







|  |   |   |                      |               |
|--|---|---|----------------------|---------------|
|   | <h1>PowerEdge R7515</h1>                            |   | TPCx-HS              | 2.0.3         |
|  |   |   | TPC Pricing          | 2.4.0         |
|  |   |   | Report Date          | Sep. 17, 2019 |
| Availability Date  | TPCx-HS Performance                                 | Price/Performance                           | Total System Cost    |               |
| <b>October 15, 2019</b>  | <b>11.73<br/>HSph@1TB</b>                           | <b>\$38,182.70<br/>\$/ HSph@1TB</b>         | <b>\$447,883 USD</b> |               |
| System Under Test Configuration Overview   |   |   |                      |               |
| Scale Factor   | Hadoop Software                                     | Operating System                            | Other Software       |               |
| 1  | Cloudera Enterprise Edition 6.3                     | Red Hat Enterprise Linux Server 7.6         | N/A                  |               |
| <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>...</p> <p><b>9x Dell PowerEdge R7515 Servers (Data Nodes)</b></p> <ul style="list-style-type: none"> <li>• 1x AMD EPYC 7542 32-Core Processor</li> <li>• 512 GB (8x 64GB RDIMM 3200MT/s Dual Rank)</li> <li>• 2x240GB SSD SATA m.2 Hot-plug Drive</li> <li>• 1x Mellanox Dual Port 100GbE QSFP28 NIC</li> <li>• 3x Dell 1.6TB, NVMe, 2.5 SFF Drive</li> </ul> <p>...</p>  <p>...</p>  <p><b>1x Dell PowerEdge R6525 Server (Master Node)</b></p> <ul style="list-style-type: none"> <li>• 2x AMD EPYC 7502 32-Core Processor</li> <li>• 512 GB (8x 64GB RDIMM 3200MT/s Dual Rank)</li> <li>• 2x240GB SSD SATA 2.5in Hot-plug Drive</li> <li>• 1x Broadcom Adv. Dual 25Gb Ethernet NIC (cluster connectivity)</li> <li>• 1x Embedded Broadcom Gigabit NIC (external connectivity)</li> </ul> </div> <div style="text-align: center;">  <p>Mellanox SN2700</p> </div> </div> |   |   |                      |               |
| Physical Storage/Scale Factor: 48.00   |   | Scale Factor/Physical Memory: 0.20          |                      |               |
| Total Number of Servers:   |   | 10 (9x PowerEdge R7515; 1x PowerEdge R6525) |                      |               |
| Total Processors/Cores/Threads:  |   | 11/352/704                                  |                      |               |
| Server Configuration:  | Per PowerEdge R7515                                 | Per PowerEdge R6525                         |                      |               |
| Processors   | 1x AMD EPYC 7542 32-Core Processor                  | 2x AMD EPYC 7502 32-Core Processor          |                      |               |
| Memory   | 512 GiB   | 512 GiB                                     |                      |               |
| Storage Controller   | Perc H740P  | Perc H740P                                  |                      |               |
| Storage Device   | 2x 240GB SATA SSD m.2<br>3x Dell 1.6TB NVMe         | 2x 240GB SATA SSD m.2                       |                      |               |
| Network  | Mellanox Dual Port 100GbE                           | Broadcom Adv. Dual 25Gb                     |                      |               |
| Connectivity:  | Mellanox SN2700 (32-port, 100Gbe)                   |   |                      |               |
| Total Rack Units:  | (9xR7515)+(1xR6525)+(1xMSN2700) = 18 + 1 + 1 = 20RU |   |                      |               |

