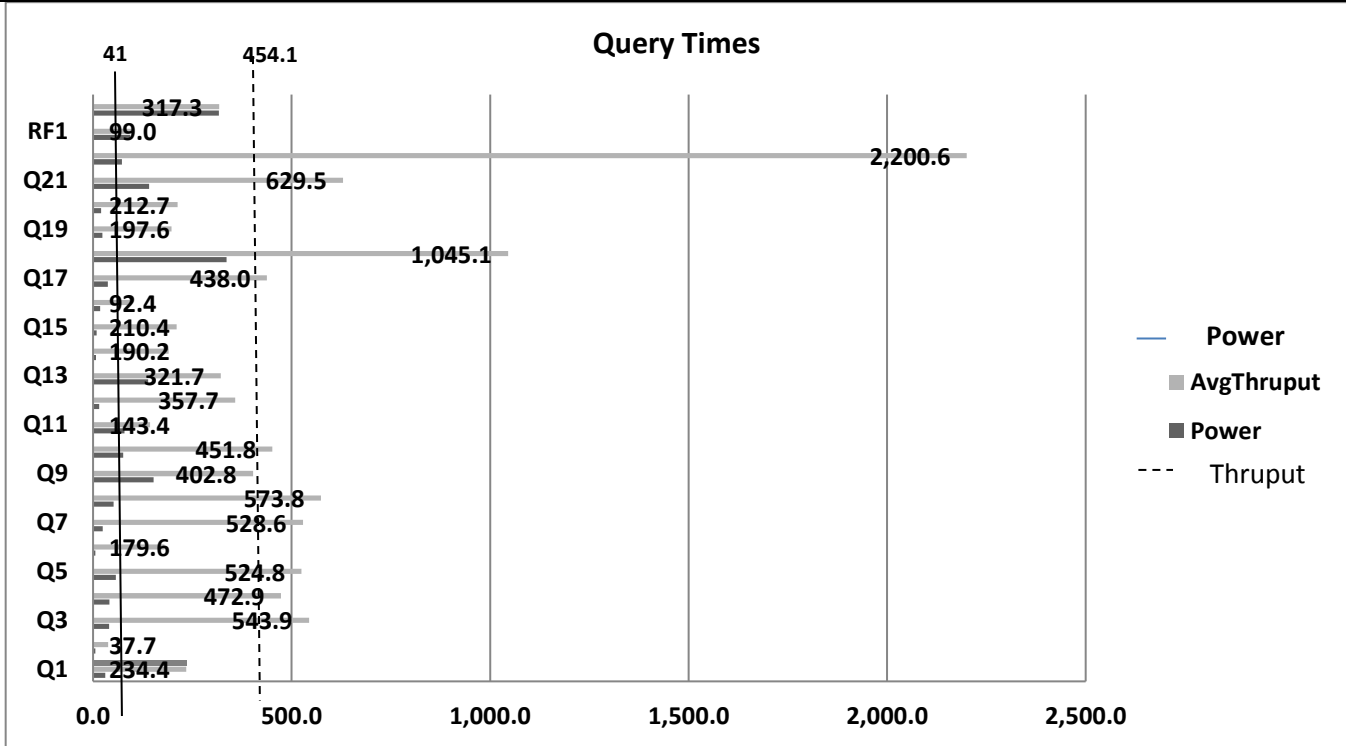


lenovo	System x[®] 3950 X6 Microsoft[®] SQL Server[®] 2014			TPC-H Rev. 2.17.1 TPC-Pricing 2.0.0
				Report Date 4/06/15
Total System Cost	Composite Query-per-Hour Metric			Price/Performance
\$1,583,576 USD	652,239.0 QphH @ 10000GB			\$2.43 per QphH @10000GB
Database Size	Database Manager	Operating System	Other Software	Availability
10,000GB	Microsoft SQL Server 2014 Enterprise Edition	Microsoft Windows Server[®] 2012R2 Standard Edition	n.a.	April 6, 2015



Database Load Time: 01d 19h 32m 38s		Total Data Storage / Database Size: 9.8	Load Included Backup: Y	Memory Ratio=41%
RAID (Base Tables Only): N		RAID (Base Tables and Auxiliary Data Structures): N	RAID (All): N	
Configuration				
Processors/Cores/Threads	8/120/240	Intel Xeon Processor E7-8890 v2, 2.80GHz, 37.5MB L3 Cache		
Memory	64	64GB PC3L-10600 CL9 ECC DDR3 1333MHz LP LRDIMM		
Disk Controllers	2	4,096 GB		
Disk Drives	2	Lenovo ServeRAID-M5210 SAS/SATA Controller		
	6	200GB SATA 2.5" MLC G3HS Enterprise SSD		
	16	400GB SATA 2.5" MLC G3HS Enterprise SSD		
		6,400GB Enterprise io3 Flash PCIe Adapter		
Total Disk Storage		105,200 GB		



