

## VMware® VMmark® V2.1.1 Results

Vendor and Hardware Platform: HP ProLiant DL560 Gen8  
 Virtualization Platform: VMware ESX 4.1.0 U2 Build 502767  
 VMware vCenter Server: VMware vCenter Server 5.0.0 Build 455964

**VMmark V2.1.1 Score =  
18.75 @ 18 Tiles**

Number of Hosts: 2

Uniform Hosts [yes/no]: yes

Total sockets/core/threads in test: 8/64/128

Tested By: Hewlett-Packard

Test Date: 09-30-2012

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### Performance

|        | mailserver |       |        | olio    |       |        | dvdstoreA |       |        | dvdstoreB |       |        | dvdstoreC |       |        |      |
|--------|------------|-------|--------|---------|-------|--------|-----------|-------|--------|-----------|-------|--------|-----------|-------|--------|------|
| TILE_0 | Actual     | Ratio | QoS    | Actual  | Ratio | QoS    | Actual    | Ratio | QoS    | Actual    | Ratio | QoS    | Actual    | Ratio | QoS    | GM   |
| p0     | 333.07     | 1.01  | 114.75 | 4643.57 | 1.00  | 192.04 | 3147.93   | 1.43  | 109.00 | 2266.75   | 1.49  | 121.23 | 1688.60   | 1.60  | 127.99 | 1.28 |
| p1     | 330.88     | 1.00  | 114.00 | 4632.45 | 1.00  | 211.67 | 3197.20   | 1.45  | 105.89 | 2240.50   | 1.48  | 117.25 | 1552.00   | 1.47  | 127.60 | 1.26 |
| p2     | 330.23     | 1.00  | 114.00 | 4634.65 | 1.00  | 215.27 | 3187.10   | 1.45  | 106.34 | 2278.93   | 1.50  | 120.19 | 1621.20   | 1.53  | 128.01 | 1.27 |
| TILE_1 | Actual     | Ratio | QoS    | Actual  | Ratio | QoS    | Actual    | Ratio | QoS    | Actual    | Ratio | QoS    | Actual    | Ratio | QoS    | GM   |
| p0     | 323.95     | 0.98  | 64.00  | 4646.75 | 1.00  | 194.43 | 3270.78   | 1.49  | 101.82 | 2241.57   | 1.48  | 116.26 | 1654.55   | 1.56  | 123.29 | 1.28 |
| p1     | 328.30     | 0.99  | 67.50  | 4645.27 | 1.00  | 198.82 | 3209.75   | 1.46  | 105.33 | 2212.20   | 1.46  | 119.61 | 1558.55   | 1.47  | 127.08 | 1.26 |
| p2     | 327.23     | 0.99  | 80.25  | 4636.68 | 1.00  | 196.00 | 3169.97   | 1.44  | 106.90 | 2383.07   | 1.57  | 117.36 | 1713.03   | 1.62  | 125.49 | 1.29 |
| TILE_2 | Actual     | Ratio | QoS    | Actual  | Ratio | QoS    | Actual    | Ratio | QoS    | Actual    | Ratio | QoS    | Actual    | Ratio | QoS    | GM   |
| p0     | 325.18     | 0.98  | 64.00  | 4664.80 | 1.01  | 189.65 | 3272.68   | 1.49  | 101.11 | 2290.32   | 1.51  | 112.61 | 1636.80   | 1.55  | 118.00 | 1.28 |
| p1     | 327.57     | 0.99  | 64.00  | 4635.45 | 1.00  | 208.81 | 3255.85   | 1.48  | 102.06 | 2349.60   | 1.55  | 113.92 | 1684.97   | 1.59  | 120.20 | 1.29 |
| p2     | 324.15     | 0.98  | 64.00  | 4645.95 | 1.00  | 197.56 | 3235.57   | 1.47  | 102.90 | 2371.53   | 1.56  | 112.58 | 1796.40   | 1.70  | 116.46 | 1.31 |
| TILE_3 | Actual     | Ratio | QoS    | Actual  | Ratio | QoS    | Actual    | Ratio | QoS    | Actual    | Ratio | QoS    | Actual    | Ratio | QoS    | GM   |
| p0     | 328.45     | 0.99  | 53.02  | 4644.00 | 1.00  | 173.25 | 3296.53   | 1.50  | 99.36  | 2334.22   | 1.54  | 108.73 | 1668.85   | 1.58  | 113.65 | 1.29 |
| p1     | 325.52     | 0.99  | 53.00  | 4646.18 | 1.00  | 201.88 | 3243.78   | 1.47  | 102.17 | 2444.57   | 1.61  | 112.53 | 1769.45   | 1.67  | 118.66 | 1.31 |
| p2     | 331.82     | 1.00  | 53.00  | 4639.93 | 1.00  | 204.83 | 3233.20   | 1.47  | 103.62 | 2238.32   | 1.47  | 116.76 | 1673.35   | 1.58  | 121.43 | 1.28 |
| TILE_4 | Actual     | Ratio | QoS    | Actual  | Ratio | QoS    | Actual    | Ratio | QoS    | Actual    | Ratio | QoS    | Actual    | Ratio | QoS    | GM   |
| p0     | 327.15     | 0.99  | 60.50  | 4666.65 | 1.01  | 181.45 | 3143.53   | 1.43  | 109.93 | 2248.65   | 1.48  | 123.55 | 1604.80   | 1.52  | 130.91 | 1.26 |
| p1     | 325.95     | 0.99  | 53.33  | 4655.75 | 1.00  | 193.86 | 3195.75   | 1.45  | 106.18 | 2222.28   | 1.46  | 119.12 | 1648.40   | 1.56  | 125.36 | 1.27 |
| p2     | 327.82     | 0.99  | 53.08  | 4648.15 | 1.00  | 206.08 | 3332.38   | 1.52  | 97.39  | 2355.30   | 1.55  | 107.44 | 1683.85   | 1.59  | 112.00 | 1.30 |
| TILE_5 | Actual     | Ratio | QoS    | Actual  | Ratio | QoS    | Actual    | Ratio | QoS    | Actual    | Ratio | QoS    | Actual    | Ratio | QoS    | GM   |
| p0     | 324.15     | 0.98  | 54.00  | 4649.77 | 1.00  | 189.43 | 3523.70   | 1.60  | 85.63  | 2726.65   | 1.80  | 91.08  | 2030.03   | 1.92  | 92.03  | 1.40 |
| p1     | 322.32     | 0.98  | 53.55  | 4630.40 | 1.00  | 200.13 | 3316.75   | 1.51  | 99.17  | 2322.72   | 1.53  | 110.32 | 1742.28   | 1.65  | 114.83 | 1.30 |

