

## VMmark® 3.1.1 Results

**Server Vendor & Model: Dell PowerEdge R860**  
**Storage Vendor & Model: Dell EMC Powerstore 5000T**  
**Hypervisor: VMware ESXi 8.0 Update 2, Build 22380479**  
**Datacenter Management Software: VMware vCenter Server 8.0 Update 2, Build 22385739**

**VMmark 3.1.1 Score =**  
**23.85 @ 25 Tiles**

Number of Hosts: 2	Uniform Hosts [yes/no]: yes	Total sockets/cores/threads in test: 8/256/512
Tested By: Dell Technologies		Test Date: 12-17-2023
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	3577.29	0.99	0.43   0.00	566.47	0.99	0.60   0.31	991.20	1.35	673.41	701.23	1.40	784.74	494.32	1.43	865.70	1.22
p1	3558.74	0.99	0.45   0.00	566.01	0.99	0.69   0.44	987.38	1.34	685.76	729.70	1.46	777.49	521.75	1.50	847.40	1.24
p2	3548.52	0.99	0.45   0.00	563.32	0.98	0.57   0.30	984.25	1.34	688.89	695.17	1.39	805.82	512.23	1.48	881.39	1.22
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	3570.62	0.99	1.61   0.09	569.92	1.00	0.85   0.64	1006.02	1.37	630.73	713.65	1.43	733.78	501.35	1.45	823.69	1.23
p1	3550.47	0.99	1.87   0.22	562.31	0.98	0.46   0.22	1003.48	1.37	651.82	734.58	1.47	750.25	524.05	1.51	838.81	1.24
p2	3545.38	0.99	1.32   0.12	558.35	0.98	0.50   0.25	1002.23	1.36	644.93	711.70	1.42	745.96	523.42	1.51	829.37	1.23
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	3588.67	1.00	0.60   0.00	569.52	1.00	0.90   0.54	983.35	1.34	686.41	697.52	1.39	803.43	485.85	1.40	898.77	1.21
p1	3562.64	0.99	0.60   0.00	563.93	0.99	0.72   0.50	976.65	1.33	692.73	720.67	1.44	796.96	517.15	1.49	882.04	1.23
p2	3555.34	0.99	0.58   0.00	555.69	0.97	0.43   0.15	978.23	1.33	701.95	691.02	1.38	814.61	508.50	1.47	905.92	1.21
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	3579.51	0.99	0.32   0.00	565.33	0.99	0.45   0.33	1001.33	1.36	642.53	718.38	1.44	731.21	499.00	1.44	825.42	1.23
p1	3566.04	0.99	0.37   0.00	565.23	0.99	0.47   0.40	995.67	1.36	652.57	738.27	1.48	736.94	524.10	1.51	824.44	1.24
p2	3547.27	0.99	0.35   0.00	561.45	0.98	0.45   0.24	1000.08	1.36	652.31	713.45	1.43	734.83	502.60	1.45	819.85	1.22
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	3585.44	1.00	0.59   0.00	565.69	0.99	0.44   0.22	880.55	1.20	995.34	589.58	1.18	1224.46	384.57	1.11	1394.98	1.09
p1	3572.19	0.99	0.60   0.00	568.83	0.99	0.49   0.20	869.45	1.18	1021.45	612.48	1.22	1224.15	440.43	1.27	1396.28	1.13
p2	3566.14	0.99	0.58   0.00	565.48	0.99	0.54   0.36	879.02	1.20	998.96	573.73	1.15	1208.48	403.85	1.16	1382.74	1.09
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	3571.97	0.99	0.47   0.01	564.77	0.99	0.81   0.65	895.60	1.22	931.52	600.95	1.20	1091.95	399.73	1.15	1280.87	1.11

