

## VMware® VMmark™ V1.1.1 Results

Vendor and Hardware Platform: IBM® BladeCenter HS22  
 Virtualization Platform: VMware ESX 4.0 (Build 161959)

**VMmark V1.1.1 Score =  
24.05 @ 17Tiles**

Tested By: IBM Inc., RTP, NC

Test Date: 06-14-2009

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### Performance

	webserver		javaserver		mailserver		fileserver		database		
	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	GM
<b>TILE_0</b>											
<b>p0</b>	1859.90	1.83	18132.90	1.09	1623.75	1.48	16.78	1.31	2337.10	1.57	1.43
<b>p1</b>	1888.80	1.85	18149.58	1.09	1601.85	1.46	16.91	1.32	2335.65	1.57	1.44
<b>p2</b>	1889.33	1.85	18155.55	1.09	1485.97	1.35	17.07	1.33	2337.95	1.57	1.42
<b>TILE_1</b>											
<b>p0</b>	1867.92	1.83	18123.15	1.09	1718.83	1.57	16.46	1.28	2353.55	1.58	1.45
<b>p1</b>	1889.65	1.85	18123.58	1.09	1624.47	1.48	16.46	1.28	2351.75	1.58	1.43
<b>p2</b>	1893.35	1.86	18129.30	1.09	1643.17	1.50	16.72	1.30	2353.90	1.58	1.44
<b>TILE_2</b>											
<b>p0</b>	1763.97	1.73	18143.45	1.09	1773.88	1.62	15.38	1.20	2363.75	1.58	1.42
<b>p1</b>	1767.97	1.74	18122.47	1.09	1814.75	1.65	15.39	1.20	2362.07	1.58	1.43
<b>p2</b>	1773.45	1.74	18132.10	1.09	1685.35	1.54	15.56	1.21	2360.82	1.58	1.41
<b>TILE_3</b>											
<b>p0</b>	1764.95	1.73	18132.05	1.09	1594.42	1.45	16.98	1.32	2352.75	1.58	1.42
<b>p1</b>	1769.20	1.74	18145.20	1.09	1438.47	1.31	16.90	1.32	2361.22	1.58	1.39
<b>p2</b>	1662.10	1.63	18113.12	1.09	1458.40	1.33	16.88	1.32	2380.80	1.60	1.38
<b>TILE_4</b>											
<b>p0</b>	1763.20	1.73	18126.20	1.09	1569.10	1.43	16.60	1.29	2374.30	1.59	1.41
<b>p1</b>	1763.17	1.73	18127.05	1.09	1523.03	1.39	16.86	1.31	2383.85	1.60	1.41
<b>p2</b>	1763.67	1.73	18117.97	1.09	1503.58	1.37	16.98	1.32	2377.12	1.59	1.40
<b>TILE_5</b>											
<b>p0</b>	1698.85	1.67	18145.45	1.09	1725.05	1.57	16.52	1.29	2345.40	1.57	1.42
<b>p1</b>	1802.70	1.77	18119.00	1.09	1626.00	1.48	16.92	1.32	2352.75	1.58	1.43

