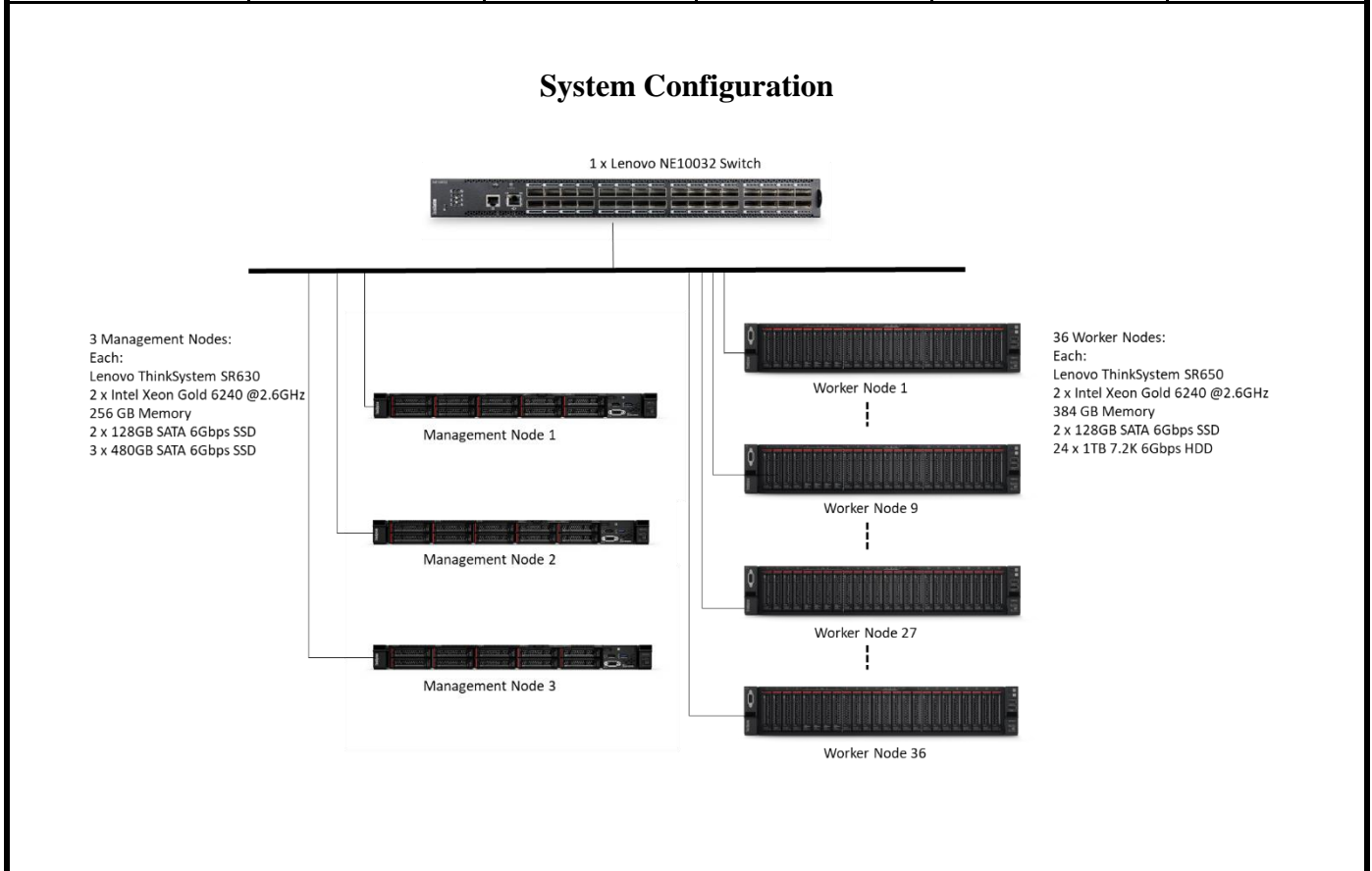
	<b>Lenovo Cluster</b>	TPCx-BB Rev. v1.2.0 TPC-Pricing Rev. v2.4.0
		Report Date: July 12, 2019
Total System Cost	TPCx-BB Performance Metric	Price/Performance
<b>1,433,851 USD</b>	<b>3,767.91</b> BBQpm@30000	<b>380.55 USD</b> \$/BBQpm@30000