|                |        |       |        |         |       |        |         |       |        |         |       |        |         |       |        |      |
|----------------|--------|-------|--------|---------|-------|--------|---------|-------|--------|---------|-------|--------|---------|-------|--------|------|
| <b>p2</b>      | 332.48 | 1.01  | 53.23  | 4636.50 | 1.00  | 196.56 | 3168.75 | 1.44  | 108.44 | 2195.78 | 1.45  | 122.24 | 1526.12 | 1.44  | 131.92 | 1.25 |
| <b>TILE_6</b>  | Actual | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | GM   |
| <b>p0</b>      | 325.65 | 0.99  | 58.77  | 4662.95 | 1.00  | 188.92 | 3322.62 | 1.51  | 97.85  | 2421.88 | 1.59  | 107.78 | 1753.03 | 1.66  | 111.76 | 1.32 |
| <b>p1</b>      | 324.05 | 0.98  | 63.73  | 4637.30 | 1.00  | 206.66 | 3391.50 | 1.54  | 93.59  | 2329.93 | 1.53  | 102.05 | 1712.67 | 1.62  | 107.27 | 1.30 |
| <b>p2</b>      | 321.55 | 0.97  | 64.00  | 4635.48 | 1.00  | 195.92 | 3194.82 | 1.45  | 106.19 | 2397.78 | 1.58  | 117.20 | 1714.35 | 1.62  | 125.92 | 1.29 |
| <b>TILE_7</b>  | Actual | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | GM   |
| <b>p0</b>      | 326.85 | 0.99  | 56.02  | 4661.57 | 1.00  | 188.58 | 3196.55 | 1.45  | 106.93 | 2142.90 | 1.41  | 119.80 | 1550.42 | 1.47  | 129.06 | 1.24 |
| <b>p1</b>      | 327.45 | 0.99  | 57.15  | 4644.85 | 1.00  | 212.79 | 3282.35 | 1.49  | 100.55 | 2387.07 | 1.57  | 111.20 | 1699.33 | 1.61  | 119.04 | 1.30 |
| <b>p2</b>      | 326.82 | 0.99  | 63.88  | 4645.07 | 1.00  | 213.36 | 3237.43 | 1.47  | 103.40 | 2344.47 | 1.54  | 114.58 | 1772.50 | 1.68  | 119.02 | 1.30 |
| <b>TILE_8</b>  | Actual | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | GM   |
| <b>p0</b>      | 323.12 | 0.98  | 64.00  | 4646.82 | 1.00  | 183.38 | 3342.35 | 1.52  | 96.58  | 2375.07 | 1.56  | 105.23 | 1696.25 | 1.60  | 110.43 | 1.30 |
| <b>p1</b>      | 326.20 | 0.99  | 55.48  | 4654.50 | 1.00  | 198.18 | 3282.50 | 1.49  | 99.40  | 2431.00 | 1.60  | 107.22 | 1771.45 | 1.67  | 110.74 | 1.32 |
| <b>p2</b>      | 326.40 | 0.99  | 56.58  | 4675.43 | 1.01  | 177.74 | 3278.43 | 1.49  | 100.81 | 2283.88 | 1.50  | 113.37 | 1729.12 | 1.63  | 116.29 | 1.30 |
| <b>TILE_9</b>  | Actual | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | GM   |
| <b>p0</b>      | 322.85 | 0.98  | 63.00  | 4665.40 | 1.01  | 174.59 | 3304.70 | 1.50  | 99.24  | 2278.07 | 1.50  | 113.76 | 1634.95 | 1.55  | 118.02 | 1.28 |
| <b>p1</b>      | 324.27 | 0.98  | 63.20  | 4674.45 | 1.01  | 185.82 | 3267.55 | 1.49  | 101.26 | 2374.38 | 1.56  | 111.80 | 1790.58 | 1.69  | 116.66 | 1.31 |
| <b>p2</b>      | 325.30 | 0.99  | 63.15  | 4643.85 | 1.00  | 194.38 | 3251.10 | 1.48  | 102.11 | 2290.80 | 1.51  | 112.51 | 1636.70 | 1.55  | 117.79 | 1.28 |
