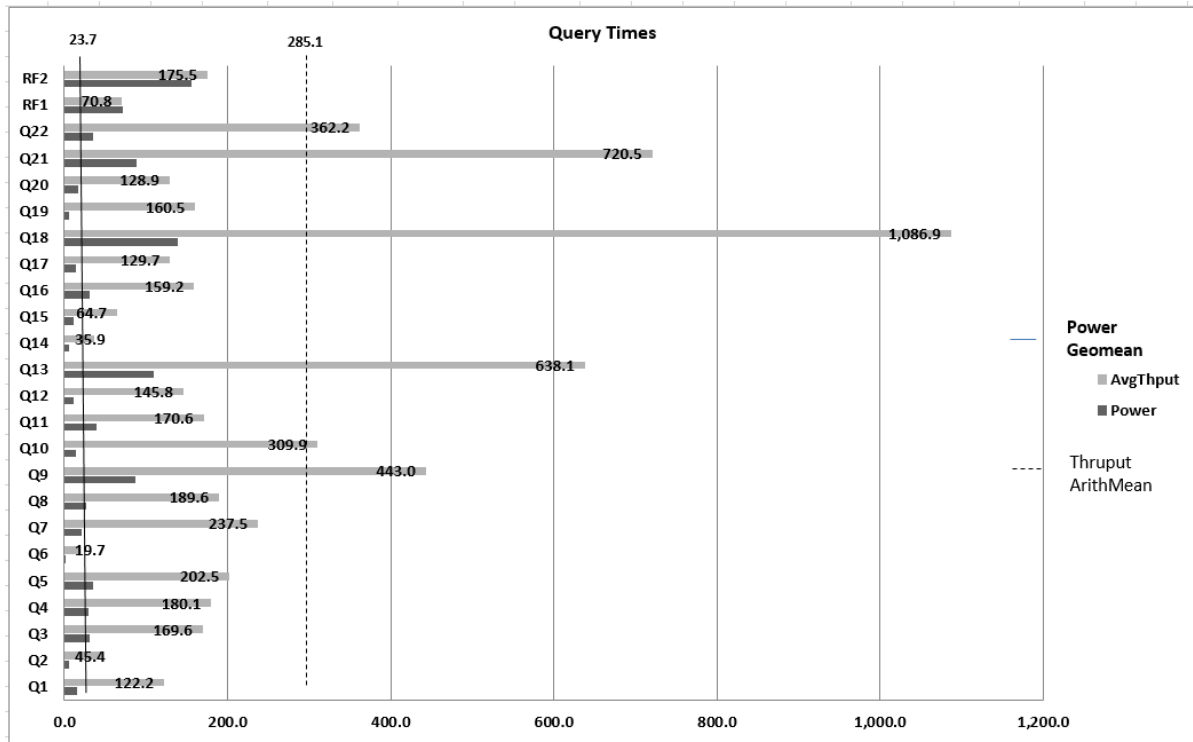
	Lenovo® System x®3850 X6 Microsoft® SQL Server® 2016	TPC-H™ 2.17.1 TPC Pricing 2.0.0		
		Report Date: 7/26/16 Revision Date: 7/26/16		
Total System Cost	TPC-H Composite Query per Hour Metric	Price/Performance		
\$983,870.88 USD	1,106,832.6 QphH™@10,000GB	\$0.89 \$/ QphH@10,000GB		
Database Size	DBMS Manager	Operating System	Other Software	System Availability Date
10,000GB	Microsoft SQL Server 2016 Enterprise Edition	Microsoft Windows Server® 2016 Standard Edition	N/A	September 30, 2016



Database Load Time 00d 06h 48m 42s	Total Disk/Database Size 5.12	Memory/Database Size Percentage 61.4%	Load Includes Backup Y
Storage Redundancy Level Zero	Base Tables No RAID	Auxiliary Structures No RAID	DBMS Temp Space No RAID
OS and DBMS RAID-1			

<u>System Configuration</u>			
Processors/Cores/Threads	4/96/192	Intel® Xeon® Processor E7-8890 v4, 2.20GHz, 60MB L3 Cache	
Memory	96	64GB PC4-19200 ECC DDR4 2400MHz LP LRDIMM	
Total Memory		6TB	
Storage Controllers	1	Lenovo ServeRAID™ M5210 SAS/SATA Controller	
Storage Devices	2	300GB SAS 2.5" 10K RPM HDD	
	4	800GB SATA 2.5" MLC G3HS Enterprise Value SSD	
	8	6.4TB Enterprise io3 Flash PCIe Adapter	
Total Storage		55TB	

Database Size includes only raw data (e.g., no temp, index, redundant storage space, etc.).