|                                       | <h1>PowerEdge R7515</h1> | TPCx-HS     | 2.0.3         |             |     |                |                    |
|--|--------------------------|-------------|---------------|-------------|-----|----------------|--------------------|
|  |                          | TPC Pricing | 2.4.0         |             |     |                |                    |
|  |                          | Report Date | Sep. 17, 2019 |             |     |                |                    |
| Description  |                          | Part Number | Source        | Unit Price  | Qty | Extended Price | 3 Yr. Maint. Price |
| <b>HARDWARE COMPONENTS</b>   |                          |             |               |             |     |                |                    |
| <b>PowerEdge R7515</b>   |                          |             |               |             |     |                |                    |
| PowerEdge R7515 Server   |                          | 1           |               | \$41,778.17 | 9   | \$376,003.53   |                    |
| PowerEdge R6515/R7515 Motherboard, with 2 x No Trusted Platform Module   | 210-ASVQ                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| PowerEdge R7515 Shipping   | 384-BCEL                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| PowerEdge R7515 Shipping Material,DAO w/CC Cert Marking  | 461-AADZ                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| Standard Heatsink  | 340-CODN,                | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| 3200MT/s RDIMMs  | 343-BBNT                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| Performance Optimized  | 412-AASE                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| No Media Required  | 370-AEVR                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| iDRAC9, Express X5   | 370-AAIP                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| iDRAC Group Manager, Disabled  | 605-BBFN                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| iDRAC,Factory Generated Password   | 385-BBOU                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| Single, Hot-plug Power Supply (1+0), 495W  | 379-BCQY                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| NEMA 5-15P to C13 Wall Plug, 125 Volt, 15 AMP,   | 379-BCSF                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| PowerEdge 2U Standard Bezel  | 450-ADWP                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| No Quick Sync  | 450-AALV                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| Performance BIOS Setting   | 350-BBWP                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| ReadyRails Sliding Rails With Cable Management Arm   | 350-BBKU                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| No Systems Documentation, No OpenManage DVD Kit  | 384-BBBL                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| US Order   | 770-BBBR                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| Basic Deployment Dell Server R Series 1U/2U  | 631-AACK                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| Chassis with up to 24x2.5" Drives  | 332-1286                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| No Internal Optical Drive for x10 or greater HDD Chassis   | 804-6747                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| Riser Config 2, 2 x 16 FH + 2 x 16 LP PCIe slot  | 379-BDTF                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| NVMe Backplane   | 429-AAIQ                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| No Additional Mid Fan  | 330-BBNL                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| 2.5" Chassis with up to 24 NVMe Drives   | 379-BDSX                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| AMD EPYC 7542 2.90GHz, 2C/64T, 128M Cache (225W) DDR4-3200   | 384-BBSO                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| 64GB RDIMM, 3200MT/s, Dual Rank  | 321-BERW                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| C30, No RAID for NVME chassis  | 338-BTTY                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| No Hard Drive  | 370-AEVP                 | 1           |               | \$0.00      | 8   | \$0.00         |                    |
| Dell 1.6TB, NVMe, Mixed Use Express Flash, 2.5 SFF Drive, U.2, PM1725b with Carrier                                    | 780-BCDO                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| Mellanox ConnectX-5 EX Dual Port 40/100GbE   | 400-ABHL                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| BOSS controller card + with 2 M.2 Sticks 240G  | 400-BEFC                 | 1           |               | \$0.00      | 3   | \$0.00         |                    |
| No Controller  | 540-BCIU                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| UEFI BIOS Boot Mode with GPT Partition   | 403-BCHM                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| Keyboard and Optical Mouse, USB, Black, English  | 405-AACD                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| 3 Years ProSupport Plus Mission Critical 4Hr Onsite Service  | 800-BBDM                 | 1           |               | \$0.00      | 1   | \$0.00         |                    |
| Dell 24 Monitor - E2417H   | 570-AAKV,                | 1           |               | \$12.00     | 3   | \$36.00        |                    |
| Mellanox MSN2700-CS2F, 32 Port QSFP 100Gbe   | 827-1296,                | 1           |               | \$5,299.00  | 9   | \$47,691.00    |                    |
| 1m (3ft) Dell DAC-Q28-100G-1M Compatible 100G QSFP28 Passive Direct Attach Copper Twinax Cable                         | E2417H                   | 1           |               | \$169.99    | 3   | \$509.97       |                    |
| 3m (10ft) Dell DAC-Q28-45FP28-25G-3M Compatible 100G QSFP28 to 4x25G SFP28 Passive Direct Attach Copper Breakout Cable | MSN2700-                 |             |               | \$35,913.00 | 1   | \$35,913.00    |                    |
| C13 to C14, PDU Style, 12 AMP, 2 Feet (.6m) Power Cord, North America  | Q28-PC01                 |             |               | \$29.00     | 11  | \$319.00       |                    |
| APC NetShelter SX 24U 600mm x 1070mm Deep Enclosure  | Q-                       |             |               | \$93.00     | 3   | \$279.00       |                    |
| Rack PDU, Basic, Zero U, 15A, 120V, 5-15 input, (14) 5-15 output   | 492-BBDI                 | 1           |               | \$20.00     | 22  | \$440.00       |                    |
|  | A7545498                 | 1           |               | \$1,129.99  | 1   | \$1,129.99     |                    |
|  | A7541364                 | 1           |               | \$174.99    | 1   | \$174.99       |                    |
| <b>Subtotal</b>  |                          |             |               |             |     | \$414,805.48   | \$47,691.00        |