<b>p2</b>	1827.45	1.79	18143.75	1.09	1627.70	1.48	17.03	1.33	2357.28	1.58	1.44
<b>TILE_6</b>	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	GM
<b>p0</b>	1777.70	1.74	18162.92	1.09	1646.65	1.50	16.51	1.29	2366.55	1.59	1.42
<b>p1</b>	1783.05	1.75	18135.08	1.09	1563.30	1.43	17.03	1.33	2368.22	1.59	1.42
<b>p2</b>	1789.47	1.76	18136.62	1.09	1625.55	1.48	17.23	1.34	2373.20	1.59	1.43
<b>TILE_7</b>	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	GM
<b>p0</b>	1730.28	1.70	17676.70	1.06	1543.50	1.41	15.22	1.19	2380.85	1.60	1.37
<b>p1</b>	1664.53	1.63	18123.10	1.09	1654.30	1.51	15.46	1.20	2380.50	1.60	1.39
<b>p2</b>	1640.95	1.61	18122.12	1.09	1611.47	1.47	15.59	1.21	2382.03	1.60	1.38
<b>TILE_8</b>	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	GM
<b>p0</b>	1720.33	1.69	18136.90	1.09	1635.92	1.49	15.22	1.19	2378.32	1.59	1.39
<b>p1</b>	1802.58	1.77	18126.95	1.09	1714.38	1.56	15.42	1.20	2387.32	1.60	1.42
<b>p2</b>	1829.30	1.80	18146.17	1.09	1688.25	1.54	15.49	1.21	2390.88	1.60	1.42
<b>TILE_9</b>	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	GM
<b>p0</b>	1693.92	1.66	17667.90	1.06	1595.97	1.46	17.40	1.36	2352.07	1.58	1.41
<b>p1</b>	1696.72	1.67	18126.90	1.09	1723.50	1.57	17.39	1.36	2349.43	1.57	1.44
<b>p2</b>	1697.17	1.67	18107.85	1.09	1553.83	1.42	17.36	1.35	2353.75	1.58	1.41
<b>TILE_10</b>	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	GM
<b>p0</b>	1807.78	1.77	18117.28	1.09	1577.30	1.44	16.88	1.32	2359.15	1.58	1.42
<b>p1</b>	1833.65	1.80	18122.25	1.09	1594.38	1.45	17.10	1.33	2356.12	1.58	1.43
<b>p2</b>	1844.85	1.81	18103.05	1.09	1571.78	1.43	17.04	1.33	2356.43	1.58	1.43
<b>TILE_11</b>	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	GM
<b>p0</b>	1761.92	1.73	17656.70	1.06	1509.62	1.38	16.94	1.32	2373.97	1.59	1.40
<b>p1</b>	1686.65	1.66	18114.95	1.09	1632.92	1.49	17.28	1.35	2380.78	1.60	1.42
<b>p2</b>	1678.28	1.65	18120.30	1.09	1712.20	1.56	17.30	1.35	2383.78	1.60	1.43
<b>TILE_12</b>	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	GM
<b>p0</b>	1769.35	1.74	18132.35	1.09	1568.40	1.43	15.41	1.20	2342.38	1.57	1.39
<b>p1</b>	1711.25	1.68	18140.80	1.09	1585.05	1.45	15.36	1.20	2354.00	1.58	1.38
<b>p2</b>	1842.90	1.81	18146.28	1.09	1580.53	1.44	15.41	1.20	2356.65	1.58	1.40
<b>TILE_13</b>	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	GM
<b>p0</b>	1823.38	1.79	18104.70	1.09	1407.20	1.28	15.26	1.19	2364.07	1.58	1.36
<b>p1</b>	1818.40	1.78	18100.47	1.09	1644.15	1.50	15.29	1.19	2359.62	1.58	1.41
<b>p2</b>	1660.25	1.63	18136.47	1.09	1623.20	1.48	15.55	1.21	2369.15	1.59	1.38
<b>TILE_14</b>	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	GM
<b>p0</b>	1794.05	1.76	18116.10	1.09	1320.20	1.20	16.81	1.31	2365.53	1.59	1.37
<b>p1</b>	1787.62	1.75	18112.17	1.09	1534.03	1.40	16.98	1.32	2357.75	1.58	1.41

<b>p2</b>	1797.47	1.76	18113.17	1.09	1642.12	1.50	17.25	1.34	2359.07	1.58	1.44
<b>TILE_15</b>	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	GM
<b>p0</b>	1782.10	1.75	18113.42	1.09	1358.40	1.24	16.83	1.31	2348.38	1.57	1.37
<b>p1</b>	1783.58	1.75	18106.50	1.09	1519.40	1.39	17.06	1.33	2344.60	1.57	1.41
<b>p2</b>	1791.15	1.76	18114.92	1.09	1807.62	1.65	17.02	1.33	2345.50	1.57	1.46
<b>TILE_16</b>	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	Actual	Ratio	GM
<b>p0</b>	1897.28	1.86	17938.17	1.08	1204.35	1.10	16.57	1.29	2341.57	1.57	1.35
<b>p1</b>	1897.72	1.86	17536.05	1.06	1517.30	1.38	16.76	1.31	2353.90	1.58	1.41
<b>p2</b>	1873.92	1.84	18077.60	1.09	1667.60	1.52	17.05	1.33	2360.30	1.58	1.45
<b>p0_score:</b>	23.80										
<b>p1_score:</b>	24.05										
<b>p2_score:</b>	24.12										
<b>Unreviewed_VMmark_Score:</b>	24.05										