Lenovo System x3850 X6 Microsoft SQL Server 2016

TPC-H 2.17.1
TPC Pricing 2.0.0

Report Date: 7/26/16
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Description	Part Number	Price Source	Unit Price	Quantity	Extended Price	3-Yr. Maint. Price
Server Hardware						
Lenovo System x3850 X6 Configure-To-Order, includes:	6241AC1		249,891	1	249,891	
X6 Half-length I/O Book	A4A2			2		
4x 2.5" HDD Riser	A4A6			2		
Line cord - 2.8m, 10A/250V, C13 to NEMA 6-15P (US)	6372			4		
ServeRAID M5210 SAS/SATA Controller	A3YZ			1		
Intel I350-T4 ML2 Quad Port GbE Adapter	A40R			1		
X6 Storage Book	A4A1			1		
x3850/x3950 X6 I/O Planar IV	ATYH			1		
Rail Kit	A4AA			1		
Midplane for 4U Chassis	A4A4			1		
64GB TruDDR4 Memory (4Rx4, 1.2V) PC4-19200 PC4 2400MHz LP LRDIMM	ATGG			96		
800GB SATA 2.5" MLC G3HS Enterprise Value SSD	A57A			4		
300GB 10K 12Gbps SAS 2.5" G3HS HDD	AT89			2		
X6 Compute Book Intel Xeon Processor E7-8890 v4 24C 2.2GHz 60M 165W	ATX9			1		
Addl X6 Compute Book Intel Xeon Processor E7-8890 v4 24C 2.2GHz 165W	ATXZ			3		
x3850 X6 4U Chassis	ASMH			1		
1400W HE Redundant Power Supply	A54E			4		
Lightpath LCD Op Panel	A4VH			1		
3YR Tech Install Parts 24x7x4 x3850 x6	01HV226	1	1,949	1		1,949
				Subtotal	249,891	1,949
ServerStorage						
io3 6.4TB Enterprise Mainstream Flash Adapter	00YA809	1	39,779	8	318,232	
				Subtotal	318,232	
Server Software						
SQL Server 2016 Enterprise Edition (2 Core License)		2	13,472.50	48	646,680	
Windows Server 2016 Standard Edition (2 Core Pack)		2	92	48	4,416	
Microsoft Problem Resolution Services (1 Incident)		2	259	1		259
				Subtotal	651,096	259
Infrastructure						
S2 42U Standard Rack	93074RX	1	1,565	1	1,565	
Preferred Pro Keyboard USB - US English 103P RoHS v2	00AM600	1	29	1	29	
2-Button Optical Mouse - Black - USB	40K9200	1	19	1	19	
ThinkVision E2054 19.5-inch LED Backlit LCD Monitor	60DFAAR1US	1	94	1	94	
ServicePac for 3-Year 24x7x4 Support (Rack)	41L2760	1	315	1		315
				Subtotal	1,707	315
				Total	1,220,926	2,523
Dollar Volume Discount (See Note 1)	41.88%	1			239,578	

Pricing: 1 - Lenovo 1-877-782-7134; 2 - Microsoft Note 1: Discount applies to all line items where Source=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.	Three-Year Cost of Ownership USD: \$983,870.88 QpH@10000GB: 1,106,832.6 \$ USD/QpH@10000GB: \$0.89
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Benchmark results and test methodology audited by Francois Raab for InfoSizing, Inc. (www.sizing.com)

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 section of the TPC benchmark specifications. If you find that stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org. Thank you.



Lenovo System x3850 X6
Microsoft SQL Server 2016

TPC-H 2.17.1
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 Report Date: 7/26/16
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Measurement Results:

Database Scale Factor	10,000
Total Data Storage/Database Size	5.12
Memory/Database Size	61.4%
Start of Database Load	06/26/2016 12:17:31
End of Database Load	06/26/2016 19:06:13
Database Load Time	00d 06h 48m 42s
Query Streams for Throughput Test	9
TPC-H Power (QppH™@10,000)	1,517,082.8
TPC-H Throughput (QthH™@10,000)	807,522.4
TPC-H Composite Query-per-Hour Metric (QphH@10,000GB)	1,106,832.6
Total System Price over 3 Years	\$983,870.88 USD
TPC-H Price/Performance Metric (\$/QphH@10,000GB)	\$ 0.89 USD

Measurement Intervals:

Measurement Interval in Throughput Test (Ts) **8,827**

Duration of Stream Execution:

Power Run	Seed	Query Start Time	Duration (sec)	RF1 Start Time	RF2 Start Time
		Query End Time		RF1 End Time	RF2 End Time
	626190613	2016-06-27 12:42:58	776	2016-06-27 12:41:46	2016-06-27 12:55:54
		2016-06-27 12:55:54		2016-06-27 12:42:58	2016-06-27 12:58:29