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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	411,859	1	411,859	
x3950 X6 8U Chassis	ASMJ			1		
Midplane for 8U Chassis	A4A5			1		
X6 Compute Book Intel Xeon Processor E7-8890 v2	A4AZ			1		
Addl X6 Compute Book Intel Xeon Processor E7-8890 v2	A4BF			7		
X6 Primary I/O Book	ASFC			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 for System x	A3YZ			2		
400GB SATA 2.5" G3HS Enterprise SSD	A4UB			6		
200GB SATA 2.5" 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		
PC3L-10600 CL9 ECC DDR3 1333MHz LP LRDIMM	A451			64		
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	
6400GB Enterprise Value io3 Flash Adapter for System x	00AE992	1	39,779	16	636,464	
ServicePac for 3-Year 24x7x4 Support (x3950 X6)	67568BU	1	1,500	1		1500
ThinkVision E1922 18.5-inch LED Backlit LCD Monitor	60B8AAR6US	1	110	1	110	
				Subtotal	1,048,481	1,500
Server Software						
SQL Server 2014 Enterprise Edition	7JQ-00750	2	13,472.50	60	808,350	
Windows Server 2012 R2 Standard Edition	P73-06284	2	735	4	2,940	
SQL Server 2014 Client Access License	R18-04280	2	24	90	2,193	
Microsoft Problem Resolution Services	N/A	2	259	1		259
				Subtotal	813,483	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	1,863,549	2,074
Dollar Volume Discount (See Note 1)	26.82%	1			282,047	
Pricing: 1 - Lenovo 1-877-782-7134; 2 - Microsoft				Three-Year Cost of Ownership USD:		\$1,583,576
Note 1: Discount applies to all line items where Pricing=1; pricing is for these or similar quantities.				QpH@10000GB:		652,239
Discounts for similarly sized configurations will be similar to what is quoted here, but may vary based on the specific components priced.				\$ USD/QpH@10000GB:		\$2.43
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	10000
Total Data Storage/Database Size	9.8
Memory/Database Size	41%
Start of Database Load	03/24/15 23:04:12
End of Database Load	03/26/15 18:36:50
Database Load Time	01d 19h 32m 38s
Query Streams for Throughput Test	9
TPC-H Power	880,732.2
TPC-H Throughput	483,025.0
TPC-H Composite Query-per-Hour (QphH@10000GB)	652,239.0
Total System Price over 3 Years	\$1,583,576 USD
TPC-H Price/Performance Metric (\$/QphH@10000GB)	\$ 2.43 USD

Measurement Interval

Measurement Interval in Throughput Test (Ts) = 14,757

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
	326183650	2015-03-30 07:50:17	1,384	2015-03-30 07:48:43	2015-03-30 08:13:21
		2015-03-30 08:13:21		2015-03-30 07:50:16	2015-03-30 08:18:38
Throughput Stream	Seed	Query Start Time	Duration (sec)	RF1 Start Time	RF2 Start Time
1	326183651	2015-03-30 08:18:37	9,231	2015-03-30 11:22:01	2015-03-30 11:23:46
		2015-03-30 10:52:28		2015-03-30 11:23:45	2015-03-30 11:29:07
2	326183652	2015-03-30 08:18:37	10,650	2015-03-30 11:29:08	2015-03-30 11:30:42
		2015-03-30 11:16:07		2015-03-30 11:30:42	2015-03-30 11:36:02
3	326183653	2015-03-30 08:18:37	6,965	2015-03-30 11:36:02	2015-03-30 11:37:34
		2015-03-30 10:14:42		2015-03-30 11:37:34	2015-03-30 11:42:50
4	326183654	2015-03-30 08:18:37	9,198	2015-03-30 11:42:51	2015-03-30 11:44:31
		2015-03-30 10:51:55		2015-03-30 11:44:30	2015-03-30 11:49:44
5	326183655	2015-03-30 08:18:37	11,005	2015-03-30 11:49:44	2015-03-30 11:51:22
		2015-03-30 11:22:02		2015-03-30 11:51:22	2015-03-30 11:56:28
6	326183656	2015-03-30 08:18:37	10,819	2015-03-30 11:56:29	2015-03-30 11:58:16
		2015-03-30 11:18:56		2015-03-30 11:58:16	2015-03-30 12:03:28
7	326183657	2015-03-30 08:18:37	10,778	2015-03-30 12:03:28	2015-03-30 12:05:05
		2015-03-30 11:18:15		2015-03-30 12:05:05	2015-03-30 12:10:22
8	326183658	2015-03-30 08:18:37	10,792	2015-03-30 12:10:22	2015-03-30 12:12:02
		2015-03-30 11:18:29		2015-03-30 12:12:01	2015-03-30 12:17:18
9	326183659	2015-03-30 08:18:37	10,479	2015-03-30 12:17:18	2015-03-30 12:18:59
		2015-03-30 11:13:16		2015-03-30 12:18:59	2015-03-30 12:24:34