<b>p1</b>	3570.18	0.99	0.46   0.00	564.07	0.99	0.61   0.41	884.85	1.20	963.68	631.73	1.26	1124.10	460.80	1.33	1267.62	1.15
<b>p2</b>	3556.53	0.99	0.49   0.03	560.44	0.98	0.43   0.30	907.98	1.24	902.83	628.20	1.26	1066.13	424.50	1.22	1248.28	1.13
<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>	3586.78	1.00	0.37   0.00	573.05	1.00	0.77   0.47	985.33	1.34	684.70	700.65	1.40	798.80	477.82	1.38	932.58	1.21
<b>p1</b>	3574.12	0.99	0.39   0.00	566.88	0.99	0.54   0.32	975.98	1.33	700.70	723.27	1.45	791.52	527.40	1.52	900.28	1.24
<b>p2</b>	3559.90	0.99	0.39   0.00	563.47	0.98	0.41   0.17	982.48	1.34	692.98	694.88	1.39	805.86	477.80	1.38	927.30	1.20
<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>	3553.98	0.99	1.42   0.12	563.16	0.98	0.58   0.39	978.67	1.33	709.57	689.00	1.38	827.72	475.10	1.37	950.35	1.20
<b>p1</b>	3541.43	0.98	1.76   0.23	557.25	0.97	0.44   0.19	974.83	1.33	707.92	718.98	1.44	805.24	526.77	1.52	916.98	1.23
<b>p2</b>	3526.29	0.98	1.32   0.14	560.60	0.98	0.47   0.24	986.98	1.34	692.08	693.33	1.39	798.71	480.85	1.39	923.14	1.20
<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>	3580.41	1.00	0.58   0.00	568.58	0.99	0.66   0.45	886.27	1.21	979.64	597.65	1.19	1175.49	406.75	1.17	1360.33	1.11
<b>p1</b>	3568.54	0.99	0.62   0.00	564.90	0.99	0.49   0.27	873.62	1.19	1006.05	617.62	1.23	1169.57	444.80	1.28	1360.15	1.13
<b>p2</b>	3546.57	0.99	0.57   0.02	560.58	0.98	0.39   0.29	893.58	1.22	954.49	607.55	1.21	1156.96	390.57	1.13	1349.70	1.10
<b>TILE_9</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>	3575.74	0.99	0.39   0.00	567.15	0.99	0.67   0.49	934.58	1.27	830.50	648.45	1.30	974.88	448.62	1.29	1088.05	1.16
<b>p1</b>	3562.62	0.99	0.36   0.00	563.19	0.98	0.50   0.24	933.98	1.27	828.85	673.42	1.35	969.71	494.77	1.43	1073.88	1.19
<b>p2</b>	3548.71	0.99	0.40   0.00	558.57	0.98	0.63   0.41	936.17	1.27	807.02	650.85	1.30	955.94	452.77	1.31	1094.66	1.16
<b>TILE_10</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>	3571.19	0.99	0.40   0.00	563.81	0.99	0.45   0.29	988.83	1.35	681.00	704.62	1.41	783.04	488.73	1.41	888.27	1.21
<b>p1</b>	3558.09	0.99	0.42   0.01	565.87	0.99	0.52   0.28	980.83	1.34	696.70	717.70	1.43	814.16	531.48	1.53	909.56	1.23
<b>p2</b>	3539.41	0.98	0.43   0.02	561.11	0.98	0.48   0.28	992.55	1.35	668.53	707.67	1.41	778.17	490.35	1.41	877.67	1.21
<b>TILE_11</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>	3565.73	0.99	0.49   0.00	565.09	0.99	0.72   0.38	963.77	1.31	727.89	688.92	1.38	831.04	474.10	1.37	952.11	1.19
<b>p1</b>	3557.40	0.99	0.49   0.01	562.68	0.98	0.48   0.24	970.40	1.32	715.44	711.25	1.42	829.56	521.50	1.50	921.44	1.22
<b>p2</b>	3543.02	0.98	0.53   0.04	560.10	0.98	0.45   0.18	980.35	1.34	695.00	671.12	1.34	807.55	459.43	1.32	921.84	1.18
<b>TILE_12</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>	3577.12	0.99	0.41   0.00	564.19	0.99	0.66   0.40	970.38	1.32	720.66	716.35	1.43	823.39	502.40	1.45	935.01	1.22
<b>p1</b>	3563.58	0.99	0.42   0.00	560.13	0.98	0.59   0.29	978.52	1.33	709.25	689.90	1.38	824.50	504.98	1.46	924.46	1.21
<b>p2</b>	3551.75	0.99	0.43   0.02	555.77	0.97	0.57   0.35	978.67	1.33	704.30	691.67	1.38	810.93	484.62	1.40	917.51	1.20
<b>TILE_13</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>	3571.78	0.99	1.44   0.18	568.98	0.99	1.04   0.68	895.38	1.22	937.35	641.48	1.28	1100.60	438.55	1.26	1276.28	1.14
<b>p1</b>	3562.07	0.99	1.01   0.02	564.51	0.99	0.93   0.58	901.48	1.23	929.71	623.27	1.25	1094.63	438.02	1.26	1277.76	1.14
<b>p2</b>	3547.00	0.99	0.91   0.01	558.83	0.98	0.58   0.35	906.25	1.23	911.71	629.80	1.26	1059.66	425.85	1.23	1235.17	1.13
<b>TILE_14</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>	3574.04	0.99	0.38   0.00	568.07	0.99	0.67   0.37	945.83	1.29	773.91	704.83	1.41	847.97	492.57	1.42	981.83	1.21

