

| | | | | | | | | | | | | | | | | |
|----------------|--------|-------|-----|--------|-------|-----|--------|-------|-----|--------|-------|-----|--------|-------|-----|----|
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| TILE_5 | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | GM |
| p0 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| TILE_6 | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | GM |
| p0 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| TILE_7 | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | GM |
| p0 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| TILE_8 | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | GM |
| p0 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| TILE_9 | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | GM |
| p0 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| TILE_10 | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | GM |
| p0 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| TILE_11 | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | GM |
| p0 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| TILE_12 | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | GM |
| p0 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| TILE_13 | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | GM |

| | | | | | | | | | | | | | | | | |
|-----------|--------|-------|-----|--------|-------|-----|--------|-------|-----|--------|-------|-----|--------|-------|-----|----|
| p0 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| TILE_14 | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | GM |
| p0 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| TILE_15 | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | Actual | Ratio | QoS | GM |
| p0 | | | | | | | | | | | | | | | | |
| p1 | | | | | | | | | | | | | | | | |
| p2 | | | | | | | | | | | | | | | | |
| p0_score: | | | | | | | | | | | | | | | | |
| p1_score: | | | | | | | | | | | | | | | | |
| p2_score: | | | | | | | | | | | | | | | | |

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|--|--|--|--|--|--|--|--|--|--|---------|--|--|----------|--|--|--------|--|
| Infrastructure_Operations_Scores: | | | | | | | | | | vmotion | | | svmotion | | | deploy | |
| Completed_Ops_PerHour | | | | | | | | | | | | | | | | | |
| Avg_Seconds_To_Complete | | | | | | | | | | | | | | | | | |
| Failures | | | | | | | | | | | | | | | | | |
| Ratio | | | | | | | | | | | | | | | | | |
| Number_Of_Threads | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | |
|--|--|--|--|--|--|----|----------------------------------|--|--|--|--|--|-------------------|--|--|--|
| Summary | | | | | | NC | Number_Of_Compliance_Issues - NC | | | | | | Median_Phase - NC | | | |
| Unreviewed_VMmark2_Applications_Score | | | | | | NC | | | | | | | | | | |
| Unreviewed_VMmark2_Infrastructure_Score | | | | | | NC | | | | | | | | | | |
| Unreviewed_VMmark2_Score | | | | | | NC | | | | | | | | | | |

Configuration

| | |
|--|---|
| Virtualization Software | |
| Hypervisor Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY) | VMware ESX 4.1.0 U3 Build-800380 / 08-30-2012 |

| | |
|---|---|
| Datacenter Management Software Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY) | VMware vCenter Server 5.0.0 Build 455964 / 08-24-2011 |
| Supplemental Software | none |
| Servers | |
| Quantity | 2 |
| Server Manufacturer and Model | HP ProLiant DL585 G7 |
| Processor Vendor and Model | AMD Opteron 6386 SE |
| Processor Speed (GHz) | 2.80 |
| Total Sockets/Total Cores/Total Threads | 4 Sockets / 64 Cores / 64 Threads |
| Primary Cache | 512 KB I + 256 KB D on chip per chip |
| Secondary Cache | 16 MB I+D on chip per chip |
| Other Cache | 16 MB I+D on chip per chip L3 |
| BIOS Version | A16 12/07/2012 |
| Memory Size (in GB, Number of DIMMs) | 512 GB, 32 x 16 GB DIMMs |
| Memory Type and Speed | dual rank PC3-12800 Registered DDR3/1600 MHz |
| Disk Subsystem Type | FC SAN |
| Number of Disk Controllers | 1 |
| Disk Controller Vendors and Models | HP Smart Array P420i |
| Number of Host Bus Adapters | 1 |
| Host Bus Adapter Vendors and Models | HP 82Q PCIe dual port 8Gb Fibre HBA |
| Number of Network Controllers | 2 |
| Network Controller Vendors and Models | HP Ethernet 1 Gb 4-port 331FLR Adapter, 1 x Intel X520-DA2 Dual Port 10GbE Server Adapter |
| Other Hardware | none |
| Other Software | none |
| Hardware Availability Date (MM-DD-YYYY) | 12-04-2012 |
| Software Availability Date (MM-DD-YYYY) | 08-30-2012 |
| Network | |