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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	30.5	5.6	40.5	41.5	57.0	5.5	24.0	51.7	152.3	75.6	79.0	15.8
1	428.1	20.3	575.3	618.9	503.5	112.6	599.4	380.7	135.6	328.9	266.5	149.7
2	182.0	94.3	390.0	313.6	680.9	150.0	71.0	265.3	1,093.6	483.7	161.6	105.5
3	92.5	29.2	169.7	337.8	648.5	221.9	607.7	698.6	371.5	457.4	162.9	106.6
4	129.3	26.0	786.9	867.8	619.1	205.0	61.1	211.8	196.4	233.1	90.9	630.6
5	183.7	34.5	862.7	233.2	339.2	228.4	900.6	387.2	109.6	210.5	211.4	322.0
6	143.2	27.3	712.9	750.5	296.3	205.8	548.2	1,004.2	486.2	628.1	95.6	804.4
7	27.8	48.3	173.2	527.3	983.3	173.7	556.7	373.8	117.9	392.7	86.6	254.2
8	450.6	36.0	238.4	247.6	355.9	103.0	851.3	958.6	770.4	1,095.2	120.3	436.9
9	472.7	23.1	985.8	359.4	296.2	216.1	561.0	883.6	344.1	236.3	95.1	409.5
Min	27.8	5.6	40.5	41.5	57.0	5.5	24.0	51.7	109.6	75.6	79.0	15.8
Avg	214.0	34.5	493.5	429.8	478.0	162.2	478.1	521.6	377.8	414.2	137.0	323.5
Max	472.7	94.3	985.8	867.8	983.3	228.4	900.6	1,004.2	1,093.6	1,095.2	266.5	804.4
Stream ID	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
0	138.7	7.6	8.6	18.2	37.5	336.6	23.4	20.0	141.4	72.3	93.4	316.8
1	430.2	80.6	146.6	40.5	235.5	1,982.3	24.5	89.5	894.8	1,186.2	103.4	321.6
2	178.2	243.7	231.4	83.7	755.8	1,398.8	179.9	238.4	295.0	3,052.2	94.3	319.4
3	249.4	179.4	74.0	56.5	834.3	538.7	149.0	220.5	508.9	248.5	91.8	316.1
4	244.8	176.6	481.3	55.1	593.6	814.6	458.4	225.2	723.3	1,366.2	99.8	313.1
5	492.1	205.7	266.3	443.4	195.6	793.6	406.5	209.5	1,004.3	2,963.7	98.1	305.9
6	231.7	227.0	187.6	45.9	203.1	899.2	187.6	250.4	164.2	2,718.6	107.2	311.8
7	352.2	230.6	182.7	36.9	24.8	1,045.5	29.1	279.4	1,354.3	3,525.5	96.9	316.8
8	211.0	170.1	170.9	37.4	500.9	663.2	176.5	177.0	475.5	2,543.4	99.0	316.1
9	505.5	198.3	153.1	32.6	598.1	1,270.1	167.1	224.3	245.1	2,200.7	100.6	334.7
Min	138.7	7.6	8.6	18.2	24.8	336.6	23.4	20.0	141.4	72.3	91.8	305.9
Avg	303.4	172.0	190.3	85.0	397.9	974.3	180.2	193.4	580.7	1,987.7	98.5	317.2
Max	505.5	243.7	481.3	443.4	834.3	1,982.3	458.4	279.4	1,354.3	3,525.5	107.2	334.7