<b>p1</b>	3552.41	0.99	0.41   0.00	568.26	0.99	0.69   0.39	946.67	1.29	774.41	673.10	1.34	880.04	487.85	1.41	983.29	1.19
<b>p2</b>	3532.83	0.98	0.44   0.03	562.77	0.98	0.52   0.27	960.33	1.31	747.48	676.48	1.35	873.77	467.68	1.35	1012.79	1.18
<b>TILE_15</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>	3585.43	1.00	0.40   0.04	566.54	0.99	0.44   0.27	981.70	1.34	679.29	732.05	1.46	754.92	519.88	1.50	848.59	1.24
<b>p1</b>	3560.63	0.99	0.39   0.03	562.77	0.98	0.45   0.36	958.08	1.30	743.03	680.77	1.36	866.38	493.55	1.42	966.31	1.20
<b>p2</b>	3549.20	0.99	0.39   0.01	560.58	0.98	0.39   0.16	969.60	1.32	711.12	693.38	1.39	805.86	485.62	1.40	909.98	1.20
<b>TILE_16</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>	3578.82	0.99	0.68   0.01	564.57	0.99	0.43   0.21	974.83	1.33	711.58	722.98	1.44	801.48	503.32	1.45	925.80	1.22
<b>p1</b>	3568.36	0.99	0.67   0.00	564.88	0.99	0.52   0.24	980.48	1.34	704.92	690.00	1.38	833.09	498.93	1.44	941.64	1.21
<b>p2</b>	3552.04	0.99	0.68   0.03	561.56	0.98	0.38   0.14	985.83	1.34	691.19	701.02	1.40	798.42	487.82	1.41	900.38	1.21
<b>TILE_17</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>	3563.52	0.99	0.68   0.01	564.46	0.99	0.53   0.30	907.30	1.24	888.66	657.95	1.31	1014.60	456.48	1.32	1152.97	1.16
<b>p1</b>	3557.57	0.99	0.65   0.00	561.09	0.98	0.43   0.21	922.73	1.26	842.90	637.95	1.27	1020.94	440.88	1.27	1138.77	1.15
<b>p2</b>	3548.92	0.99	0.66   0.04	562.01	0.98	0.51   0.24	916.70	1.25	855.39	644.08	1.29	997.11	458.20	1.32	1147.72	1.16
<b>TILE_18</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>	3566.68	0.99	1.11   0.00	568.02	0.99	0.39   0.43	956.55	1.30	746.92	740.15	1.48	817.53	529.17	1.53	916.47	1.24
<b>p1</b>	3550.42	0.99	1.12   0.00	566.28	0.99	0.71   0.47	960.10	1.31	736.58	665.33	1.33	833.24	482.00	1.39	943.23	1.19
<b>p2</b>	3539.16	0.98	1.00   0.00	560.76	0.98	0.48   0.34	958.92	1.31	744.33	708.05	1.41	851.23	500.12	1.44	951.82	1.21
<b>TILE_19</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>	3568.75	0.99	1.22   0.07	563.89	0.99	0.49   0.37	910.62	1.24	881.86	660.52	1.32	1019.27	477.82	1.38	1166.83	1.17
<b>p1</b>	3552.82	0.99	1.43   0.10	564.21	0.99	0.54   0.29	926.75	1.26	833.50	650.33	1.30	981.41	440.73	1.27	1141.95	1.15
<b>p2</b>	3539.85	0.98	1.10   0.04	557.08	0.97	0.70   0.43	917.67	1.25	860.55	666.92	1.33	997.19	458.07	1.32	1145.65	1.16
<b>TILE_20</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>	3579.93	0.99	0.44   0.00	563.57	0.98	0.52   0.30	988.40	1.35	672.41	720.48	1.44	786.62	546.85	1.58	832.47	1.25
<b>p1</b>	3571.12	0.99	0.43   0.00	560.93	0.98	0.31   0.18	992.83	1.35	666.75	696.75	1.39	788.97	492.25	1.42	873.26	1.21
<b>p2</b>	3556.98	0.99	0.42   0.02	556.97	0.97	0.55   0.34	984.02	1.34	686.95	715.88	1.43	798.36	514.88	1.48	871.49	1.22
<b>TILE_21</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>	3567.28	0.99	1.54   0.09	570.20	1.00	0.91   0.60	881.27	1.20	956.04	636.50	1.27	1117.09	462.93	1.33	1244.49	1.15
<b>p1</b>	3558.06	0.99	1.52   0.16	564.59	0.99	0.67   0.32	895.50	1.22	934.79	621.83	1.24	1107.33	421.85	1.22	1258.42	1.12
<b>p2</b>	3540.60	0.98	1.37   0.13	562.84	0.98	0.50   0.25	889.05	1.21	932.89	647.85	1.29	1072.44	449.57	1.30	1221.69	1.14
<b>TILE_22</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>	3580.00	1.00	0.40   0.00	567.12	0.99	0.47   0.26	872.42	1.19	1000.55	616.08	1.23	1195.08	445.85	1.29	1352.75	1.13
<b>p1</b>	3553.79	0.99	0.40   0.00	563.99	0.99	0.42   0.24	878.95	1.20	999.36	596.92	1.19	1194.23	390.15	1.12	1352.00	1.09
<b>p2</b>	3547.41	0.99	0.40   0.00	556.89	0.97	0.42   0.24	874.42	1.19	998.01	624.88	1.25	1161.86	455.77	1.31	1303.13	1.13
<b>TILE_23</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>	3575.97	0.99	0.60   0.01	569.30	0.99	0.72   0.39	882.65	1.20	949.22	638.38	1.28	1100.35	466.48	1.35	1230.63	1.15