Throughput Stream	Seed	Query Start Time	Duration (sec)	RF1 Start Time	RF2 Start Time
		Query End Time		RF1 End Time	RF2 End Time
1	626190614	2016-06-27 12:58:28	6,041	2016-06-27 14:48:15	2016-06-27 14:49:22
		2016-06-27 14:39:09		2016-06-27 14:49:21	2016-06-27 14:52:01
2	626190615	2016-06-27 12:58:28	6,035	2016-06-27 14:52:01	2016-06-27 14:53:18
		2016-06-27 14:39:03		2016-06-27 14:53:18	2016-06-27 14:56:25
3	626190616	2016-06-27 12:58:29	6,422	2016-06-27 14:56:25	2016-06-27 14:57:42
		2016-06-27 14:45:31		2016-06-27 14:57:42	2016-06-27 15:00:34
4	626190617	2016-06-27 12:58:29	5,603	2016-06-27 15:00:35	2016-06-27 15:01:43
		2016-06-27 14:31:52		2016-06-27 15:01:43	2016-06-27 15:04:46
5	626190618	2016-06-27 12:58:29	6,541	2016-06-27 15:04:46	2016-06-27 15:05:55
		2016-06-27 14:47:30		2016-06-27 15:05:54	2016-06-27 15:08:44
6	626190619	2016-06-27 12:58:29	6,241	2016-06-27 15:08:45	2016-06-27 15:09:59
		2016-06-27 14:42:30		2016-06-27 15:09:58	2016-06-27 15:13:00
7	626190620	2016-06-27 12:58:29	6,561	2016-06-27 15:13:01	2016-06-27 15:14:11
		2016-06-27 14:47:50		2016-06-27 15:14:11	2016-06-27 15:17:28
8	626190621	2016-06-27 12:58:29	6,586	2016-06-27 15:17:28	2016-06-27 15:18:38
		2016-06-27 14:48:15		2016-06-27 15:18:37	2016-06-27 15:21:39
9	626190622	2016-06-27 12:58:29	6,425	2016-06-27 15:21:39	2016-06-27 15:22:46
		2016-06-27 14:45:34		2016-06-27 15:22:46	2016-06-27 15:25:35



Lenovo System x3850 X6
Microsoft SQL Server 2016

TPC-H 2.17.1
 TPC-Pricing 2.0.0

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Timing Intervals (in seconds):

Stream ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
0	15.2	6.3	31.6	30.1	35.3	0.9	21.6	27.1	87.7	13.4	39.5	10.9
1	179.6	55.3	222.0	159.5	235.7	35.4	175.5	246.0	541.5	274.9	178.1	308.3
2	51.6	67.3	177.8	176.9	232.9	22.6	288.6	202.2	595.3	201.2	148.1	173.2
3	75.5	36.4	73.1	161.3	214.0	8.6	301.5	197.1	465.4	855.2	163.9	54.0
4	219.2	45.5	189.8	176.3	219.3	8.5	255.6	231.1	345.1	152.2	216.9	182.5
5	205.7	46.6	168.6	181.4	228.7	42.4	331.9	171.4	195.0	197.8	203.7	177.2
6	101.2	42.5	177.4	164.4	253.9	28.5	345.3	223.5	581.0	185.2	211.5	217.5
7	165.2	53.1	180.1	156.2	223.3	12.5	132.9	174.9	625.4	148.6	236.6	12.8
8	157.1	47.6	186.7	393.2	250.8	29.9	276.4	223.4	436.1	786.0	69.6	196.0
9	51.5	53.1	288.6	201.4	130.9	7.2	245.2	198.8	557.3	284.8	238.2	125.6
Min	15.2	6.3	31.6	30.1	35.3	0.9	21.6	27.1	87.7	13.4	39.5	10.9
Avg	122.2	45.4	169.6	180.1	202.5	19.7	237.5	189.6	443.0	309.9	170.6	145.8
Max	219.2	67.3	288.6	393.2	253.9	42.4	345.3	246.0	625.4	855.2	238.2	308.3

Stream ID	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
0	108.9	5.7	11.1	31.0	13.5	138.8	5.0	16.7	88.9	35.8	71.7	155.5
1	368.8	35.0	37.3	110.5	116.7	1,151.6	222.9	134.1	830.6	420.1	65.8	159.3
2	663.7	43.3	116.2	249.0	86.6	1,302.7	44.1	122.3	759.2	308.5	76.5	186.9
3	847.3	50.0	41.5	117.6	89.0	1,249.0	41.1	133.4	747.4	499.6	77.4	172.0
4	513.8	41.9	61.9	253.4	66.3	772.8	277.3	151.8	810.3	411.0	68.5	182.6
5	790.1	20.5	90.3	229.9	63.1	1,623.7	194.8	127.3	831.4	419.0	68.1	169.6
6	803.3	41.4	148.6	209.3	77.2	955.8	259.7	149.0	690.7	373.1	73.9	181.9
7	786.0	16.8	17.0	84.9	467.5	1,457.7	174.0	192.3	860.4	382.0	69.7	197.0
8	553.0	66.2	67.5	218.4	87.8	1,086.1	193.9	143.2	741.8	374.6	69.4	181.2
9	945.7	37.7	55.6	88.3	229.7	1,130.3	192.4	118.5	844.5	398.7	66.8	169.4
Min	108.9	5.7	11.1	31.0	13.5	138.8	5.0	16.7	88.9	35.8	65.8	155.5
Avg	638.1	35.9	64.7	159.2	129.7	1,086.9	160.5	128.9	720.5	362.2	70.8	175.5
Max	945.7	66.2	148.6	253.4	467.5	1,623.7	277.3	192.3	860.4	499.6	77.4	197.0