## Configuration

<b>Server and Network</b>	
Server Manufacturer and Model	IBM BladeCenter HS22
Processor Vendor and Model	Intel® Xeon® Processor X5570 2.93GHz/8MB L3 Cache
Processor Speed (GHz)	2.93
Total Sockets/Total Cores/Total Threads	2 Sockets / 8 Cores / 16 Threads
Primary Cache	32 KB(I) + 32KB(D) on chip, per core
Secondary Cache	256KB per core, 1MB per processor
Other Cache	8MB L3 cache per processor
BIOS Version	1.01
Memory Size (in GB, Number of DIMMs)	96 GB, 12
Memory Type and Speed	8GB DDR3 1066 PC3-8500R
Disk Subsystem Type	FC SAN (OS + VMs)
Number of Disk Controllers	4
Disk Controller Vendors and Models	2 x IBM System Storage DS4800 (with 2 controllers each)
Number of Host Bus Adapters	2 (1xCIOv, Fibre Channel half of CFFh Combo Expansion card with Ethernet)

Host Bus Adapter Vendors and Models	1 x QLogic® 8Gb Fibre Channel Expansion Card (CIOv) for IBM BladeCenter
Number of Network Controllers	2 (1xCIOv, Ethernet half of CFFh Combo Expansion Card)
Network Controller Vendors and Models	1 x Broadcom® 5709S onboard NIC with dual Gigabit Ethernet ports with TOE
Network Switch Vendors and Models	4 x Cisco® Systems Intelligent Gigabit Ethernet Switch Module for IBM BladeCenter®
Network Speed	1Gb
Other Hardware	1 x QLogic CFFh Ethernet/Fibre Combo Expansion Card for IBM BladeCenter 2 x Multi Switch Interconnect Module for IBM BladeCenter
Other Software	None
Hardware Availability Date	03/31/2009
Software Availability Date	03/31/2009

#### Virtualization Software

Vendor, Product, Version, and Build	VMware ESX 4.0 ( Build 161959)
Virtualization Type	Hardware Virtualization
Supplemental Software	None
Virtualization Software Availability Date	05/21/2009

#### Storage

Array Vendors, Models, and Firmware Versions	2 x IBM System Storage DS4800, version 07.15.10.01 19 x IBM System Storage EXP 810 storage expansion unit, version B977
Fibre Channel Switch Vendors and Models	2 x Cisco® 4Gb 20 port Fibre Channel Switch Module for IBM BladeCenter 2 x Brocade® 4Gb 20 port SAN Switch Modules for IBM BladeCenter
Disk Space Used	1053.5GB
Array Cache Size	IBM System Storage DS4800, 4GB
Total Number of Physical Disks Used	289
Total Number of Enclosures/Pods/Shelves Used	19
Total Number of Physical Disks per Enclosures/Pods/Shelves Used	16
Total Number of Storage Groups Used	1
Number LUNs Used	1 LUN (ESX host): 17 LUNs (DB VMs): 17 LUNs (Mailserver, Javaser, Webserver, Fileserver, Standby VMs):

LUN Size and Number of Disks Per LUN	1 x 100GB LUN (ESX host): 16 disks per LUN 17 x 100GB LUN (DB VMs): 3 disks per LUN 17 x 100GB LUNs (Remaining VMs): 13 disks per LUN
RAID Type	RAID5 for ESX image; RAID 0 for VMs
Number of Members per RAID Set	ESX LUN: 16 members DB LUNs: 3 members All Other LUNs: 13 members
Disk Vendors, Models, and Speeds	Seagate Technologies Inc., ST373455FC, 15K RPM

#### Clients

Number of Clients	17
System Model(s)	IBM eServer xSeries 330
Processor Vendor(s) and Model(s)	Intel Xeon
Processor Speed(s) (GHz)	2.8
Total Sockets/Total Cores/Total Threads	2 Sockets / 2 Cores / 4 Threads
Memory per Client	2GB
Network Controller Vendors and Models	Broadcom NetXtreme Gigabit Ethernet
Operating System, Version, and Service Pack	Microsoft Windows Server 2003 R2 Enterprise Edition SP2
Other Hardware	None
Other Software	None

## Notes for Workload

None.