| | |
|---|--|
| Network Switch Vendors and Models | 1 x H3C S5820X-28S 4 x HP Virtual Connect Flex-10 10Gb Ethernet Module for BladeSystem |
| Network Speed | H3C S5820X-28S - 24 x 10 GbE ports, 4 x 1 GbE ports HP Virtual Connect Flex-10 - 10GbE |
| Storage | |
| Array Vendors, Models, and Firmware Versions | 2 x VS-SmartArray Storage Servers by id ₇ Limited System BIOS: P70 05/30/2012 HP SmartArray P420i firmware: 3.02 HP SmartArray P420 firmware: 3.02 |
| Fibre Channel Switch Vendors and Models | 1 x HP StorageWorks SAN Switch 8/24 |
| Disk Space Used | 13.07 TB |
| Array Cache Size | 2 GB |
| Total Number of Physical Disks Used | 36 |
| Total Number of Enclosures/Pods/Shelves Used | 2 |
| Number of Physical Disks Used per Enclosure/Pod/Shelf | Internal: 2 disks per host (OS) 2 enclosures: 16 disks each |
| Total Number of Storage Groups Used | 0 |
| Number of LUNs Used | 16 |
| LUN Size and Number of Disks Per LUN | 16 LUNs: 742 GB on 8 disks |
| RAID Type | RAID 0 for enclosures, RAID 1 for OS drives |
| Number of Members per RAID Set | RAID 1: 2 RAID 0: 8 |
| Disk Vendors, Models, and Speeds | 4 x HP 146GB 15K RPM SAS SFF (P/N 652605-B21) 32 x HP 400GB 6G SAS SFF SSD (P/N 653082-B21) |
| Datacenter Management Server | |
| System Model | HP ProLiant BL460c G7 |
| Processor Vendor and Model | Intel Xeon X5675 |
| Processor Speed (GHz) | 3.06 |
| Total Sockets/Total Cores/Total Threads | 2 Sockets / 12 Cores / 24 Threads |
| Memory | 24 GB |
| Network Controller(s) Vendors and Models | 1 x HP NC553i Dual Port FlexFabric 10Gb Adapter |

| | |
|---|--|
| Operating System, Version, and Service Pack | Microsoft® Windows® 2008 R2 Enterprise (64-bit) |
| Other Hardware | none |
| Other Software | VMware ESXi 5.0.0 Build 469512 |
| Clients | |
| Number of Clients | 4 physical servers 1 physical server used for non-virtualized prime client 3 physical servers hosting 16 virtual clients |
| System Model(s) | HP ProLiant BL460c G7 (prime client) HP ProLiant BL465c G7 (virtual client hosts) |
| Processor Vendor(s) and Model(s) | Prime client: Intel Xeon X5675 Physical Clients: AMD Opteron 6174 |
| Processor Speed(s) (GHz) | Prime Client: 3.06 Physical Clients: 2.2 |
| Total Sockets/Total Cores/Total Threads | Prime Client: 2 Sockets / 12 Cores / 24 Threads Physical Clients: 2 Sockets / 24 Cores / 24 Threads |
| Memory per Client | Prime Client: 24 GB Physical Clients: 64 GB |
| Network Controller(s) Vendors and Models | Prime Client: 1 x HP NC553i Dual Port FlexFabric 10GbE Adapter Physical Clients 0-1: 1 x HP NC551i Dual Port FlexFabric 10GbE Adapter Physical Client 2: 1 x HP NC551i Dual Port FlexFabric 10GbE Adapter, 1 x HP NC542m Dual Port Flex-10 10GbE adapter |
| Operating System, Version, and Service Pack | Prime Client: Microsoft® Windows® 2003 Enterprise SP2 (32-bit) Physical Clients 0-2: VMware ESXi 4.1 U1 (Build 348481) Virtual Clients 0-15: Microsoft® Windows® 2008 R2 Enterprise (64-bit) |
| Other Hardware | none |
| Other Software | none |