<b>p1</b>	3563.30	0.99	0.57   0.00	566.07	0.99	0.76   0.63	888.45	1.21	937.87	626.23	1.25	1083.01	405.90	1.17	1246.51	1.12
<b>p2</b>	3554.31	0.99	0.58   0.04	564.48	0.99	0.79   0.48	886.35	1.21	938.18	650.33	1.30	1053.77	471.77	1.36	1193.71	1.16
<b>TILE_24</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>	3581.30	1.00	0.42   0.00	567.65	0.99	0.46   0.21	871.15	1.19	1003.40	614.75	1.23	1199.33	429.20	1.24	1350.62	1.12
<b>p1</b>	3563.23	0.99	0.43   0.00	566.93	0.99	0.49   0.33	877.70	1.20	996.21	578.15	1.16	1201.17	406.45	1.17	1371.63	1.10
<b>p2</b>	3540.19	0.98	0.41   0.00	563.16	0.98	0.42   0.16	874.80	1.19	998.63	623.15	1.25	1165.58	454.27	1.31	1320.33	1.13
<b>p0_score:</b>	29.55															
<b>p1_score:</b>	29.53															
<b>p2_score:</b>	29.38															

<b>Infrastructure_Operations_Scores:</b>	vMotion	SVMotion	XVMotion	Deploy
<b>Completed_Ops_PerHour</b>	28.50	24.00	19.00	9.00
<b>Avg_Seconds_To_Complete</b>	5.37	103.54	120.85	369.75
<b>Failures</b>	0.00	0.00	0.00	0.00
<b>Ratio</b>	1.10	1.33	1.06	1.12
<b>Number_Of_Threads</b>	1	1	1	1