| <b>TILE_10</b> | Actual | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | GM   |
| <b>p0</b>      | 325.43 | 0.99  | 226.28 | 4640.73 | 1.00  | 203.21 | 3235.15 | 1.47  | 102.90 | 2427.70 | 1.60  | 113.77 | 1771.60 | 1.67  | 118.64 | 1.31 |
| <b>p1</b>      | 329.80 | 1.00  | 127.40 | 4632.20 | 1.00  | 207.06 | 3215.07 | 1.46  | 104.34 | 2233.68 | 1.47  | 116.94 | 1679.85 | 1.59  | 120.84 | 1.28 |
| <b>p2</b>      | 329.05 | 1.00  | 100.75 | 4656.88 | 1.00  | 190.84 | 3196.10 | 1.45  | 105.86 | 2233.97 | 1.47  | 117.57 | 1591.88 | 1.50  | 122.96 | 1.26 |
| <b>TILE_11</b> | Actual | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | GM   |
| <b>p0</b>      | 324.68 | 0.98  | 75.83  | 4646.68 | 1.00  | 193.63 | 3313.25 | 1.51  | 97.80  | 2438.70 | 1.61  | 106.15 | 1851.97 | 1.75  | 109.28 | 1.33 |
| <b>p1</b>      | 324.68 | 0.98  | 67.25  | 4627.77 | 1.00  | 215.80 | 3252.88 | 1.48  | 101.67 | 2273.22 | 1.50  | 113.64 | 1622.47 | 1.53  | 118.50 | 1.27 |
| <b>p2</b>      | 326.05 | 0.99  | 64.00  | 4656.35 | 1.00  | 192.76 | 3208.65 | 1.46  | 104.97 | 2324.10 | 1.53  | 116.77 | 1673.00 | 1.58  | 122.46 | 1.28 |
| <b>TILE_12</b> | Actual | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | GM   |
| <b>p0</b>      | 333.40 | 1.01  | 161.00 | 4646.55 | 1.00  | 191.25 | 3259.88 | 1.48  | 101.55 | 2287.15 | 1.51  | 112.77 | 1706.33 | 1.61  | 117.85 | 1.29 |
| <b>p1</b>      | 326.50 | 0.99  | 105.33 | 4640.00 | 1.00  | 193.16 | 3157.72 | 1.44  | 109.41 | 2185.10 | 1.44  | 123.56 | 1527.95 | 1.44  | 132.25 | 1.24 |
| <b>p2</b>      | 324.35 | 0.98  | 89.00  | 4635.48 | 1.00  | 206.33 | 3291.05 | 1.50  | 99.27  | 2419.40 | 1.59  | 108.61 | 1826.28 | 1.73  | 113.06 | 1.32 |
| <b>TILE_13</b> | Actual | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | GM   |
| <b>p0</b>      | 331.23 | 1.00  | 74.83  | 4653.98 | 1.00  | 195.46 | 3501.15 | 1.59  | 87.20  | 2516.90 | 1.66  | 93.78  | 1829.12 | 1.73  | 95.07  | 1.36 |
| <b>p1</b>      | 329.95 | 1.00  | 63.25  | 4637.55 | 1.00  | 198.23 | 3244.75 | 1.48  | 102.75 | 2369.38 | 1.56  | 112.78 | 1733.80 | 1.64  | 116.07 | 1.30 |
| <b>p2</b>      | 324.95 | 0.98  | 63.67  | 4651.93 | 1.00  | 191.78 | 3166.07 | 1.44  | 108.08 | 2196.30 | 1.45  | 121.16 | 1632.80 | 1.54  | 127.09 | 1.26 |
| <b>TILE_14</b> | Actual | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | GM   |
| <b>p0</b>      | 328.50 | 0.99  | 64.00  | 4665.73 | 1.01  | 177.25 | 3421.97 | 1.56  | 91.35  | 2446.88 | 1.61  | 99.43  | 1776.10 | 1.68  | 101.39 | 1.33 |
| <b>p1</b>      | 323.07 | 0.98  | 70.75  | 4675.05 | 1.01  | 186.30 | 3322.03 | 1.51  | 97.89  | 2430.80 | 1.60  | 106.74 | 1858.80 | 1.76  | 109.81 | 1.33 |