Framework	Operating System	Other Software	Availability Date	Scale Factor	Streams
Cloudera for Apache Hadoop (CDH) 5.12.1	Red Hat Enterprise Linux Server 7.6	None	July 12, 2019	30000	4



Physical Storage/Scale Factor: 29.28	Scale Factor/Physical Memory: 2.06
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Servers:	36x ThinkSystem SR650, 3x ThinkSystem SR630
Total Processors/Cores/Threads	78/1,404/2,808

Server Configuration:	Per ThinkSystem SR650:	Per ThinkSystem SR630:
Processors	2x Intel Xeon Gold 6240 @ 2.60GHz	2x Intel Xeon Gold 6240 @ 2.60 GHz
Memory	384GiB	256GiB
Storage Controller	3x ThinkSystem RAID 430-8i	ThinkSystem RAID 930-16i
Storage Device	2x 128GB SATA 6Gbps SSD 24x 1TB 7.2K rpm SATA 6Gbps HDD	2x 128GB SATA 6Gbps SSD 3x 480GB SATA 6Gbps SSD
Network	1x ThinkSystem 10Gb 4-port	1x ThinkSystem 10Gb 4-port

Connectivity:	1x NE 10032 100GbE Switch
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## Lenovo Cluster

TPCx-BB Rev. v1.2.0  
TPC-Pricing Rev. v2.4.0

Report Date:  
July 12, 2019

Description	Part Number	Price Source	Unit Price	Quantity	Extended Price	3-Yr. Maint. Price
<b>Server Hardware - Management Nodes</b>						
ThinkSystem SR630 Configure-To-Order, includes:	7X02CTO1WW	1	26,575	3	79,725	
ThinkSystem SR630 2.5" Chassis with 10 Bays	AUW1			3		
Intel Xeon Gold 6240 18C 150W 2.6GHz Processor	B4HH			6		
ThinkSystem 32GB TruDDR4 2933MHz (2Rx4 1.2V) RDIMM	B4H3			24		
ThinkSystem SR630/SR570 2.5" AnyBay 10-Bay Backplane	AUW9			3		
ThinkSystem RAID 930-16i 8GB Flash PCIe 12Gb Adapter	B31E			3		
ThinkSystem 2.5" Intel S4500 480GB Entry SATA 6Gb Hot Swap SSD	B0YZ			9		
ThinkSystem M.2 with Mirroring Enablement Kit	AUMV			3		
ThinkSystem M.2 CV3 128GB SATA 6Gbps Non-Hot Swap SSD	AUUV			6		
ThinkSystem SR530/SR570/SR630 x16 PCIe LP Riser 2 Kit	AUWA			3		
ThinkSystem SR530/SR570/SR630 x8/x16 PCIe LP+LP Riser 1 Kit	AUWC			3		
Lenovo ThinkSystem 1U LP+LP BF Riser Bracket	AUWQ			3		
ThinkSystem 10Gb 4-port SFP+ LOM	AUKK			3		
ThinkSystem 1100W (230V/115V) Platinum Hot-Swap Power Supply	AVWB			6		
2.8m, 10A/100-250V, C13 to C14 Jumper Cord	6311			6		
ThinkSystem Toolless Slide Rail	AXCA			3		
ThinkSystem SR630 Refresh MB	B4NK			3		
FBU345 SuperCap	AUNP			3		
RAID Configuration	2302			3		
Lenovo ThinkSystem 1U LP Riser Bracket	AUWN			3		
Essential Service - 3Yr 24x7 4Hr Response + YourDrive YourData	5PS7A01504	1	1,539	3		4,617
				<b>Subtotal</b>	<b>79,725</b>	<b>4,617</b>
<b>Server Hardware - Worker Nodes</b>						
ThinkSystem SR650 Configure-To-Order, includes:	7X06CTO1WW	1	37,964	36	1,366,704	
ThinkSystem SR650 2.5" Chassis with 8, 16 or 24 bays	AUVV			36		
Intel Xeon Gold 6240 18C 150W 2.6GHz Processor	B4HH			72		
ThinkSystem 32GB TruDDR4 2933MHz (2Rx4 1.2V) RDIMM	B4H3			432		
ThinkSystem 2U/Twr 2.5" SATA/SAS 8-Bay Backplane	AURA			72		
ThinkSystem 2U/Twr 2.5" AnyBay 8-Bay Backplane	AUR5			36		
ThinkSystem 430-8i SAS/SATA 12Gb HBA	AUNL			108		
ThinkSystem 2.5" 1TB 7.2K SATA 6Gb Hot Swap 512n HDD	AUUE			864		
ThinkSystem M.2 with Mirroring Enablement Kit	AUMV			36		
ThinkSystem M.2 CV3 128GB SATA 6Gbps Non-Hot Swap SSD	AUUV			72		
ThinkSystem SR550/SR590/SR650 x16/x8 PCIe FH Riser 1 Kit	AUR3			36		
ThinkSystem 10Gb 4-port SFP+ LOM	AUKK			36		
ThinkSystem 1100W (230V/115V) Platinum Hot-Swap Power Supply	AVWF			72		
2.8m, 13A/100-250V, C13 to C14 Jumper Cord	6400			72		
ThinkSystem Toolless Slide Rail	AXCA			36		
ThinkSystem 2U left EIA Latch Standard	AURD			36		
ThinkSystem SR650 Refresh MB	B4NL			36		
Lenovo ThinkSystem 2U 3FH Riser Bracket	AURQ			36		
Essential Service - 3Yr 24x7 4Hr Response + YourDrive YourData	5PS7A01558	1	2,079	36		74,844
				<b>Subtotal</b>	<b>1,366,704</b>	<b>74,844</b>

