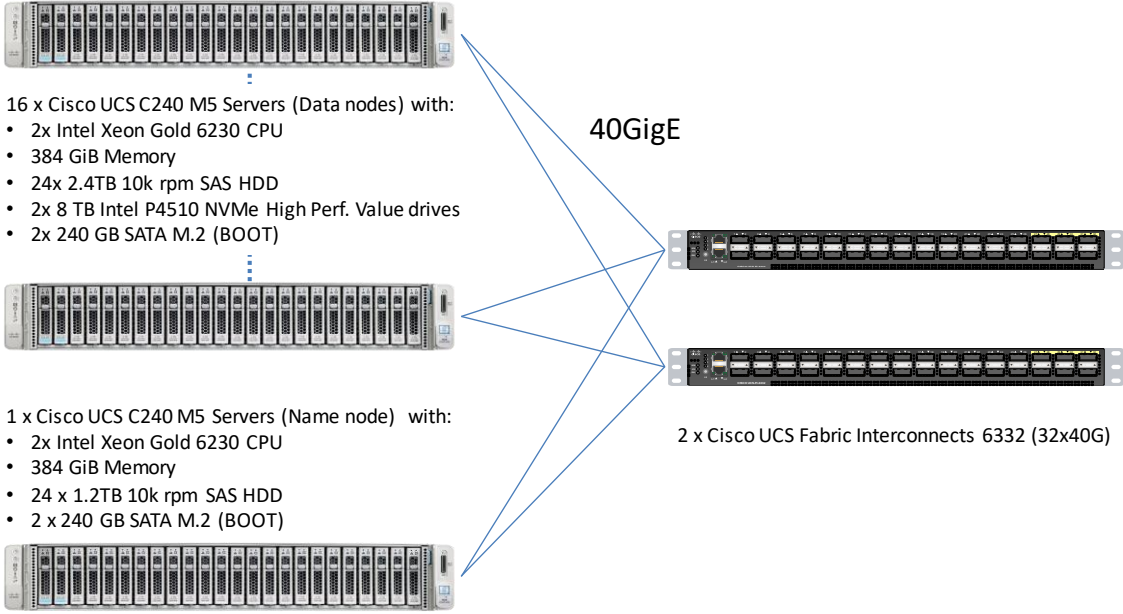

	<h1 style="text-align: center;">Cisco Data Intelligence Platform</h1>		TPCx-HS	2.0.3
			TPC Pricing	2.5.0
			Report Date	Dec. 12, 2019
Availability Date	TPCx-HS Performance	Price/Performance	Total System Cost	
<b>Currently Available</b>	<b>15.03 HSph@10TB</b>	<b>\$67,487.03 \$ / HSph@10TB</b>	<b>\$1,014,330 USD</b>	
System Under Test Configuration Overview				
Scale Factor	Hadoop Software	Operating System	Other Software	
10	Cloudera Enterprise Basic 6.3.0	Red Hat Enterprise Linux Server 7.6	n/a	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>16 x Cisco UCS C240 M5 Servers (Data nodes) with:</p> <ul style="list-style-type: none"> <li>• 2x Intel Xeon Gold 6230 CPU</li> <li>• 384 GiB Memory</li> <li>• 24x 2.4TB 10k rpm SAS HDD</li> <li>• 2x 8 TB Intel P4510 NVMe High Perf. Value drives</li> <li>• 2x 240 GB SATA M.2 (BOOT)</li> </ul> </div> <div style="width: 10%; text-align: center;"> <p>40GigE</p> </div> <div style="width: 40%;">  <p>2 x Cisco UCS Fabric Interconnects 6332 (32x40G)</p> </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 20px;"> <div style="width: 45%;"> <p>1 x Cisco UCS C240 M5 Servers (Name node) with:</p> <ul style="list-style-type: none"> <li>• 2x Intel Xeon Gold 6230 CPU</li> <li>• 384 GiB Memory</li> <li>• 24 x 1.2TB 10k rpm SAS HDD</li> <li>• 2 x 240 GB SATA M.2 (BOOT)</li> </ul> </div> </div>				
Physical Storage/Scale Factor: 121.46		Scale Factor/Physical Memory: 1.57		
Servers:	17 (1x Cisco UCS C240 M5; 16x Cisco UCS C240 M5)			
Total Processors/Cores/Threads:	34/680/1,360			
Server Configuration:	1x Cisco UCS C240 M5:		16x Cisco UCS C240 M5:	
Processors	2x Intel(R) Xeon(R) Gold 6230		2x Intel(R) Xeon(R) Gold 6230	
Memory	384 GiB		384 GiB	
Storage Controller	1x 12G SAS Modular RAID		1x 12G SAS Modular RAID	
Storage Device	2x 240GB SATA M.2		2x 240GB SATA M.2	
	24x 1.2TB 10k rpm SAS HDD		24x 2.4TB 10k rpm SAS HDD	
Network	VIC 1387 Dual Port 40Gb		VIC 1387 Dual Port 40Gb	
Connectivity:	2x Cisco UCS Fabric Interconnect 6332 (32x40G)			
Total Rack Units:	(17 x UCS C240 M5) + (2 x FI 6332) = (17x2) + (2x1) = 36RU			

