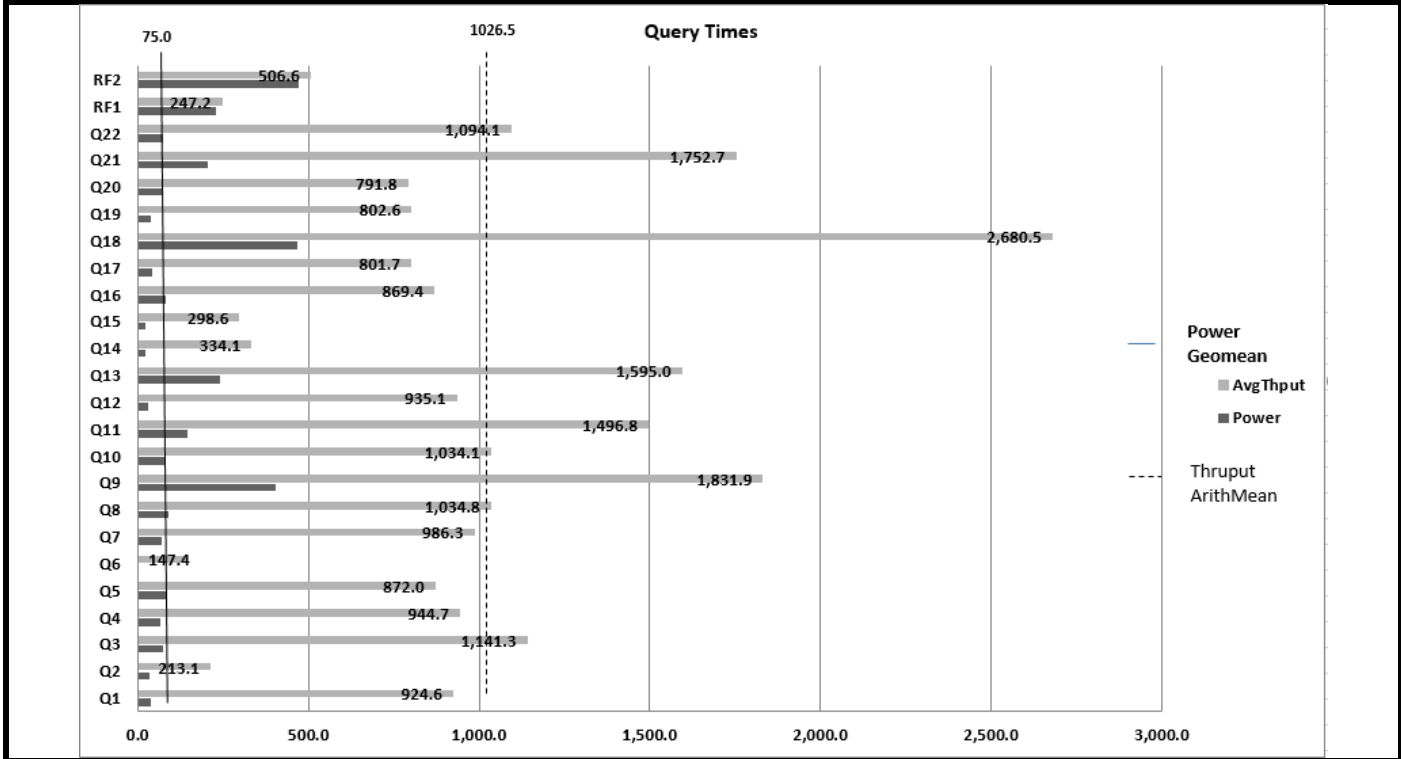
	Lenovo® System x® 3950 X6 Microsoft® SQL Server® 2016			TPC-H Rev. 2.17.1 TPC-Pricing 2.0.0
				Report Date 5/01/16
Total System Cost	Composite Query-per-Hour Metric			Price/Performance
\$2,147,059 USD	1,056,164.7 QphH @ 30000GB			\$2.04 per QphH @30000GB
Database Size	Database Manager	Operating System	Other software	Availability
30,000GB	Microsoft SQL Server 2016 Enterprise Edition	Microsoft Windows Server® 2016 Standard Edition	n.a.	September 30, 2016