<b>Summary</b>	Run_Is_Compliant	Turbo_Setting:0
	Number_Of_Compliance_Issues(0)*	Median_Phase(p1)
<b>Unreviewed_VMmark3_Applications_Score</b>	29.53	
<b>Unreviewed_VMmark3_Infrastructure_Score</b>	1.15	
<b>Unreviewed_VMmark3_Score</b>	23.85	

## Configuration

<b>Virtualization Software</b>	
Hypervisor Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY)	VMware ESXi 8.0 Update 2, Build 22380479 / 09-21-2023
Datacenter Management Software Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY)	VMware vCenter Server 8.0 Update 2, Build 22385739 / 09-21-2023
Supplemental Software	None
<b>Servers</b>	
Number of Servers in System Under Test	2

(all subsequent fields in this section are per server)	
Server Manufacturer and Model	Dell PowerEdge R860
Processor Vendor and Model	Intel Xeon Platinum 8454H
Processor Speed (GHz) / Turbo Boost Speed (GHz)	2.10 / 3.40
Total Sockets/Total Cores/Total Threads	4 Sockets / 128 Cores / 256 Threads
Primary CPU Cache	32KB I + 48KB D on chip per core
Secondary CPU Cache	2MB I+D on chip per core
Other CPU Cache	82.5MB I+D on chip per chip
BIOS Version	1.6.6
Memory Size (in GB, Number of DIMMs)	4096,64
Memory Type and Speed	64GB 2Rx4 DDR5 4800 MT/s RDIMMs
Disk Subsystem Type	FC-NVMe SAN
Number of Disk Controllers	1
Disk Controller Vendors and Models	BOSS-N1 Monolithic
Total Number of Physical Disks for Hypervisor	1
Disk Vendors, Models, Capacities, and Speeds	Dell EC NVMe ISE 7400 RI M.2 960GB - no RAID
Number of Host Bus Adapters	1
Host Bus Adapter Vendors and Models	QLogic QLE2772 32Gbps Dual Port Fibre Channel Controller
Number of Network Controllers	2
Network Controller Vendors and Models	2 x Mellanox ConnectX-6 Dx Dual Port 100 GbE QSFP56 Adapter
Other Hardware	None
Other Software	None
Hardware Availability Date (MM-DD-YYYY)	05-24-2023
BIOS Availability Date (MM-DD-YYYY)	11-03-2023
Software Availability Date (MM-DD-YYYY)	09-21-2023

**Network**

Network Switch Vendors and Models	1xDell EMC Z9432F-ON switch
Network Speed	<ul style="list-style-type: none"> <li>• 1x100Gbps for Management,Deploy and DS3* workload VMs</li> <li>• 1x100Gbps for Auction* and Standby workload VMs</li> <li>• 1x100Gbps for vMotion</li> <li>• 1x100Gbps for Elastic* workload VMs</li> </ul>
<b>Primary Storage</b>	
Storage Category	FC-NVMe SAN
Storage Vendors, Models, and Firmware Versions	Dell EMC Powerstore 5200T , 3.2.1.0
Storage Configuration Summary	FC SAN Switch 1 x Connectrix DS6620B 32 Gb FC Switch  Dell EMC Powerstore 5000T: <ul style="list-style-type: none"> <li>• 16 x 3.84TB NVMe SSD</li> <li>• 5 x 1.92TB NVMe SSD</li> </ul>
<b>Datacenter Management Server</b>	
System Model	Dell PowerEdge R7625
Processor Vendor and Model	AMD EPYC 9654
Processor Speed (GHz)	2.4
Total Sockets/Total Cores/Total Threads	2 Sockets / 192 Cores / 384 Threads
Memory Size (in GB, Number of DIMMs)	3072, 24
Network Controller(s) Vendors and Models	Mellanox ConnectX-6 Dx Dual Port 100 GbE QSFP56 Adapter
Operating System, Version, Bitness, and Service Pack	VMware ESXi 8.0 Update 1c Build 22088125
Virtual Center VM Number of vCPUs	8
Virtual Center VM Virtual Memory (in GB)	30
Virtual Center VM Operating System, Version, Bitness, and Service Pack	VMware vCenter Server 8.0 Update 2, Build 22385739
Other Hardware	None
Other Software	None
<b>Clients</b>	
Total Number of Virtual Clients / Virtual Client Hosts	26 / 3
System Model(s)	3 x Dell PowerEdge R7625