|                  |        |       |        |         |       |        |         |       |        |         |       |        |         |       |        |      |
|------------------|--------|-------|--------|---------|-------|--------|---------|-------|--------|---------|-------|--------|---------|-------|--------|------|
| <b>p2</b>        | 328.60 | 1.00  | 69.30  | 4653.95 | 1.00  | 180.32 | 3216.15 | 1.46  | 105.15 | 2260.88 | 1.49  | 116.34 | 1611.75 | 1.52  | 122.31 | 1.27 |
| <b>TILE_15</b>   | Actual | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | GM   |
| <b>p0</b>        | 324.77 | 0.98  | 59.50  | 4655.10 | 1.00  | 194.82 | 3209.28 | 1.46  | 105.05 | 2339.85 | 1.54  | 115.10 | 1690.65 | 1.60  | 120.40 | 1.29 |
| <b>p1</b>        | 323.25 | 0.98  | 53.70  | 4650.60 | 1.00  | 192.12 | 3282.53 | 1.49  | 100.10 | 2326.20 | 1.53  | 109.91 | 1742.00 | 1.65  | 114.15 | 1.30 |
| <b>p2</b>        | 332.15 | 1.01  | 59.33  | 4632.52 | 1.00  | 197.39 | 3326.32 | 1.51  | 97.99  | 2344.62 | 1.54  | 108.15 | 1674.88 | 1.58  | 113.65 | 1.30 |
| <b>TILE_16</b>   | Actual | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | GM   |
| <b>p0</b>        | 324.32 | 0.98  | 108.25 | 4663.48 | 1.00  | 182.87 | 3230.55 | 1.47  | 103.62 | 2344.25 | 1.54  | 114.60 | 1746.97 | 1.65  | 120.94 | 1.30 |
| <b>p1</b>        | 329.77 | 1.00  | 82.75  | 4651.98 | 1.00  | 201.38 | 3229.95 | 1.47  | 103.88 | 2263.85 | 1.49  | 115.28 | 1570.67 | 1.48  | 124.55 | 1.27 |
| <b>p2</b>        | 326.85 | 0.99  | 74.00  | 4640.20 | 1.00  | 197.07 | 3224.95 | 1.47  | 104.50 | 2307.32 | 1.52  | 118.22 | 1630.47 | 1.54  | 127.01 | 1.28 |
| <b>TILE_17</b>   | Actual | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | Actual  | Ratio | QoS    | GM   |
| <b>p0</b>        | 324.15 | 0.98  | 73.42  | 4651.77 | 1.00  | 194.67 | 3267.68 | 1.49  | 101.95 | 2234.70 | 1.47  | 117.04 | 1659.47 | 1.57  | 122.49 | 1.28 |
| <b>p1</b>        | 326.45 | 0.99  | 68.15  | 4645.32 | 1.00  | 208.16 | 3252.72 | 1.48  | 102.62 | 2252.70 | 1.48  | 116.07 | 1573.97 | 1.49  | 124.38 | 1.26 |
| <b>p2</b>        | 324.48 | 0.98  | 63.60  | 4638.82 | 1.00  | 196.20 | 3190.93 | 1.45  | 105.97 | 2322.05 | 1.53  | 116.78 | 1709.28 | 1.62  | 125.58 | 1.29 |
| <b>p0_score:</b> | 23.42  |       |        |         |       |        |         |       |        |         |       |        |         |       |        |      |
| <b>p1_score:</b> | 23.18  |       |        |         |       |        |         |       |        |         |       |        |         |       |        |      |
| <b>p2_score:</b> | 23.13  |       |        |         |       |        |         |       |        |         |       |        |         |       |        |      |