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Value Endurance</td> <td>UCSC-NVMEHW-I8000</td> <td></td> <td>1 \$14,675.00</td> <td>32</td> <td>\$469,600.00</td> <td></td> </tr> <tr> <td>2.4 TB 12G SAS 10K RPM SFF HDD (4K)</td> <td>UCS-HD24TB10K4KN</td> <td></td> <td>1 \$2,065.00</td> <td>32</td> <td>\$66,080.00</td> <td></td> </tr> <tr> <td>Riser 2C incl 3 PCIe slots (3 x8) supports front+rear NVMe</td> <td>UCSC-PCI-2C-240M5</td> <td></td> <td>1 \$199.00</td> <td>16</td> <td>\$3,184.00</td> <td></td> </tr> <tr> <td>Cisco UCS 1050W AC Power Supply for Rack Server</td> <td>UCSC-PSU1-1050W</td> <td></td> <td>1 \$729.00</td> <td>32</td> <td>\$23,328.00</td> <td></td> </tr> <tr> <td>Power Cord, 125VAC 13A NEMA 5-15 Plug, North America</td> <td>CAB-9K12A-NA</td> <td></td> <td>1 \$0.00</td> <td>32</td> <td>\$0.00</td> <td></td> </tr> <tr> <td>Heat sink for UCS C240 M5 rack servers 150W CPUs &amp; below</td> <td>UCSC-HS-C240M5</td> <td></td> <td>1 \$0.00</td> <td>32</td> <td>\$0.00</td> <td></td> </tr> <tr> <td>Intel 6230 2.1GHz/125W 20C/27.50MB DCP DDR4 2933 MHz</td> <td>UCS-CPU-I6230</td> <td></td> <td>1 \$6,500.00</td> <td>32</td> <td>\$208,000.00</td> <td></td> </tr> <tr> <td>Cisco R42612 standard rack, w/side panels</td> <td>RACK2-UCS2</td> <td></td> <td>1 \$6,241.00</td> <td>1</td> <td>\$6,241.00</td> <td></td> </tr> <tr> <td>SNTC 8X5XNBD, Cisco R42612 standard rack, w side panels</td> <td>CON-SNT-RCK2UCS2</td> <td></td> <td>1 \$300.00</td> <td>1</td> <td></td> <td>\$300.00</td> </tr> <tr> <td>(Not sold standalone) UCS 6332 1RU FI/12 QSFP+</td> <td>UCS-SP-FI6332</td> <td></td> <td>1 \$24,400.00</td> <td>2</td> <td>\$48,800.00</td> <td></td> </tr> <tr> <td>ONSITE 24X7X4 (Not sold standalone) UCS 6332 1RU FI/No PSU/3</td> <td>CON-OSP-SPFI6332</td> <td></td> <td>1 \$7,011.90</td> <td>2</td> <td></td> <td>\$14,023.80</td> </tr> <tr> <td>UCS 6332/ 6454 Power Supply/100-240VAC</td> <td>UCS-PSU-6332-AC</td> <td></td> <td>1 \$0.00</td> <td>4</td> <td>\$0.00</td> <td></td> </tr> <tr> <td>Power Cord, 125VAC 13A NEMA 5-15 Plug, North America</td> <td>CAB-9K12A-NA</td> <td></td> <td>1 \$0.00</td> <td>4</td> <td>\$0.00</td> <td></td> </tr> <tr> <td>40GBASE-CR4 Passive Copper Cable, 3m</td> <td>QSFP-H40G-CU3M</td> <td></td> <td>1 \$0.00</td> <td>16</td> <td>\$0.00</td> <td></td> </tr> <tr> <td>QSFP40G BiDi Short-reach Transceiver</td> <td>QSFP-40G-SR-BD</td> <td></td> <td>1 \$0.00</td> <td>8</td> <td>\$0.00</td> <td></td> </tr> <tr> <td>UCS Manager v3.2</td> <td>N10-MGT015</td> <td></td> <td>1 \$0.00</td> <td>2</td> <td>\$0.00</td> <td></td> </tr> <tr> <td>UCS 6332/ 6454 Fan Module</td> <td>UCS-FAN-6332</td> <td></td> <td>1 \$0.00</td> <td>8</td> <td>\$0.00</td> <td></td> </tr> <tr> <td>UCS 6332/ 6454 Chassis Accessory Kit</td> <td>UCS-ACC-6332</td> <td></td> <td>1 \$0.00</td> <td>2</td> <td>\$0.00</td> <td></td> </tr> <tr> <td>3rd Gen FI Per port License to connect C-direct only</td> <td>UCS-LIC-6300-40GC=</td> <td></td> <td>1 \$1,388.00</td> <td>20</td> <td>\$27,760.00</td> <td></td> </tr> </tbody> </table>					Description	Part Number	Source	Unit Price	Qty	Extended Price	3 Yr. Maint. Price	<b>Hardware</b>							UCS C240 M5 24 SFF + 2 rear drives w/o CPU,mem,HD,PCIe,PS	UCSC-C240-M5SX		1 \$4,939.00	16	\$79,024.00		SNTC 24X7X40S UCS C240 M5 24 SFF + 2 rear drives w/o CPU,mem	CON-OSP-C240M5SX		1 \$3,102.75	17		\$52,746.75	Riser 1 incl 3 PCIe slots (x8, x16, x8); slot 3 req CPU2	UCSC-PCI-1-C240M5		1 \$199.00	16	\$3,184.00		Cisco VIC 1387 Dual Port 40Gb QSFP CNA MLOM	UCSC-MLOM-C40Q-03		1 \$2,192.00	16	\$35,072.00		240GB SATA M.2	UCS-M2-240GB		1 \$535.00	32	\$17,120.00		Ball Bearing Rail Kit for C220 & C240 M4 & M5 rack servers	UCSC-RAILB-M4		1 \$220.00	16	\$3,520.00		IMC SW (Recommended) latest release for C-Series Servers.	