Database Load Time: 00d 20h 41m 05s		Total Data Storage / Database Size: 3.70	Load Included Backup: Y	Memory Ratio=40.96%
RAID (Base Tables Only): N		RAID (Base Tables and Auxiliary Data Structures): N	RAID (All): N	
Configuration				
Processors/Cores/Threads	8/144/288	Intel Xeon Processor E7-8890 v3, 2.50GHz, 45MB L3 Cache		
Memory	192	64GB PC3L-12800 ECC DDR3 1600MHz LP RDIMM		
Disk Controllers	2	12TB		
Disk Drives	2	Lenovo ServeRAID-M5210 SAS/SATA Controller		
	4	200GB SATA 2.5" MLC G3HS Enterprise SSD		
	16	3.84TB SATA 2.5" MLC G3HS Enterprise SSD		
Total Disk Storage		6.4TB Enterprise io3 Flash PCIe Adapter		
		118.16TB		



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Description	Part Number	Price Source	Unit Price	Quantity	Extended Price	3-Yr. Maint. Price
Server Hardware						
Lenovo System x3950 X6 Configure-To-Order, includes:	6241AC2	1	1,482,899	1	1,482,899	
x3950 X6 8U Chassis	ASMJ			1		
Midplane for 8U Chassis	A4A5			1		
X6 DDR4 Compute Book Intel Xeon Processor E7-8890 v3 18C 2.5GHz 165W	AS8B			1		
Addl X6 DDR4 Compute Book Intel Xeon Processor E7-8890 v3 18C 2.5GHz	AS91			7		
x3850/x3950 X6 I/O Planar III	ASFB			2		
X6 Storage Book	A4A1			2		
X6 Half-length I/O Book	A4A2			4		
4x 2.5" HDD Riser	A4A6			3		
ServeRAID M5210 SAS/SATA Controller	A3YZ			2		
3.84TB 6Gb SAS Enterprise Capacity G3HS MLC SSD	ASW6			4		
200GB 12G SAS 2.5" MLC G3HS Enterprise SSD	AS7C			2		
Intel I350-T4 ML2 Quad Port GbE Adapter for System x	A40R			1		
1400W HE Redundant Power Supply	A54E			8		
System x Rail Kit	A4AA			1		
Power Cable	6311			8		
64GB TruDDR4 Memory (4Rx4, 1.2V) PC4-17000 CL15 2133MHz LP LRDIMM	A451			192		
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	
ServicePac for 3-Year 24x7x4 Support (x3950 X6)	00GW689	1	1,500	1		1500
ThinkVision E1922 18.5-inch LED Backlit LCD Monitor	60B8AAR6US	1	110	1	110	
				Subtotal	1,483,057	1,500
Storage						
SKU, FIO IOMEMORY SX350-6400	SDFADCMOS-6T40-SF1	3	10,816	16	173,056	
SDFADCMOS-6T40-SF1;SX3.5-GLD-36-6.55TB	FADCMOS6T40SF1G36	3	0	16	0	
				Subtotal	173,056	
Server Software						
SQL Server 2016 Enterprise Edition	7JQ-00750	2	13,472.50	72	970,020	
Windows Server 2016 Standard Edition	P73-06284	2	92	72	6,624	
Microsoft Problem Resolution Services	N/A	2	259	1		259
				Subtotal	976,644	259
Infrastructure						
Ethernet Cables	78004256	1	5	4	20	
S2 42U Standard Rack	93074RX	1	1,565	1	1,565	
ServicePac for 3-Year 24x7x4 Support (Rack)	41L2760	1	315	1		315
				Subtotal	1,585	315
				Total	2,634,342	2,074
Dollar Volume Discount (See Note 1)	33.00%	1			489,357	
Pricing: 1 - Lenovo 1-877-782-7134; 2 - Microsoft; 3 - SanDisk					Three-Year Cost of Ownership USD: \$2,147,059	
Note 1: Discount applies to all line items where Pricing=1; pricing is for these or similar quantities.					QphH@30000GB: 1,056,164.70	
Discounts for similarly sized configurations will be similar to what is quoted here, but may vary based on the specific components priced.					\$ USD/QphH@30000GB: \$2.04	

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.