(continued on next page)



## Lenovo Cluster

TPCx-BB Rev. v1.2.0  
TPC-Pricing Rev. v2.4.0

Report Date:  
July 12, 2019

(continued from previous page)

Description	Part Number	Price Source	Unit Price	Quantity	Extended Price	3-Yr. Maint. Price
<b>Server Software</b>						
RHEL Server Physical or Virtual Node, 2 Skt Prem RH Sup 3Yr	7S0FCTO1WW	1	3,703	39	144,417	
Cloudera Enterprise Data Engineering Edition Node License Gold Support 1yr 24x7	CEDEN-GOLD	2	4,000	117	468,000	
				<b>Subtotal</b>	<b>612,417</b>	<b>0</b>
<b>Network</b>						
NE10032 100GbE RackSwitch : Lenovo ThinkSystem NE10032 RackSwitch	7159HE1	1	28,656	1	28,656	
Lenovo ThinkSystem NE10032 RackSwitch (Rear to Front)	AV17			1		
Adjustable 19" 4 Post Rail Kit	A3KP			1		
Lenovo 3m 100G QSFP28 to 4x25G SFP28 Breakout DAC Cable	AV23			10		
2.8m, 10A/100-250V, C13 to C14 Jumper Cord	6311			2		
Essential Service - 3Yr 24x7 4Hr Response	5WS7A01109	1	3,599	1		3,599
				<b>Subtotal</b>	<b>28,656</b>	<b>3,599</b>
<b>Infrastructure</b>						
Infrastructure Rack : NetBAY S2 42U Rack Cabinet	9307RC4	1	2,349	2	4,698	
OU 36 C13/6 C19 24A/200-240V 1 Phase PDU with NEMA L6-30P line cord	00YJ776	1	479	3	1,437	
ThinkSystem Keyboard w/ Int. Pointing Device USB - US Eng 103P RoHS v2	7ZB7A05470	1	99	1	99	
Lenovo L22e-20 21.5-inch LED Backlit LCD Monitor	65DEKCC1US	1	100	1	100	
Essential Service - 3Yr 24x7 4Hr Response	41L2760	1	315	2		630
				<b>Subtotal</b>	<b>6,334</b>	<b>630</b>
				<b>Total</b>	<b>2,093,836</b>	<b>83,690</b>
Dollar Volume Discount (See Note 1)	43.50%	1			743,675	