CIMC-LATEST		1 \$0.00	16	\$0.00		Big Data and Analytics Platform (Hadoop/IoT/ITOA/AI/ML)	UCS-SID-INFRA-BD		1 \$0.00	16	\$0.00		Big Data and Analytics (Hadoop/IoT/ITOA)	UCS-SID-WKL-BD		1 \$0.00	16	\$0.00		Mini Storage carrier for M.2 SATA/NVME (holds up to 2)	UCS-MSTOR-M2		1 \$0.00	16	\$0.00		Super Cap cable for UCSC-RAID-M5HD	CBL-SC-MR12GM5P		1 \$0.00	16	\$0.00		Super Cap for UCSC-RAID-M5, UCSC-MRAID1GB-KIT	UCSC-SCAP-M5		1 \$0.00	16	\$0.00		Cisco 12G Modular RAID controller with 4GB cache	UCSC-RAID-M5HD		1 \$2,900.00	16	\$46,400.00		2.4 TB 12G SAS 10K RPM SFF HDD (4K)	UCS-HD24TB10K4KN		15 \$2,065.00	352	\$726,880.00		32GB DDR4-2933-MHz RDIMM/2Rx4/1.2v	UCS-MR-X32G2RT-H		1 \$2,043.00	192	\$392,256.00		C240 Rear UCS-RAID-M5HD SAS cbl(1)kitinclfan,bkpln	UCSC-RSAS-240M5X		1 \$0.00	16	\$0.00		C240 M5 Front NVMe cable (1)	CBL-NVME-C240SFF		1 \$0.00	16	\$0.00		8TB 2.5in U.2 Intel P4510 NVMe High Perf. Value Endurance	UCSC-NVMEHW-I8000		1 \$14,675.00	32	\$469,600.00		2.4 TB 12G SAS 10K RPM SFF HDD (4K)	UCS-HD24TB10K4KN		1 \$2,065.00	32	\$66,080.00		Riser 2C incl 3 PCIe slots (3 x8) supports front+rear NVMe	UCSC-PCI-2C-240M5		1 \$199.00	16	\$3,184.00		Cisco UCS 1050W AC Power Supply for Rack Server	UCSC-PSU1-1050W		1 \$729.00	32	\$23,328.00		Power Cord, 125VAC 13A NEMA 5-15 Plug, North America	CAB-9K12A-NA		1 \$0.00	32	\$0.00		Heat sink for UCS C240 M5 rack servers 150W CPUs & below	UCSC-HS-C240M5		1 \$0.00	32	\$0.00		Intel 6230 2.1GHz/125W 20C/27.50MB DCP DDR4 2933 MHz	UCS-CPU-I6230		1 \$6,500.00	32	\$208,000.00		Cisco R42612 standard rack, w/side panels	RACK2-UCS2		1 \$6,241.00	1	\$6,241.00		SNTC 8X5XNBD, Cisco R42612 standard rack, w side panels	CON-SNT-RCK2UCS2		1 \$300.00	1		\$300.00	(Not sold standalone) UCS 6332 1RU FI/12 QSFP+	UCS-SP-FI6332		1 \$24,400.00	2	\$48,800.00		ONSITE 24X7X4 (Not sold standalone) UCS 6332 1RU FI/No PSU/3	CON-OSP-SPFI6332		1 \$7,011.90	2		\$14,023.80	UCS 6332/ 6454 Power Supply/100-240VAC	UCS-PSU-6332-AC		1 \$0.00	4	\$0.00		Power Cord, 125VAC 13A NEMA 5-15 Plug, North America	CAB-9K12A-NA		1 \$0.00	4	\$0.00		40GBASE-CR4 Passive Copper Cable, 3m	QSFP-H40G-CU3M		1 \$0.00	16	\$0.00		QSFP40G BiDi Short-reach Transceiver	QSFP-40G-SR-BD		1 \$0.00	8	\$0.00		UCS Manager v3.2	N10-MGT015		1 \$0.00	2	\$0.00		UCS 6332/ 6454 Fan Module	UCS-FAN-6332		1 \$0.00	8	\$0.00		UCS 6332/ 6454 Chassis Accessory Kit	UCS-ACC-6332		1 \$0.00	2	\$0.00		3rd Gen FI Per port License to connect C-direct only	UCS-LIC-6300-40GC=		1 \$1,388.00	20	\$27,760.00	
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Cisco R42612 standard rack, w/side panels	RACK2-UCS2		1 \$6,241.00	1	\$6,241.00																																																																																																																																																																																																																																																																									
SNTC 8X5XNBD, Cisco R42612 standard rack, w side panels	CON-SNT-RCK2UCS2		1 \$300.00	1		\$300.00																																																																																																																																																																																																																																																																								