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Measurement Results

Database Scale Factor	30000
Total Data Storage/Database Size	3.7
Memory/Database Size	40.96%
Start of Database Load	03/18/2016 23:14:15
End of Database Load	03/19/2016 21:07:31
Database Load Time	00d 20h 41m 05s
Query Streams for Throughput Test	10
TPC-H Power	1,439,190.1
TPC-H Throughput	775,077.5
TPC-H Composite Query-per-Hour (QphH@30000GB)	1,056,164.7
Total System Price over 3 Years	\$2,147,059 USD
TPC-H Price/Performance Metric (\$/QphH@30000GB)	\$ 2.04 USD

Measurement Interval

Measurement Interval in Throughput Test (Ts) = 30,655

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
	319210731	2016-03-20 13:38:23	2,386	2016-03-20 13:34:36	2016-03-20 14:18:09
		2016-03-20 14:18:09		2016-03-20 13:38:24	2016-03-20 14:25:59

Throughput Stream	Seed	Query Start Time	Duration (sec)	RF1 Start Time	RF2 Start Time
		Query End Time		RF1 End Time	RF2 End Time
1	319210732	2016-03-20 14:25:58	22,542	2016-03-20 20:51:09	2016-03-20 20:54:47
		2016-03-20 20:41:40		2016-03-20 20:54:47	2016-03-20 21:02:36
2	319210733	2016-03-20 14:25:58	23,111	2016-03-20 21:02:36	2016-03-20 21:06:58
		2016-03-20 20:51:09		2016-03-20 21:06:58	2016-03-20 21:14:48
3	319210734	2016-03-20 14:25:58	22,629	2016-03-20 21:14:48	2016-03-20 21:19:33
		2016-03-20 20:43:07		2016-03-20 21:19:32	2016-03-20 21:29:33
4	319210735	2016-03-20 14:25:58	22,781	2016-03-20 21:29:34	2016-03-20 21:33:39
		2016-03-20 20:45:39		2016-03-20 21:33:38	2016-03-20 21:41:58
5	319210736	2016-03-20 14:25:58	21,585	2016-03-20 21:41:58	2016-03-20 21:46:02
		2016-03-20 20:25:43		2016-03-20 21:46:02	2016-03-20 21:54:52
6	319210737	2016-03-20 14:25:58	22,984	2016-03-20 21:54:52	2016-03-20 21:58:59
		2016-03-20 20:49:02		2016-03-20 21:58:59	2016-03-20 22:06:59
7	319210738	2016-03-20 14:25:58	22,667	2016-03-20 22:07:00	2016-03-20 22:11:22
		2016-03-20 20:43:45		2016-03-20 22:11:22	2016-03-20 22:19:30
8	319210739	2016-03-20 14:25:58	22,602	2016-03-20 22:19:30	2016-03-20 22:23:36
		2016-03-20 20:42:40		2016-03-20 22:23:36	2016-03-20 22:32:17
9	319210740	2016-03-20 14:25:58	22,070	2016-03-20 22:32:17	2016-03-20 22:36:11
		2016-03-20 20:33:48		2016-03-20 22:36:11	2016-03-20 22:44:03
10	319210741	2016-03-20 14:25:58	22,867	2016-03-20 22:44:04	2016-03-20 22:47:54
		2016-03-20 20:47:05		2016-03-20 22:47:53	2016-03-20 22:56:52



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**TPC-H
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TPC-Pricing
2.0.0**

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TPC-H Timing Intervals in seconds