|  |         |          |        |
|--|---------|----------|--------|
| <b>Infrastructure_Operations_Scores:</b> | vmotion | svmotion | deploy |
| <b>Completed_Ops_PerHour</b>             | 14.50   | 11.00    | 4.00   |
| <b>Avg_Seconds_To_Complete</b>           | 40.43   | 29.63    | 430.50 |
| <b>Failures</b>                          | 0.00    | 0.00     | 0.00   |
| <b>Ratio</b>                             | 0.91    | 1.22     | 1.00   |
| <b>Number_Of_Threads</b>                 | 1       | 1        | 1      |

|  |                  |                                 |                  |
|--|------------------|---------------------------------|------------------|
| <b>Summary</b>                                 | Run_Is_Compliant | Number_Of_Compliance_Issues(0)* | Median_Phase(p1) |
| <b>Unreviewed_VMmark2_Applications_Score</b>   | 23.18            |                                 |                  |
| <b>Unreviewed_VMmark2_Infrastructure_Score</b> | 1.03             |                                 |                  |
| <b>Unreviewed_VMmark2_Score</b>                | 18.75            |                                 |                  |

## Configuration

|   |   |
|---|---|
| <b>Virtualization Software</b>  |   |
| Hypervisor Vendor, Product, Version, and Build / Availability Date (MM-DD-YYYY) | VMware ESX 4.1.0 U2 Build 502767/ 10-27-2011          |
| Datacenter Management Software Vendor, Product, Version, and Build /            | VMware vCenter Server 5.0.0 Build 455964 / 08-24-2011 |