(Not sold standalone) UCS 6332 1RU FI/12 QSFP+	UCS-SP-FI6332		1 \$24,400.00	2	\$48,800.00																																																																																																																																																																																																																																																																									
ONSITE 24X7X4 (Not sold standalone) UCS 6332 1RU FI/No PSU/3	CON-OSP-SPFI6332		1 \$7,011.90	2		\$14,023.80																																																																																																																																																																																																																																																																								
UCS 6332/ 6454 Power Supply/100-240VAC	UCS-PSU-6332-AC		1 \$0.00	4	\$0.00																																																																																																																																																																																																																																																																									
Power Cord, 125VAC 13A NEMA 5-15 Plug, North America	CAB-9K12A-NA		1 \$0.00	4	\$0.00																																																																																																																																																																																																																																																																									
40GBASE-CR4 Passive Copper Cable, 3m	QSFP-H40G-CU3M		1 \$0.00	16	\$0.00																																																																																																																																																																																																																																																																									
QSFP40G BiDi Short-reach Transceiver	QSFP-40G-SR-BD		1 \$0.00	8	\$0.00																																																																																																																																																																																																																																																																									
UCS Manager v3.2	N10-MGT015		1 \$0.00	2	\$0.00																																																																																																																																																																																																																																																																									
UCS 6332/ 6454 Fan Module	UCS-FAN-6332		1 \$0.00	8	\$0.00																																																																																																																																																																																																																																																																									
UCS 6332/ 6454 Chassis Accessory Kit	UCS-ACC-6332		1 \$0.00	2	\$0.00																																																																																																																																																																																																																																																																									
3rd Gen FI Per port License to connect C-direct only	UCS-LIC-6300-40GC=		1 \$1,388.00	20	\$27,760.00																																																																																																																																																																																																																																																																									
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	<h1>Cisco Data Intelligence Platform</h1>	TPCx-HS	2.0.3
		TPC Pricing	2.5.0
		Report Date	Dec. 12, 2019