## Server and Network Notes

### BIOS Settings

- Turbo Enabled (default disabled)
- Hyperthreading Enabled (default disabled)
- CPU C-States Enabled (default disabled)
- Thermal mode Performance (default normal)
- Onboard SAS disabled (default enabled)
- Power capping disabled (default enabled)

- Intel Turbo Boost Technology up to 3.2GHz

## Virtualization Software Notes

- Four vSwitches: vSwitch0, vSwitch1, vSwitch2, and vSwitch3
- vSwitch0 and vSwitch2 are configured with 248 ports. vSwitch1 and vSwitch3 are configured with 120 ports (default 24 for vSwitch0; 56 for the rest)
- vSwitch0 was attached to vmnic0
- vSwitch1 was attached to vmnic1
- vSwitch2 was attached to vmnic2
- vSwitch3 was attached to vmnic3
- Service console is attached to vSwitch0
- Webservers 0-7 are attached to vSwitch3
- Webservers 8-16 are attached to vSwitch1
- Database/Fileserver/ Java/Mail/Standby 0-7 are attached to vSwitch0
- Database/Fileserver/ Java/Mail/Standby 8-16 are attached to vSwitch2
- Network adapter type was set to vmxnet3 for all VMs
- 2 physical Arrays (1 3-disk RAID0, and 1 13-disk RAID0) are configured for each tile.
  1. The database VM is stored on the 3-disk RAID0 array
  2. The remaining VMs (Fileserver, Javasever, Mailserver, Standby and Webserver) for each tile are stored on the 13-disk RAID0 Array
- 1 physical array (16-disk RAID5) contained ESX boot image and was on LUN 2
- Stopped Firewall and IPtables processes on ESX host prior to run
- Disabled ESX logging on all VMs
- CPU/MMU Virtualization was set to Hardware on all VMs (CPU/MMU)
- Disk.SchedNumReqOutstanding was set to 128 (default 32)
- EtherswitchHashSize was set to 4 (default 1)
- BufferCache.SoftMaxDirty was set to 85 (default 15)
- /adv/VMFS3/MaxHeapSizeMB = "64"
- /vmkernel/module/vmfs3/options = "MaxHeapSizeMB=64"
- /vmkernel/module/qla2xxx.o/option "ql2xmaxqdepth=128" (default 32)
- Net.MaxNetifRxQueueLen was set to 300 (default 100)
- Net.MaxNetifTxQueueLen was set to 1000 (default 500)
- Net.MaxPortRxQueueLen was set to 160 (default 80)
- Net.Vmxnet2PinRxBuf was set to "1" (default 0)
- Hardware Version is 7 for all VMs
- VMs configured to use vmxnet3
- IDE and Floppy devices were removed from all VMs prior to run (default connected)
- Storage Path policy was set to fixed (default most recently used)
- sched.mem.maxmemctl=0 in fileserver VMs. (not set by default)

## Operating System Notes

- Microsoft Windows Server 2003 R2 Enterprise Edition Service Pack 2 on Windows-based virtual machines
- KB 933360 was applied
- Suse Linux Enterprise Server 10 (64-bit) Service Pack 2 on 64-bit Linux-based virtual machines
- Suse Linux Enterprise Server 10 (32-bit) Service Pack 2 on 32-bit Linux-based virtual machines

## Software Notes

### Client Notes

- Microsoft Windows Server 2003 R2 Enterprise Edition, Service Pack 2
- [KB 933360](#) was applied

### Other Notes

#### IBM System Storage DS4800

- Cache block size 16KB (default 4KB)
- Background media scan disabled (default enabled)
- Write caching with mirroring disabled (default enabled)
- Write caching without batteries disabled (default enabled)

#### QLogic QLA2462

- Loop reset delay 8 (default 5)
- PortDownRetryCount 14 (default 30)
- Operation Mode 5 (default 0)
- Interrupt Delay Timer 10 (default 0)
- Enable Target Reset No (default Yes)
- Link down timeout 60 (default 30)
- Execution Throttle 256 (default 16)
- LUNs per Target 256 (default 128)
- Maximum queue depth 128 (default 32)
- Loop reset delay 8 (default 5)

#### Vmmark.conf

- Standby/DELAYTIME="260" (default 170)
- WebServer/DELAYTIME="280" (default 180)
- Database/DELAYTIME="420" (default 360)
- FileServer/DELAYTIME="480"(default 450)

For information about VMmark and the rules regarding its usage visit [www.vmware.com/products/vmmark](http://www.vmware.com/products/vmmark).

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