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|   |                          |             |               |
|---|--------------------------|-------------|---------------|
|  | <h1>PowerEdge R7515</h1> | TPCx-HS     | 2.0.3         |
|   |                          | TPC Pricing | 2.4.0         |
|   |                          | Report Date | Sep. 17, 2019 |

(continued from previous page)

**PowerEdge R6525 Server**

|  |            |   |            |   |             |
|--|------------|---|------------|---|-------------|
| PowerEdge R6525 Server   | 210-ATCF   | 1 | \$749.00   | 1 | \$749.00    |
| BOSS controller card + with 2 M.2 sticks 240G (RAID 1), LP                             | 403-BCHM   | 1 | \$879.00   | 1 | \$879.00    |
| PowerEdge R6525 Motherboard, with 2 x 1Gb Onboard LOM (BCM5720)                        | 384-BCGI   | 1 | \$0.00     | 1 | \$0.00      |
| Very High Performance Fan for 10 x 2.5" or 10 x 2.5" + 2 x 2.5" chassis                | 384-BCGH   | 1 | \$399.00   | 1 | \$399.00    |
| Chassis with up to 10 x 2.5" Hot Plug Hard Drives (2CPU & XGM1)                        | 321-BEUP   | 1 | \$370.00   | 1 | \$370.00    |
| No Trusted Platform Module   | 461-AADZ   | 1 | \$0.00     | 1 | \$0.00      |
| PowerEdge R6525 Shipping Label, FCC2, PSU, 800W, w/o BIS                               | 343-BBOL   | 1 | \$0.00     | 1 | \$0.00      |
| PowerEdge R6525 x4 or x10 Drive Shipping Material                                      | 340-COGL   | 1 | \$99.00    | 1 | \$99.00     |
| AMD EPYC 7502 2.00GHz/2.55GHz, 32C/64T, 64M Cache (180W) DDR4-2666                     | 338-BSWD   | 1 | \$5,599.00 | 2 | \$11,198.00 |
| Heatsink for 1st CPU, greater than or equal to 180W                                    | 412-AASH   | 1 | \$0.00     | 1 | \$0.00      |
| Heatsink for 2nd CPU, greater than or equal to 180W                                    | 412-AASJ   | 1 | \$0.00     | 1 | \$0.00      |
| 3200MT/s RDIMMs  | 370-AEVR   | 1 | \$0.00     | 1 | \$0.00      |
| 64GB RDIMM, 3200MT/s Dual Rank   | 370-AEVP   | 1 | \$2,439.00 | 8 | \$19,512.00 |
| Performance Optimized  | 370-AAIP   | 1 | \$0.00     | 1 | \$0.00      |
| Unconfigured RAID  | 780-BCDS   | 1 | \$0.00     | 1 | \$0.00      |
| PERC H745 for Chassis up to 10 drives  | 405-AAUZ   | 1 | \$1,199.00 | 1 | \$1,199.00  |
| No Media Required  | 421-5736   | 1 | \$0.00     | 1 | \$0.00      |
| iDRAC9,Enterprise  | 385-BBKT   | 1 | \$489.00   | 1 | \$489.00    |
| iDRAC Group Manager, Disabled  | 379-BCQY   | 1 | \$0.00     | 1 | \$0.00      |
| iDRAC, Factory Generated Password  | 379-BCSF   | 1 | \$0.00     | 1 | \$0.00      |
| Riser Config 2, 1 x 16 LP PCIe slot (CPU1), 2 x 16 LP PCIe slot (CPU2)                 | 330-BBNR   | 1 | \$349.00   | 1 | \$349.00    |
| No Internal Optical Drive  | 429-ABBF   | 1 | \$0.00     | 1 | \$0.00      |
| Dual, Hot-plug, Redundant Power Supply (1+1), 1400W                                    | 450-AIQZ   | 1 | \$1,699.00 | 1 | \$1,699.00  |
| No Bezel   | 350-BBBW   | 1 | \$0.00     | 1 | \$0.00      |
| Dell EMC Luggage Tag (x8 or x10 chassis)   | 350-BBXP   | 1 | \$0.00     | 1 | \$0.00      |
| No Quick Sync  | 350-BBXM   | 1 | \$49.00    | 1 | \$49.00     |
| Performance BIOS Settings  | 384-BBBL   | 1 | \$0.00     | 1 | \$0.00      |
| UEFI BIOS Boot Mode with GPT Partition   | 800-BBDM   | 1 | \$0.00     | 1 | \$0.00      |
| ReadyRails Sliding Rails With Cable Management Arm                                     | 770-BCKT   | 1 | \$189.00   | 1 | \$189.00    |
| No Systems Documentation, No OpenManage DVD Kit  | 631-AAACK  | 1 | \$0.00     | 2 | \$0.00      |
| US Order   | 332-1286   | 1 | \$0.00     | 1 | \$0.00      |
| ProSupport and 4Hr Mission Critical, 36 Month(s)                                       | [865-BBNB] | 1 | \$4,661.00 | 1 | \$4,661.00  |
| No Installation  | [900-9997] | 1 | \$0.00     | 1 | \$0.00      |
| NEMA 5-15P to C13 Wall Plug, 125 Volt, 15 AMP, 10 Feet (3m), Power Cord, North America | 450-AALV   | 1 | \$0.00     | 2 | \$0.00      |