(continued from previous page)

Description	Part Number	Source	Unit Price	Qty	Extended Price	3 Yr. Maint. Price	
UCS C240 M5 24 SFF + 2 rear drives w/o CPU,mem,HD,PCIe,PS	UCSC-C240-M5SX	1	\$4,939.00	1	\$4,939.00		
Riser 1 incl 3 PCIe slots (x8, x16, x8); slot 3 req CPU2	UCSC-PCI-1-C240M5	1	\$199.00	1	\$199.00		
Cisco VIC 1387 Dual Port 40Gb QSFP CNA MLOM	UCSC-MLOM-C40Q-03	1	\$2,192.00	1	\$2,192.00		
240GB SATA M.2	UCS-M2-240GB	1	\$535.00	2	\$1,070.00		
Ball Bearing Rail Kit for C220 & C240 M4 & M5 rack servers	UCSC-RAILB-M4	1	\$220.00	1	\$220.00		
IMC SW (Recommended) latest release for C-Series Servers.	CIMC-LATEST	1	\$0.00	1	\$0.00		
Big Data and Analytics Platform (Hadoop/IoT/ITOA/AI/ML)	UCS-SID-INFR-BD	1	\$0.00	1	\$0.00		
Big Data and Analytics (Hadoop/IoT/ITOA)	UCS-SID-WKL-BD	1	\$0.00	1	\$0.00		
Mini Storage carrier for M.2 SATA/NVME (holds up to 2)	UCS-MSTOR-M2	1	\$0.00	1	\$0.00		
Super Cap cable for UCSC-RAID-M5HD	CBL-SC-MR12GM5P	1	\$0.00	1	\$0.00		
Super Cap for UCSC-RAID-M5, UCSC-MRAID1GB-KIT	UCSC-SCAP-M5	1	\$0.00	1	\$0.00		
Cisco 12G Modular RAID controller with 4GB cache	UCSC-RAID-M5HD	1	\$2,900.00	1	\$2,900.00		
32GB DDR4-2933-MHz RDIMM/2Rx4/1.2v	UCS-MR-X32G2RT-H	1	\$2,043.00	12	\$24,516.00		
Riser 2C incl 3 PCIe slots (3 x8) supports front+rear NVMe	UCSC-PCI-2C-240M5	1	\$199.00	1	\$199.00		
Cisco UCS 1050W AC Power Supply for Rack Server	UCSC-PSU1-1050W	1	\$729.00	2	\$1,458.00		
Power Cord, 125VAC 13A NEMA 5-15 Plug, North America	CAB-9K12A-NA	1	\$0.00	2	\$0.00		
Heat sink for UCS C240 M5 rack servers 150W CPUs & below	UCSC-HS-C240M5	1	\$0.00	2	\$0.00		
UCS C-Series M5 SFF drive blanking panel	UCSC-BBLKD-S2	1	\$0.00	2	\$0.00		
Intel 6230 2.1GHz/125W 20C/27.50MB DCP DDR4 2933 MHz	UCS-CPU-I6230	1	\$6,500.00	2	\$13,000.00		
1.2 TB 12G SAS 10K RPM SFF HDD	UCS-HD12TB10K12N	1	\$1,533.00	24	\$36,792.00		
<b>Software</b>							
Red Hat Enterprise Linux (1-2 CPU,1-2 VN); 3-Yr Support Req	RHEL-2S2V-3A	1	\$0.00	17	\$0.00		
ISV 24X7 RHEL Server 2Socket-OR-2Virtual; ANNUAL List Price	CON-ISV1-EL2S2V3A	1	\$3,897.00	17	\$66,249.00		
Cloudera Ent. Basic, Node LIC, Gold	UCS-BD-CEBN-GD=	1	\$0.00	17	\$0.00		
Cloudera Ent. Basic, Node LIC, Gold - 3 Year	UCS-BD-CEBN-GD-3Y	1	\$10,461.54	17	\$177,846.18		
Hardware & Software Subtotals					\$2,488,029.18	\$67,070.55	
Large Purchase Discount 1							
61% for products and 35% for service							
					1	\$1,517,697.80	\$23,474.69
<b>Hardware &amp; Software Totals</b>					<b>\$970,331.38</b>	<b>\$43,595.86</b>	
<b>Infrastructure</b>							
ViewSonic VA2246M 22" Monitor		2	\$83.39	3	\$250.17		
Logitech MK120 USB Wired Keyboard/mouse		2	\$12.25	3	\$36.75		
<b>Totals</b>					<b>\$970,618.30</b>	<b>\$43,595.86</b>	