Processor Vendor(s) and Model(s)	AMD EPYC 9654
Processor Speed(s) (GHz)	2.4GHz
Total Sockets/Total Cores/Total Threads	2 Sockets/192 Cores/384 Threads
Memory per Virtual Client Host	<ul style="list-style-type: none"> <li>Client1 and Client 2 : 3072GB</li> <li>Client3 : 6144GB</li> </ul>
Network Controller(s) Vendors and Models	<ul style="list-style-type: none"> <li>Client1 and Client2 : Mellanox ConnectX-6 Dx Dual Port 100 GbE QSFP56 Adapter</li> <li>Client2 :Broadcom Corporation NetXtreme BCM5720 Gigabit Ethernet</li> <li>Client3 : Broadcom NetXtreme-E BCM57508 2x100G QSFP PCIE Ethernet Adapter</li> </ul>
Virtual Client Networking Notes	vSwitch0 for Management and Client VMs at 100Gbps (only Client2 has vSwitch1 at 1Gbps for VMware vCenter Server)
Virtual Client Storage Notes	All Virtual Clients are stored on local server storage
Other Hardware	None
Other Software	The client hosts used VMware ESXi 8.0 Update 1c Build 22088125 for operating system

#### 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 Eager

### Virtualization Software Notes

- Logical CPU configuration changed for all multi-CPU VMs to 1 socket with multiple cores (default single core per socket)
- CPU shares set to high for all DS3DB, ElasticDB and ElasticLB VMs (default normal)
- Memory shares set to high for all DS3DB VMs (default normal)
- CDROM removed from all VMs except Prime Client, client and template VMs
- All memory reserved for DS3DB VMs (default non-reserved)

- CPU shares set to low for all Standby VMs (default normal)
- vSphere DRS Migration Threshold set to Fully Automated level 2
- sched.mem.pin set to TRUE for all DS3DB VMs (default False)
- Third virtual disk removed from DS3DB0 before cloning DS3DB VMs for other tiles
- vSphere DRS Advanced Option AggressiveCPUActive set to 1
- Logging disabled for all VMs except template VMs ( default enabled)
- Prime Client's second virtual disk configured to be 1.2TB (default 200GB)

### **SUT Advanced Settings:**

- Cpu.CreditAgePeriod = 1000 (default 3000)
- Cpu.HTWholeCoreThreshold = 0 (default 800)
- DataMover.HardwareAcceleratedInit = 0 (default 1)
- DataMover.HardwareAcceleratedMove = 0 (default 1)
- Disk.IdleCredit = 64 (default 32)
- Disk.ReqCallThreshold = 1 (default 8)
- Mem.CtlMaxPercent = 0 (default 65)
- Mem.ShareScanGHz = 0 (default 4)
- Numa.LTermFairnessInterval = 0 (default 5)
- Numa.LargeInterleve = 0 (default 1)
- Numa.LocalityWeightActionAffinity = 0 (default 130)
- Numa.MigImbalanceThreshold = 57 (default 10)
- Numa.MigPreventLTermThresh = 20 (default 0)
- Numa.MigThreshold = 0 (default 2)
- Numa.MonMigEnable = 0 (default 1)
- Numa.PageMigEnable = 0 (default 1)
- Numa.RebalancePeriod = 60000 (default 2000)
- Numa.SwapLoadEnable = 0 (default 1)
- Numa.SwapLocalityEnable = 0 (default 1)
- VMkernel.Boot.hyperthreadingMitigation = true (default false)
- UserVars.HostClientCEIPOptIn = 2 (default 0)
- Power.CpuPolicy = High Performance (default Balanced)
- UserVars.SuppressShellWarning = 1 (default 0)