|   |   |
|---|---|
| Availability Date (MM-DD-YYYY)          |   |
| Supplemental Software                   | none  |
| <b>Servers</b>                          |   |
| Quantity                                | 2   |
| Server Manufacturer and Model           | HP ProLiant DL560 Gen8  |
| Processor Vendor and Model              | Intel Xeon E5-4650  |
| Processor Speed (GHz)                   | 2.70  |
| Total Sockets/Total Cores/Total Threads | 4 Sockets / 32 Cores / 64 Threads   |
| Primary Cache                           | 32 KB I + 32 KB D on chip per core  |
| Secondary Cache                         | 256 KB I+D on chip per core   |
| Other Cache                             | 20 MB I+D on chip per chip L3   |
| BIOS Version                            | P77 08/12/2012  |
| 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) | 10-08-2012  |
| Software Availability Date (MM-DD-YYYY) | 10-27-2011  |
| <b>Network</b>                          |   |
| Network Switch Vendors and Models       | 1 x H3C S5820X-28S<br>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<br>HP Virtual Connect Flex-10 - 10GbE |
| <b>Storage</b>                          |   |

|   |  |
|---|--|
| Array Vendors, Models, and Firmware Versions          | 2 x VS-SmartArray Storage Servers by id7 Limited<br>System BIOS: P70 05/30/2012<br>HP SmartArray P420i firmware: 3.02<br>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)<br>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<br>RAID 0: 8   |
| Disk Vendors, Models, and Speeds                      | 4 x HP 146GB 15K RPM SAS SFF (P/N 652605-B21)<br>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<br>1 physical server used for non-virtualized prime client<br>3 physical servers hosting 18 virtual clients |
|-------------------|--|

|   |  |
|---|--|
| System Model(s)                             | HP ProLiant BL460c G7 (prime client)<br>HP ProLiant BL465c G7 (virtual client hosts)   |
| Processor Vendor(s) and Model(s)            | Prime client: Intel Xeon X5675<br>Physical Clients: AMD Opteron 6174   |
| Processor Speed(s) (GHz)                    | Prime Client: 3.06<br>Physical Clients: 2.2  |
| Total Sockets/Total Cores/Total Threads     | Prime Client: 2 Sockets / 12 Cores / 24 Threads<br>Physical Clients: 2 Sockets / 24 Cores / 24 Threads   |
| Memory per Client                           | Prime Client: 24 GB<br>Physical Clients: 64 GB   |
| Network Controller(s) Vendors and Models    | Prime Client: 1 x HP NC553i Dual Port FlexFabric 10GbE Adapter<br>Physical Clients 0-1: 1 x HP NC551i Dual Port FlexFabric 10GbE Adapter<br>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)<br>Physical Clients 0-2: VMware ESXi 4.1 U1 (Build 348481)<br>Virtual Clients 0-17: 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)
- firewall was disabled in the console os (default enabled)
- All Mailserver VMs: Paravirtual Controller
- Cluster DRS Automation Level set to Fully Automated
- DrsMigrationThreshold set to level 2
- Logical CPU layout changed for all multi-cpu VM's 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:
  - net-tg3 400.3.122g.v40.2-1vmw.2.17.00000
  - scsi-hpsa 400.4.1.0-18OEM
  - net-be2net 400.4.1.334.0-1vmw.2.17.249663
- /vmkernel/module/qla2xxx.o/options = "ql2xmaxqdepth=256 ql2xintrdelaytimer=6 ql2xenablesi=1 " (default 32, 0, and 0)
- /vmkernel/module/ixgbe.o/options = "VMDQ=1,1,1,1 InterruptThrottleRate=500,500,500,500" " (default 8 and 16000)

## Server Notes

- Intel Turbo Boost Technology up to 3.30 GHz
- Server BIOS settings:
  - HP Power Profile set to Maximum Performance (default: Balanced Power and Performance)
  - Thermal Configuration set to Max Cooling (default: Optimal Cooling)
  - HW Prefetcher set to Disabled (default: Enabled)
  - Adjacent Sector Prefetch 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
- Both "VS-SmartArray Storage Server" by id7 Limited uses LUNs configured as block devices; as such no system memory is used for write caching.

- Both "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 tiles 0 and 16
      - 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 - 17
- id7 VS-SmartArray #2
  - P420i:Logical Drive 1
    - All VMs except standby for tiles 8 and 17
  - 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 mailserv 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 mailserv 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 clients ran 6 client virtual machines each
- All client operating systems were updated via Windows Update.

## Other Notes

None

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