Pricing: 1 = Lenovo 1-877-782-7134; 2 = Cloudera  <sup>(1)</sup> Discount applies to all line items where Pricing=1; pricing is for these or similar quantities. Discounts for similarly sized configurations will be similar to what is quoted here but may vary based on the specific components priced.  <p style="text-align: center;"><b>Audited by Doug Johnson of InfoSizing</b></p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;"><b>Three-Year Cost of Ownership</b></td> <td style="text-align: right;"><b>\$1,433,851</b></td> </tr> <tr> <td style="text-align: right;"><b>BBQpm@30000</b></td> <td style="text-align: right;"><b>3,767.91</b></td> </tr> <tr> <td style="text-align: right;"><b>\$/BBQpm@30000</b></td> <td style="text-align: right;"><b>\$ 380.55</b></td> </tr> </table>	<b>Three-Year Cost of Ownership</b>	<b>\$1,433,851</b>	<b>BBQpm@30000</b>	<b>3,767.91</b>	<b>\$/BBQpm@30000</b>	<b>\$ 380.55</b>
<b>Three-Year Cost of Ownership</b>	<b>\$1,433,851</b>						
<b>BBQpm@30000</b>	<b>3,767.91</b>						
<b>\$/BBQpm@30000</b>	<b>\$ 380.55</b>						

Prices used in TPC benchmarks reflect the actual prices a customer would pay for a one-time purchase of the stated components. 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 components. For complete details, see the pricing sections of the TPC benchmark specifications. If you find that the stated prices are not available according to these terms, please inform at [pricing@tpc.org](mailto:pricing@tpc.org). Thank you.

### Numerical Quantities

Scale Factor	30000
Streams	4
SUT Validation Test	PASS

### Performance Run (Run 2)

Overall Run Start Time	2019-06-26 09:02:12.549
Overall Run End Time	2019-06-27 09:09:55.926
Overall Run Elapsed Time	86,863.377
Load Test Start Time	2019-06-26 09:02:12.550
Load Test End Time	2019-06-26 09:50:33.098
Load Test Elapsed Time	2,900.548
Power Test Start Time	2019-06-26 09:50:33.100
Power Test End Time	2019-06-26 16:58:38.782
Power Test Elapsed Time	25,685.682
Throughput Test Start Time	2019-06-26 16:58:38.782
Throughput Test End Time	2019-06-27 09:09:55.926
Throughput Test Elapsed Time	58,277.144
Performance Metric (BBQpm@ 30000)	3,767.91

### Repeatability Run (Run 1)

Overall Run Start Time	2019-06-25 08:07:16.312
Overall Run End Time	2019-06-26 08:05:37.862
Overall Run Elapsed Time	86,301.550
Load Test Start Time	2019-06-25 08:07:16.312
Load Test End Time	2019-06-25 08:56:15.453
Load Test Elapsed Time	2,939.141
Power Test Start Time	2019-06-25 08:56:15.454
Power Test End Time	2019-06-25 16:08:04.584
Power Test Elapsed Time	25,909.130
Throughput Test Start Time	2019-06-25 16:08:04.585
Throughput Test End Time	2019-06-26 08:05:37.862
Throughput Test Elapsed Time	57,453.277
Performance Metric (BBQpm@ 30000)	3,782.64

## Performance Run Report (Run 2)

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TPCx-BB

Result

v1.2

\*\*\*\*\*

INFO: T\_LOAD = 2900.548

INFO: T\_LD = 0.1 \* T\_LOAD: 290.0548

INFO: T\_PT = 13532.8125368354

INFO: T\_T\_PUT = 58277.144

INFO: T\_TT = 14569.286

INFO: === Checking validity of the final result ===

INFO: OK: All required BigBench phases were performed.

INFO: OK: All 30 queries were running in the power test.

INFO: OK: All 30 queries were running in the first throughput test.

INFO: OK: Pretend mode was inactive. All commands were executed.

INFO: === Final result ===

INFO: VALID BBQpm@30000 = 3767.91226157961

## Repeatability Run Report (Run 1)

\*\*\*\*\*

TPCx-BB

Result

v1.2

\*\*\*\*\*

INFO: T\_LOAD = 2939.141

INFO: T\_LD = 0.1 \* T\_LOAD: 293.9141

INFO: T\_PT = 13610.4037837776

INFO: T\_T\_PUT = 57453.277

INFO: T\_TT = 14363.31925

INFO: === Checking validity of the final result ===

INFO: OK: All required BigBench phases were performed.

INFO: OK: All 30 queries were running in the power test.

INFO: OK: All 30 queries were running in the first throughput test.

INFO: OK: Pretend mode was inactive. All commands were executed.

INFO: === Final result ===

INFO: VALID BBQpm@30000 = 3782.64938631678

Summary details of the run reports are shown above. For the complete run reports, see the Support Files Archive.