
- Cluster DRS Automation level set to Fully Automated.
- DRS Migration threshold set to level 2.
- Logging was disabled for all VMs (default: enabled).
- Logical CPU configuration changed for all multi-cpu VMs to one socket with multiple cores (default: Single core per socket).
- The CPU Shares of PrimeClient, all DS3DB* and Client* set to "high" (default: normal).
- 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:**

  - CPU performance policy = High Performance (default: balanced)
  - /vmkernel/hyperthreadingMitigation = true (default: false)
  - /UserVars/HostClientSessionTimeout = 0 (default: 900)
  - /UserVars/HostClientCEIPOptIn = 1 (default: 0)
  - /vmkernel/module/tcpip4/options = "ipv6=0" (default: "ipv6=1")

Networking Notes

- MTU was set to 9000 for vmnic0, vmnic1 and vmnic2, and MTU was set to 9000 for VM Network, vSAN and vMotion vSwitches.
- Three Standard vSwitches were set up: vSwitch0, vSAN and vMotion.
- These three switches were backed by vmnic0, vmnic1 and vmnic2 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.
- All vMotion traffic is only run on vMotion on its only dedicated vSwitch.

Storage Notes

- All client hosts OS installed on a RAID1 of 2 m.2 drives via SSSTC ER2-GD480.
- All SUT hosts OS installed on a RAID1 of 2 sata drives via Intel S4510 960G.

- **NFS Folder configuration**

o All folders are backed by two physical servers acted as NFS on a single striped zfs array, mounted storage device detailed in the "Secondary Shared Storage Device" section.
o deploy1 datastore -> /data/deploy1 belongs to "nfs1".
o deploy2 datastore -> /data/deploy2 belongs to "nfs2".
o vmotion1 datastore -> /data/vmotion1 belongs to "nfs1".
o vmotion2 datastore -> /data/vmotion2 belongs to "nfs2".

• System under Test configuration

o 4 x 4 x Intel(R) Xeon(R) Gold 6354 CPU @ 3.00GHz
o 4 x 16 x Hynix 64GB, 3200MHz, 2Rank (4G*4bit)
o 4 x 2 x Intel P4610 1.6TB NVMe
o 4 x 6 x Intel P4510 2TB NVMe
o 4 x 2 x Huawei SC382 2*25GE SFP+
o 4 x 2 x Intel S4510 960G
o 4 x AVAGO SAS3408

• Software configuration

o All Flash vSAN.
o Two diskgroups per host.
o Each disk group contains 1 x Intel P4610 1.6TB for caching and 3 x Intel P4510 2.0TB 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*
♦ DS3WebA*
♦ DS3WebB*
♦ DS3WebC*
♦ ElasticAppA*
♦ ElasticAppB*
♦ ElasticDB*
♦ ElasticLB*
♦ ElasticWebA*
♦ ElasticWebB*
♦ Standby*

• Secondary Shared Storage Device:

o Hardware: xFusion Digital Technologies Co.,Ltd 2288H V5
♦ 2 x xFusion Digital Technologies Co.,Ltd 2288H V5
♦ 2 x 2 x Intel(R) Xeon(R) Gold 6226R CPU @ 2.90GHz

♦ 2 x 12 x Samsung 32GB 2933 DIMM
♦ 2 x Huawei LOM X722 2*10GE+2*1GE
♦ 2 x Huawei SM380 2*25GE SFP+
♦ 2 x 4 x Intel P4610 1.6TB (SSDPE2KE016T8) NVMe SSD's
♦ 2 x 2 x SSSTC ER2-GD480
♦ 2 x LSI SAS3004

o Firmware:
♦ BIOS - 7.99 (U47)
♦ BMC - 6.38 (U4282)
♦ X722 - 3.33
♦ SM380 - 14.28.1300
♦ 1.6TB P4610 (SSDPE2KE016T8) - VDV10184
♦ SSSTC ER2-GD480 - E4N6404

o Software:
♦ CentOS-7-x86_64-DVD-2009.iso/ Updates as of 11/04/2020

o Configuration:
♦ Disks installed into Bays 2,3,4,5 per host
♦ All 4 disks mounted to /data per host
♦ Network ports for SM380 set to MTU 9000 per host
♦ ufw disabled per host

o Virtual Machine LUN Distribution:
♦ deploy1 contains the following workload: deploy1, belongs to "nfs1".
♦ deploy2 contains the following workload: deploy2, belongs to "nfs2".
♦ vmotion1 contains the following workload: vmotion1, belongs to "nfs1".
♦ vmotion2 contains the following workload: vmotion2, belongs to "nfs2".

Datacenter Management Server Notes

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

Operating System Notes

• NIC driver was installed using "Mellanox-nmlx5_4.21.71.101-1OEM.702.0.0.17630552_18117880.zip"

Software Notes

• none

Client Notes

• Cluster DRS Automation level set to Fully Automated.
• DRS Migration threshold set to level 2.
• MTU was set to 9000 for vmnic4 and MTU was set to 9000 for vSwitch of VM Network and Management.
• MTU was set to 9000 for vmnic5 and MTU was set to 9000 for vSwitch of vSAN.
• The CPU Shares of PrimeClient and all Client* set to "high" (default: normal).

• **ESXi settings of Client hosts:**

o CPU performance policy = High Performance (default: balanced)
o /vmkernel/hyperthreadingMitigation = true (default: false)
o /UserVars/HostClientSessionTimeout = 0 (default: 900)
o /UserVars/HostClientCEIPOptIn = 1 (default: 0)
o /vmkernel/module/tcpip4/options = "ipv6=0" (default: "ipv6=1")

• vSAN configuration

o All Flash vSAN.
o One diskgroup per host.
o Each disk group contains 1 x Intel P4610 1.6TB for caching and 1 x Intel P4510 2.0T 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 (default: 0)
• VMmark3.properties - VCscratchDir = /root/VMmark3/results/scratch (default: /root/VMmark3/samples/)
• VMmark3.properties - VCsupportTimeOut = 4800 (default: 2400)
• VMmark3.properties - TileDelay = 10 (default: 60)