The below ESXi module options were set to enable FC/NVMe support:

- qlnativefc: ql2xnvmesupport=1
- vmknvme: vmknvme\_hostnqn\_format=0

### **Server Notes**

Server BIOS Settings:

- Fan speed Offset = Maximum (default off)
- Opportunistic Snoop Broadcast = Disabled (default Auto)
- Hardware Prefetcher = Disabled (default enabled)



- Optimizer mode = Enabled (default Auto)
- Sub-Numa Node = 2 Way Clustering (default disabled)
- MADT Core Enumeration = Linear (default Round Robin)
- System Profile Settings = Performance (default Performance Per Watt (DAPC))

## Networking Notes

### SUT cluster - vSwitch Configuration

- vSwitch0 for Management, Deploy and DS3\* VMS on vmnic0 at 100Gbps
- vSwitch1 for Auction\* and Standby VMs on vmnic1 at 100Gbps
- vSwitch2 for vMotion on vmnic2 at 100Gbps
- vSwitch3 for Elastic\* workload on vmnic3 at 100Gbps
- All vSwitches, vmnic0 - vmnic3, vmk0 - vmk2 have MTU set to 9000 (default 1500)

## Storage Notes

SUT - OS installed on Dell EC NVMe ISE 7400 RI M.2 960GB

Dell EMC Powerstore 5000T

- 16 x 3.84TB NVMe SSD
- 5 x 1.92TB NVMe SSD
- Software Version : 3.2.1.0 (Build 1989710)
- NVMe over FC configured for all LUNs
- All SUT hosts were configured to use LB-IOPS with iops = 1 (default 1000)
- 25x1TB LUNs for each of the Tile VMs (Tile0-Tile24)
- 1TB LUN for Template
- 2TB LUN for Deploy
- 2TB LUN for svmotion
- 1TB LUN for xvmotion

The Client VMs were stored on the local storage on each of the Client Hosts as mentioned below:

- Client1 : 5.7TB (Datastore87)
- Client2 : 5.7TB (Datastore88)
- Client3 : 2.18TB (Datastore89)

## Datacenter Management Server Notes

None

## Operating System Notes

The SUT hosts used Dell customized ESXi 8.0 Update 2 ISO (VMware-VMvisor-Installer-8.0.0.update02-22380479.x86\_64-Dell\_Customized-A00.iso)for OS installation

## Software Notes

None

## Client Notes

The Client VMs were distributed across the client hosts as follows:

- Client1:Client0 - Client8
- Client2:Client9 - Client 16, Prime Client and VMware vCenter Server
- Client3:Client17 - Client24

## Client Host Advanced Settings:

- Cpu.CreditAgePeriod = 1000 (default 3000)
- Cpu.HTWholeCoreThreshold = 0 (default 800)
- Disk.IdleCredit = 64 (default 32)
- Disk.ReqCallThreshold = 1 (default 8)
- Mem.CtlMaxPercent = 0 (default 65)
- Mem.ShareScanGHz = 0 (default 4)
- Numa.LTermFairnessInterval = 0 (default 5)
- Numa.LocalityWeightActionAffinity = 0 (default 130)
- Numa.PageMigEnable = 0 (default 1)
- Numa.RebalancePeriod = 60000 (default 2000)
- Numa.SwapLoadEnable = 0 (default 1)
- Numa.SwapLocalityEnable = 0 (default 1)
- VMkernel.Boot.hyperthreadingMitigation = true (default false)
- UserVars.HostClientCEIPOptIn = 2 (default 0)
- Power.CpuPolicy = High Performance (default Balanced)
- UserVars.SuppressShellWarning = 1 (default 0)

## Client cluster - vSwitch Configuration

- vSwitch0 for Management, Prime Client and all client VMs on vmnic0 at 100Gbps (Only Client2 has vSwitch1 for VMware vCenter Server on vmnic2 at 1Gbps)
- All vSwitches, vmnic0 and vmk0 have MTU set to 9000 (default 1500)

## Other Notes

Changes to VMmark3.properties file:

- TileDelay=10 (default 60)
- VCscratchDir = /root/VMmark3/results/scratch (default /root/VMmark3/samples)

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