Notes for Workload

Virtualization Software Notes

- All VMs used virtual hardware V7
- Ethernet adapter type set to vmxnet3 for all VMs (default vmxnet2)
- Logging was disabled for all VMs (default enabled)
- IDE & floppy devices were removed on all VMs (default enabled)
- Host 2 has CD-ROM attached
- All mailserver VMs used Hard Disk 1 on LSI Logic SAS controller, Hard Disk 2 on paravirtual controller
- Cluster DRS Automation Level set to Fully Automated
- DrsMigrationThreshold set to level 1
- Logical CPU layout changed for all multi-cpu VMs to 1 socket w/ multiple cores. (default Single core per socket)

Advanced Settings:

- Cpu.CoschedCrossCall = 0 (default 1)
- Cpu.HaltingIdleMsecPenalty = 0 (default 800)
- DataMover.HardwareAcceleratedInit = 0 (default 1)
- DataMover.HardwareAcceleratedMove = 0 (default 1)
- Disk.SchedNumReqOutstanding = 256 (default 32)
- Irq.RoutingPolicy = 0 (default 2)
- Mem.BalancePeriod = 0 (default 15)
- Mem.SamplePeriod = 0 (default 60)
- Mem.ShareScanGHz = 0 (default 4)
- Mem.VMOverheadGrowthLimit = 0 (default 4294967295)
- Misc.TimerMaxHardPeriod = 4000 (default 100000)
- Misc.TimerMinHardPeriod = 2000 (default 100)
- Misc.WorldletHTSharing = 45 (default 90)
- Net.MaxNetifRxQueueLen = 500 (default 100)
- Net.MaxNetifTxQueueLen = 1000 (default 500)
- Net.NetTxCompletionWorldlet = 0 (default 1)
- Net.NetTxWordlet = 0 (default 2)
- Numa.AutoSplitVM = 0 (default 1)
- Numa.LTermFairnessInterval = 0 (default 5)
- Numa.MonMigEnable = 0 (default 1)
- Numa.PageMigEnable = 0 (default 1)
- Numa.PreferHT = 1 (default 0)
- Numa.RebalancePeriod = 60000 (default 2000)
- Numa.SwapInterval = 1 (default 3)
- Numa.SwapLoadEnable = 0 (default 1)
- Numa.SwapLocalityEnable = 0 (default 1)
- VMFS3.HardwareAcceleratedLocking = 0 (default 1)

Driver Options:

- Updated Drivers:
- /vmkernel/module/qla2xxx.o/options = "ql2xmaxqdepth=256 ql2xintrdelaytimer=3 ql2xenablesi=1 " (default 32, 0, and 0)
- /vmkernel/module/ixgbe.o/options = "VMDQ=16,16 InterruptThrottleRate=2000,2000 InterruptType=2,2 " (default 8, 16000, and 2)

Server Notes

Server BIOS settings:

- HP Power Profile set to Maximum Performance (default: Balanced Power and Performance)
- Thermal Configuration set to Increased Cooling (default: Optimal Cooling)
- HardwarePrefetch training on Software Prefetch set to Disabled (default: Enabled)
- CPU Core Hardware Prefetcher set to Disabled: (default: Enabled)
- Processor Power and Utilization Monitoring set to Disabled: (default: Enabled)
- Memory Pre-Failure Notification set to Disabled: (default: Enabled)

Networking Notes

vSwitch Configuration:

- vSwitch0 for the Service Console on vmnic0 at 1Gb/s
- vSwitch1 defined as vmkernel vMotion connection on vmnic1 at 1Gb/s
- vSwitch2 for the DS2* workloads on vmnic4 at 10Gb/s
- vSwitch3 for the Olio* workloads on vmnic5 at 10Gb/s
- vSwitch4 for the mailserver workloads on vmnic2 at 1Gb/s
- vSwitch5 for the standby and deploy workloads on vmnic3 at 1Gb/s