|                  |  |  |  |             |            |
|------------------|--|--|--|-------------|------------|
| <b>Sub Total</b> |  |  |  | \$37,180.00 | \$4,661.00 |
|------------------|--|--|--|-------------|------------|

|                            |  |  |  |                 |              |             |
|----------------------------|--|--|--|-----------------|--------------|-------------|
| <b>HARDWARE COMPONENTS</b> |  |  |  | <b>Subtotal</b> | \$451,985.48 | \$52,352.00 |
|----------------------------|--|--|--|-----------------|--------------|-------------|


|   |          |   |             |    |              |  |
|---|----------|---|-------------|----|--------------|--|
| <b>SOFTWARE COMPONENTS</b>  |          |   |             |    |              |  |
| Cloudera Enterprise Data Engineering (CDH 6.3), 3yr Node License                                      | CEDEN-   | 1 | \$14,769.24 | 10 | \$147,692.40 |  |
| Red Hat Linux Registration Document, No Subscription  | 340-AVFG | 1 | \$0.00      | 10 | \$0.00       |  |
| Enterprise Linux OS, Non Factory Installed, Requires Subscription Selection                           | 605-BBFL | 1 | \$0.00      | 10 | \$0.00       |  |
| Red Hat Enterprise Linux, 1-2SKT, Physical Node, 3YR Premium Subscription, with up to 1 Virtual Guest | 605-BBH0 | 1 | \$3,702.00  | 10 | \$37,020.00  |  |

|                            |  |  |  |                 |              |        |
|----------------------------|--|--|--|-----------------|--------------|--------|
| <b>SOFTWARE COMPONENTS</b> |  |  |  | <b>Subtotal</b> | \$184,712.40 | \$0.00 |
|----------------------------|--|--|--|-----------------|--------------|--------|

|                                |  |  |  |                     |                    |
|--------------------------------|--|--|--|---------------------|--------------------|
| <b>Total</b>                   |  |  |  | <b>\$636,697.88</b> | <b>\$52,352.00</b> |
| Large Purchase Discount (35%)* |  |  |  | -222,844.26         | -18,323.20         |

|   |                                      |                    |
|---|--------------------------------------|--------------------|
| Pricing: 1 = Dell   | <b>Three-Year Cost of Ownership:</b> | <b>\$447,883</b>   |
| * Discount applies to all line items where Key = 1. Discount based upon total system cost as purchased by a regular customer. | <b>HSpH@1TB:</b>                     | <b>11.73</b>       |
| <b>Audited by Doug Johnson, InfoSizing</b>  | <b>\$/ HSpH@1TB:</b>                 | <b>\$38,182.70</b> |

