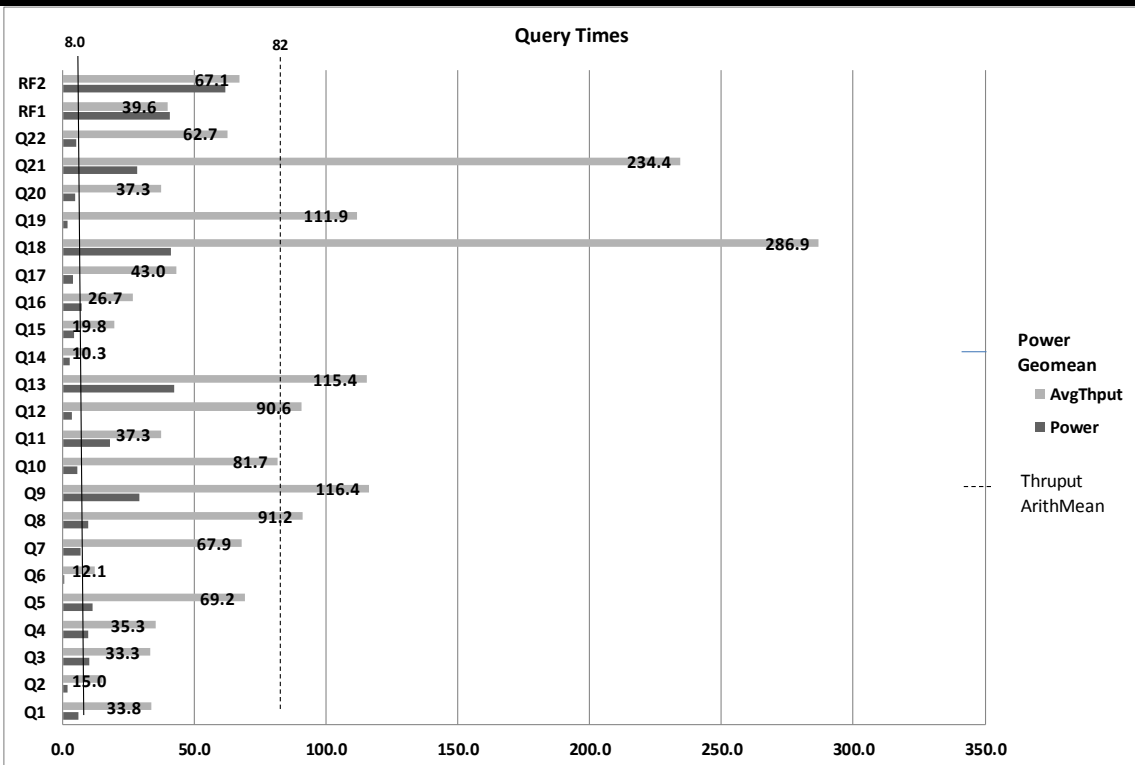


lenovo	System x[®] 3850 X6 Microsoft[®] SQL Server[®] 2016			TPC-H Rev. 2.17.1 TPC-Pricing 2.0.0
				Report Date 3/10/16
Total System Cost	Composite Query-per-Hour Metric			Price/Performance
\$689,589 USD	969,504.2 QphH @ 3000GB			\$0.72 per QphH @3000GB
Database Size	Database Manager	Operating System	Other Software	Availability
3,000GB	Microsoft SQL Server 2016 Enterprise Edition	Microsoft Windows Server[®] 2012R2 Standard Edition	n.a.	July 31, 2016



Database Load Time: 00d 02h 58m 00s	Total Data Storage / Database Size: 6.34	Load Included Backup: Y	Memory Ratio=102.4%
RAID (Base Tables Only): N	RAID (Base Tables and Auxiliary Data Structures): N	RAID (All): N	
Configuration	4/72/144	Intel Xeon Processor E7-8890 v3, 2.50GHz, 45MB L3 Cache	
Processors/Cores/Threads	96	32GB PC3L-12800 ECC DDR3 1600MHz LP RDIMM	
Memory	1	Lenovo ServeRAID-M5210 SAS/SATA Controller	
Disk Controllers	2	200GB 2.5" Enterprise SAS SSD	
Disk Drives	2	480GB Enterprise value SATA 2.5" SSD	
	6	3,200GB Enterprise io3 Flash PCIe Adapter	
Total Disk Storage		20,560GB	