Storage Notes

- ESX was installed on two disks configured as RAID1 in the internal server storage bay
- All two "VS-SmartArray Storage Server" by id₇ Limited uses LUNs configured as block devices; as such no system memory is used for write caching.
- All two "VS-SmartArray Storage Server" by id₇ Limited hardware configuration details as below:
 - HP ProLiant DL380p Gen8 server
 - Processor Configuration
 - Server #1: 2 x Intel Xeon E5-2690 2.9 GHz processors
 - Server #2: 2 x Intel Xeon E5-2643 3.3 GHz processors
 - 64 GB memory (8 x 8 GB dual rank PC3-12800 Registered DDR3 / 1600 MHz DIMMS)
 - HP 380/385 Gen8 8-SFF Cage/Bkpln Kit
 - 2xHP 82Q PCIe dual port 8Gb Fibre HBA
 - 1 x 32 GB SDHC memory card
 - used for OS and id₇ VS-SmartArray
 - HP Smart Array P420i controller with 2 GB FBWC
 - Array A - 8 x HP 400GB SAS SSD SFF disks
 - Logical disk 1
 - 742 GB, RAID 0
 - exported as fibre target LUN
 - Logical disk 2
 - 742 GB, RAID 0
 - exported as fibre target LUN
 - Logical disk 3
 - 742 GB, RAID 0
 - exported as fibre target LUN
 - Logical disk 4
 - 742 GB, RAID 0
 - exported as fibre target LUN
 - HP Smart Array P420 controller with 2 GB FBWC
 - Array A - 8 x HP 400GB SAS SSD SFF disks
 - Logical disk 1
 - 742 GB, RAID 0
 - exported as fibre target LUN
 - Logical disk 2
 - 742 GB, RAID 0
 - exported as fibre target LUN
 - Logical disk 3
 - 742 GB, RAID 0
 - exported as fibre target LUN
 - Logical disk 4

- 742 GB, RAID 0
- exported as fibre target LUN

- VM Layout on the id₇ VS-SmartArray's as below:

- id₇ VS-SmartArray #1
 - P420i:Logical Drive 1
 - All VMs except standby for tile 0
 - § P420i:Logical Drive 2
 - § All VMs except standby for tile 1
 - § P420i:Logical Drive 3
 - § All VMs except standby for tile 2
 - § P420i:Logical Drive 4
 - § All VMs except standby for tile 3
 - § DeployTemplate
 - § P420:Logical Drive 1
 - § All VMs except standby for tile 4
 - § P420:Logical Drive 2
 - § All VMs except standby for tile 5
 - § P420:Logical Drive 3
 - § All VMs except standby for tile 6
 - § P420:Logical Drive 4
 - § All VMs except standby for tile 7
 - § standby VMs for tiles 0 - 15
- id₇ VS-SmartArray #2
 - § P420i:Logical Drive 1
 - § All VMs except standby for tile 8
 - § P420i:Logical Drive 2
 - § All VMs except standby for tile 9
 - § P420i:Logical Drive 3
 - § All VMs except standby for tile 10
 - § P420i:Logical Drive 4
 - § All VMs except standby for tile 11
 - § Deploy Target LUN
 - § P420:Logical Drive 1
 - § All VMs except standby for tile 12
 - § P420:Logical Drive 2
 - § All VMs except standby for tile 13
 - § P420:Logical Drive 3
 - § All VMs except standby for tile 14
 - § P420:Logical Drive 4
 - § All VMs except standby for tile 15
 - § Standby Target LUN

Datacenter Management Server Notes

- HP ProLiant BL460c G7 had ESXi 5.0.0 installed and had 2 virtual machines
 - vCenter for SUT

- 4 virtual CPUs
- 8 GB virtual memory
- Microsoft® Windows® 2008 R2 Enterprise (64-bit)
- vCenter for clients
 - 2 virtual CPUs
 - 4 GB virtual memory
 - Microsoft® Windows® 2008 R2 Enterprise (64-bit)

Operating System Notes

- All mailserver VMs running Microsoft® Windows® 2008 R2 Enterprise (64-bit)
- All standby VMs running Microsoft® Windows® 2003 Enterprise SP2 (32-bit)

Software Notes

- Microsoft® Exchange Server 2007 Enterprise SP3 (64-bit) was installed on each mailserver VM

Client Notes

- Prime client functionality was split from the client0 driver and was run on a non-virtualized copy of Microsoft® Windows® 2003 Enterprise SP2 (32-bit).
- Prime client was running VMware vSphere PowerCLI 4.1 U1 build 332441
- All client drivers were run on virtual machines that were each defined with 4 virtual CPUs, 4GB of memory, 1 vmxnet3 network, and 32GB of disk space.
- Three HP ProLiant BL465c G7 physical clients host 16 virtual clients total; two physical hosts running 6 virtual clients each and one physical host running 4 virtual clients.
- All client operating systems were updated via Windows Update.

Other Notes

None

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.

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