Pricing: 1 = Cisco; 2 = CDW

\* Discount applies to all line items where Key = 1. Discount based upon total system cost as purchased by a regular customer.

S: One or more components of the measured configuration have been substituted in the priced configuration. See the FDR for details.


**Audited by Doug Johnson, InfoSizing**

**Three-Year Cost of Ownership: \$1,014,330**

**HSpH@10TB: 15.03**

**\$ / HSpH@10TB: \$67,487.03**

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](mailto:pricing@tpc.org). Thank you.

	<h1>Cisco Data Intelligence Platform</h1>	TPCx-HS 2.0.3 TPC Pricing 2.5.0 Report Date Dec. 12, 2019
<h2>Numerical Quantities</h2>		
<h3>Performance Run – Run 2</h3>		
Scale Factor		10TB
Run Start Time	2019-11-21 14:44:30.000	
Run End Time	2019-11-21 15:24:23.000	
Run Elapsed Time	2,394.000	
HSGen Start Time	2019-11-21 14:44:31.000	
HSGen End Time	2019-11-21 14:54:47.000	
HSGen Elapsed Time	617.606	
HSSort Start Time	2019-11-21 14:54:49.000	
HSSort End Time	2019-11-21 15:18:02.000	
HSSort Elapsed Time	1,393.772	
HSValidate Start Time	2019-11-21 15:18:05.000	
HSValidate End Time	2019-11-21 15:24:23.000	
HSValidate Elapsed Time	378.862	
<h3>Repeatability Run – Run 1</h3>		
Scale Factor		10TB
Run Start Time	2019-11-21 14:04:29.000	
Run End Time	2019-11-21 14:43:55.000	
Run Elapsed Time	2,368.000	
HSGen Start Time	2019-11-21 14:04:30.000	
HSGen End Time	2019-11-21 14:14:10.000	
HSGen Elapsed Time	581.143	
HSSort Start Time	2019-11-21 14:14:12.000	
HSSort End Time	2019-11-21 14:37:54.000	
HSSort Elapsed Time	1,422.483	
HSValidate Start Time	2019-11-21 14:37:56.000	
HSValidate End Time	2019-11-21 14:43:55.000	
HSValidate Elapsed Time	359.853	

	<h1>Cisco Data Intelligence Platform</h1>	TPCx-HS	2.0.3
		TPC Pricing	2.5.0
		Report Date	Dec. 12, 2019

Run Reports

Run Report for Performance Run – Run 2

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TPCx-HS Performance Metric (HSph@SF) Report

Test Run 2 Details	Total Time =	2394
	Total Size =	100000000000
	Scale-Factor =	10

TPCx-HS Performance Metric (HSph@SF): 15.0375

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Run Report for Repeatability Run – Run 1


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TPCx-HS Performance Metric (HSph@SF) Report

Test Run 1 Details	Total Time =	2368
	Total Size =	100000000000
	Scale-Factor =	10

TPCx-HS Performance Metric (HSph@SF): 15.2045

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	<h1>Cisco Data Intelligence Platform</h1>	TPCx-HS 2.0.3 TPC Pricing 2.5.0 Report Date Dec. 12, 2019
<h2>Revision History</h2>		
Date	Edition	Description
December 12, 2019	First	Initial Publication