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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	1	270,101	1	270,101	
x3850 X6 4U Chassis	ASMH			1		
Midplane for 4U Chassis	A4A4			1		
x3850/x3950 X6 I/O Planar III	ASFB			1		
X6 DDR4 Compute Book E7-8890 v3 18C 2.5GHz 165W	AS8B, AS91			4		
X6 Storage Book	A4A1			1		
X6 Half-length I/O Book	A4A2			2		
4x 2.5" HDD Riser	A4A6			1		
ServeRAID M5210 SAS/SATA Controller	A3YZ			1		
300GB 10K 12Gbps SAS 2.5" G3HS HDD	AT89			2		
480GB Enterprise Entry SATA G3HS 2.5" SSD	AT8T			2		
Intel I350-T4 ML2 Quad Port GbE Adapter	A40R			1		
1400W HE Redundant Power Supply for altitudes >5000 meters	A54D			4		
Rail Kit	A4AA			1		
Power Cable	6311			4		
32GB TruDDR4 Memory PC4-17000 CL15 2133MHz LP RDIMM	A5UJ			96		
3200GB Enterprise Value io3 Flash Adapter	ARYM			6		
3m Blue Cat5e Cable	3803			1		
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 (x3850 X6)	00GW689	1	1,500	1		1500
ThinkVision E1922 18.5-inch LED Backlit LCD Monitor	60B8AAR6US	1	100	1	100	
				Subtotal	270,249	1,500
Server Software						
SQL Server 2016 Enterprise Edition	7JQ-00256	2	13,472.50	36	485,010	
Windows Server 2012 R2 Standard Edition	P73-06284	2	735	2	1,470	
Microsoft Problem Resolution Services	N/A	2	259	1		259
				Subtotal	486,480	259
Infrastructure						
S2 42U Standard Rack	93074RX	1	1,565	1	1,565	
ServicePac for 3-Year 24x7x4 Support (Rack)	41L2760	1	315	1		315
				Subtotal	1,565	315
				Total	758,294	2,074
Dollar Volume Discount (See Note 1)	25.87%	1			70,779	

Pricing: 1 - Lenovo 1-877-782-7134; 2 - Microsoft

Note 1: 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.

Three-Year Cost of Ownership USD:	\$689,589
QphH@3000GB:	969,504.20
!SD/QphH@3000GB:	\$0.72

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	3000
Total Data Storage/Database Size	6.34
Memory/Database Size	102.4%
Start of Database Load	03/04/2016 21:43:17
End of Database Load	03/05/2016 01:01:35
Database Load Time	00d 02h 58m 00s
Query Streams for Throughput Test	8
TPC-H Power	1,346,018.5
TPC-H Throughput	698,310.1
TPC-H Composite Query-per-Hour (QphH@3000GB)	969,504.2
Total System Price over 3 Years	\$689,589 USD
TPC-H Price/Performance Metric (\$/QphH@3000GB)	\$ 0.72 USD

Measurement Interval

Measurement Interval in Throughput Test (Ts) = 2,722

Duration of Stream Execution:

Power Run	Seed	Query Start Time	Duration	RF1 Start Time	RF2 Start Time
		Query End Time	(sec)	RF1 End Time	RF2 End Time
	305010135	2016-03-05 09:43:45	254	2016-03-05 09:43:04	2016-03-05 09:47:59
		2016-03-05 09:47:59		2016-03-05 09:43:45	2016-03-05 09:49:01
Throughput Stream	Seed	Query Start Time	Duration	RF1 Start Time	RF2 Start Time
		Query End Time	(sec)	RF1 End Time	RF2 End Time
1	305010136	2016-03-05 09:49:00	1,782	2016-03-05 10:19:58	2016-03-05 10:20:40
		2016-03-05 10:18:42		2016-03-05 10:20:40	2016-03-05 10:21:59
2	305010137	2016-03-05 09:49:00	1,731	2016-03-05 10:21:59	2016-03-05 10:22:38
		2016-03-05 10:17:51		2016-03-05 10:22:38	2016-03-05 10:23:44
3	305010138	2016-03-05 09:49:00	1,814	2016-03-05 10:23:44	2016-03-05 10:24:24
		2016-03-05 10:19:14		2016-03-05 10:24:24	2016-03-05 10:25:41
4	305010139	2016-03-05 09:49:00	1,829	2016-03-05 10:25:42	2016-03-05 10:26:21
		2016-03-05 10:19:29		2016-03-05 10:26:21	2016-03-05 10:27:23
5	305010140	2016-03-05 09:49:00	1,859	2016-03-05 10:27:24	2016-03-05 10:28:04
		2016-03-05 10:19:59		2016-03-05 10:28:04	2016-03-05 10:29:10
6	305010141	2016-03-05 09:49:00	1,827	2016-03-05 10:29:10	2016-03-05 10:29:50
		2016-03-05 10:19:27		2016-03-05 10:29:50	2016-03-05 10:30:54
7	305010142	2016-03-05 09:49:00	1,835	2016-03-05 10:30:54	2016-03-05 10:31:33
		2016-03-05 10:19:35		2016-03-05 10:31:33	2016-03-05 10:32:38
8	305010143	2016-03-05 09:49:00	1,768	2016-03-05 10:32:39	2016-03-05 10:33:18
		2016-03-05 10:18:28		2016-03-05 10:33:18	2016-03-05 10:34:22



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Stream ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
0	5.8	1.8	10.1	9.7	11.2	0.4	6.9	9.5	29.2	5.7	18.1	3.5
1	15.0	16.8	42.8	17.7	140.6	18.9	54.9	88.8	92.6	98.2	50.8	72.4
2	15.9	15.5	57.6	27.0	55.4	1.8	70.2	128.8	86.0	105.0	49.5	119.6
3	93.7	21.8	25.5	27.2	21.6	8.2	182.2	92.4	177.8	131.7	42.3	77.4
4	8.3	15.5	34.5	26.8	92.9	3.7	33.3	125.8	152.7	51.8	38.5	85.5
5	16.2	16.3	25.4	38.5	138.1	20.2	46.6	60.5	33.3	67.0	46.9	150.3
6	85.8	14.5	25.7	13.0	44.5	37.9	87.2	106.9	119.8	118.8	29.8	160.1
7	52.7	15.3	20.9	76.6	81.1	2.2	83.6	109.8	133.5	115.4	31.6	48.5
8	10.8	17.6	57.1	81.1	37.2	15.8	46.5	98.3	222.6	41.8	28.5	97.8
Min	5.8	1.8	10.1	9.7	11.2	0.4	6.9	9.5	29.2	5.7	18.1	3.5
Avg	33.8	15.0	33.3	35.3	69.2	12.1	67.9	91.2	116.4	81.7	37.3	90.6
Max	93.7	21.8	57.6	81.1	140.6	37.9	182.2	128.8	222.6	131.7	50.8	160.1

Stream ID	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
0	42.3	2.6	4.3	7.2	3.9	41.0	1.7	4.9	28.2	5.0	40.7	61.5
1	174.0	9.3	30.8	31.5	12.5	250.5	132.8	41.5	357.5	30.9	40.4	78.8
2	170.1	10.1	27.2	23.0	23.4	329.6	55.9	45.8	236.8	76.1	39.1	65.9
3	75.5	13.3	19.2	28.4	106.7	89.1	135.5	71.5	295.4	76.3	39.3	77.3
4	52.2	8.7	31.4	30.4	33.3	498.5	163.0	33.4	187.0	120.4	39.3	62.2
5	138.5	7.8	28.9	31.2	16.7	445.0	108.0	47.9	323.3	51.4	40.2	65.9
6	80.4	9.7	8.8	20.6	58.6	347.4	147.2	25.8	220.4	63.3	39.4	64.1
7	112.3	9.3	9.4	20.6	116.2	318.7	149.0	27.7	246.5	52.6	38.5	65.1
8	192.9	21.8	17.8	47.0	15.5	262.4	113.8	37.0	214.9	88.4	39.6	63.2
Min	42.3	2.6	4.3	7.2	3.9	41.0	1.7	4.9	28.2	5.0	38.5	61.5
Avg	115.4	10.3	19.8	26.7	43.0	286.9	111.9	37.3	234.4	62.7	39.6	67.1
Max	192.9	21.8	31.4	47.0	116.2	498.5	163.0	71.5	357.5	120.4	40.7	78.8