Prices used in TPC benchmarks reflect the actual prices a customer would pay for a one-time purchase of the stated Line Items. Individually negotiated discounts are not permitted. Special prices based on assumptions about past or future purchases are not permitted. All discounts reflect standard pricing policies for the listed Line Items. For complete details, see the pricing section of the TPC Benchmark Standard. If you find that the stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org. Thank you.

|   |                        |                           |
|---|------------------------|---------------------------|
|  | <b>PowerEdge R7515</b> | TPCx-HS 2.0.3             |
|   |                        | TPC Pricing 2.4.0         |
|   |                        | Report Date Sep. 17, 2019 |

| Numerical Quantities      |                         |         |
|---------------------------|-------------------------|---------|
| Performance Run – Run 1   |                         |         |
| Scale Factor              |                         | 1TB     |
| Run Start Time            | 2019-09-09 20:20:00.000 |         |
| Run End Time              | 2019-09-09 20:25:03.000 |         |
| Run Elapsed Time          |                         | 307.000 |
| HSGen Start Time          | 2019-09-09 20:20:02.000 |         |
| HSGen End Time            | 2019-09-09 20:21:05.000 |         |
| HSGen Elapsed Time        |                         | 65.368  |
| HSSort Start Time         | 2019-09-09 20:21:10.000 |         |
| HSSort End Time           | 2019-09-09 20:24:34.000 |         |
| HSSort Elapsed Time       |                         | 205.084 |
| HSValidate Start Time     | 2019-09-09 20:24:39.000 |         |
| HSValidate End Time       | 2019-09-09 20:25:03.000 |         |
| HSValidate Elapsed Time   |                         | 25.834  |
| Repeatability Run – Run 2 |                         |         |
| Scale Factor              |                         | 1TB     |
| Run Start Time            | 2019-09-09 20:27:10.000 |         |
| Run End Time              | 2019-09-09 20:32:13.000 |         |
| Run Elapsed Time          |                         | 307.000 |
| HSGen Start Time          | 2019-09-09 20:27:11.000 |         |
| HSGen End Time            | 2019-09-09 20:28:16.000 |         |
| HSGen Elapsed Time        |                         | 66.952  |
| HSSort Start Time         | 2019-09-09 20:28:21.000 |         |
| HSSort End Time           | 2019-09-09 20:31:44.000 |         |
| HSSort Elapsed Time       |                         | 204.153 |
| HSValidate Start Time     | 2019-09-09 20:31:49.000 |         |
| HSValidate End Time       | 2019-09-09 20:32:13.000 |         |
| HSValidate Elapsed Time   |                         | 25.926  |



# PowerEdge R7515

|             |               |
|-------------|---------------|
| TPCx-HS     | 2.0.3         |
| TPC Pricing | 2.4.0         |
| Report Date | Sep. 17, 2019 |

## Run Reports

### Run Report for Performance Run – Run 1

#### TPCx-HS Performance Metric (HSph@SF) Report

|                    |                |             |
|--------------------|----------------|-------------|
| Test Run 1 Details | Total Time =   | 307         |
|                    | Total Size =   | 10000000000 |
|                    | Scale-Factor = | 1           |

TPCx-HS Performance Metric (HSph@SF): 11.7370

### Run Report for Repeatability Run – Run 2

#### TPCx-HS Performance Metric (HSph@SF) Report

|                    |                |             |
|--------------------|----------------|-------------|
| Test Run 2 Details | Total Time =   | 307         |
|                    | Total Size =   | 10000000000 |
|                    | Scale-Factor = | 1           |

TPCx-HS Performance Metric (HSph@SF): 11.7370

|   |                          |   |
|---|--------------------------|---|
|  | <h1>PowerEdge R7515</h1> | TPCx-HS 2.0.3<br>TPC Pricing 2.4.0<br>Report Date Sep. 17, 2019 |
|---|--------------------------|---|

### Revision History

| Date               | Edition | Description         |
|--------------------|---------|---------------------|
| September 17, 2019 | First   | Initial Publication |