Stream ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
0	37.6	33.2	72.6	66.5	86.9	2.4	69.3	91.6	402.1	77.0	145.3	32.4
1	596.1	166.2	1,026.6	521.9	774.4	84.6	628.6	1,219.5	1,403.9	1,606.9	879.8	706.3
2	1,210.7	254.1	2,383.0	527.4	851.1	127.7	508.0	972.9	1,029.5	850.3	454.4	2,174.1
3	916.0	150.3	440.2	422.9	2,082.2	125.1	1,145.2	977.5	1,116.1	566.3	2,046.3	421.4
4	475.3	381.8	444.2	642.0	713.2	148.1	1,553.3	638.9	2,926.1	1,042.6	2,203.9	1,476.7
5	2,303.4	256.2	701.4	1,332.3	1,215.6	97.2	596.7	1,312.3	1,976.9	790.9	2,876.0	314.6
6	1,216.1	147.5	1,981.4	1,166.5	479.4	276.6	1,710.3	1,229.9	1,322.0	922.0	1,134.6	906.0
7	371.0	241.6	1,264.6	800.4	404.5	219.6	606.0	1,751.4	1,987.6	661.7	1,301.4	735.9
8	1,073.9	130.0	740.9	1,733.7	645.3	90.5	698.3	834.4	2,118.8	2,017.8	475.0	846.0
9	803.4	212.3	1,303.3	1,723.1	1,294.9	151.4	1,468.1	830.5	1,468.6	947.2	1,609.3	172.5
10	279.5	190.9	1,127.0	576.4	258.9	152.2	950.8	582.6	2,969.3	935.4	1,987.3	1,596.8
Min	37.6	33.2	72.6	66.5	86.9	2.4	69.3	91.6	402.1	77.0	145.3	32.4
Avg	843.9	196.7	1,044.1	864.8	800.6	134.1	903.1	949.2	1,701.9	947.1	1,373.9	853.0
Max	2,303.4	381.8	2,383.0	1,733.7	2,082.2	276.6	1,710.3	1,751.4	2,969.3	2,017.8	2,876.0	2,174.1
Stream ID	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
0	240.4	21.9	23.3	81.9	40.7	468.1	38.1	73.5	205.0	74.4	227.5	470.2
1	2,279.2	436.1	181.1	1,062.9	1,560.3	1,744.8	424.6	1,227.8	2,350.6	1,659.6	217.8	468.8
2	1,122.1	312.6	263.7	316.3	374.1	5,347.3	1,528.2	464.4	921.7	1,116.7	262	469.2
3	1,362.9	144.4	181.5	1,370.5	1,156.1	2,826.0	713.1	1,413.3	2,207.9	842.5	284.5	600.8
4	1,629.6	118.2	839.4	1,015.2	838.1	1,827.8	591.2	248.0	2,428.8	597.0	244.6	499.1
5	1,169.0	151.1	201.4	1,452.2	324.6	1,556.4	460.5	340.3	1,367.4	787.5	244	529.4
6	1,367.6	303.9	250.4	227.5	503.2	3,159.9	746.1	1,748.6	1,000.0	1,182.7	247	479.9
7	1,432.1	1,209.3	268.9	623.7	1,602.2	1,432.6	1,980.1	585.1	2,406.1	779.7	262.6	487.8
8	1,354.1	124.1	257.8	988.4	822.2	3,028.3	576.7	587.9	2,383.5	1,072.8	245.3	520.7
9	1,504.2	192.1	175.3	643.9	441.6	2,910.0	411.3	785.9	1,214.8	1,805.2	234.2	472.1
10	2,728.5	347.9	366.5	993.5	394.4	2,971.8	595.3	516.2	1,247.1	1,097.1	229.7	538.4
Min	240.4	21.9	23.3	81.9	40.7	468.1	38.1	73.5	205.0	74.4	217.8	468.8
Avg	1,471.8	305.6	273.6	797.8	732.5	2,479.4	733.2	726.5	1,612.1	1,001.4	245.4	503.3
Max	2,728.5	1,209.3	839.4	1,452.2	1,602.2	5,347.3	1,980.1	1,748.6	2,428.8	1,805.2	284.5	600.8