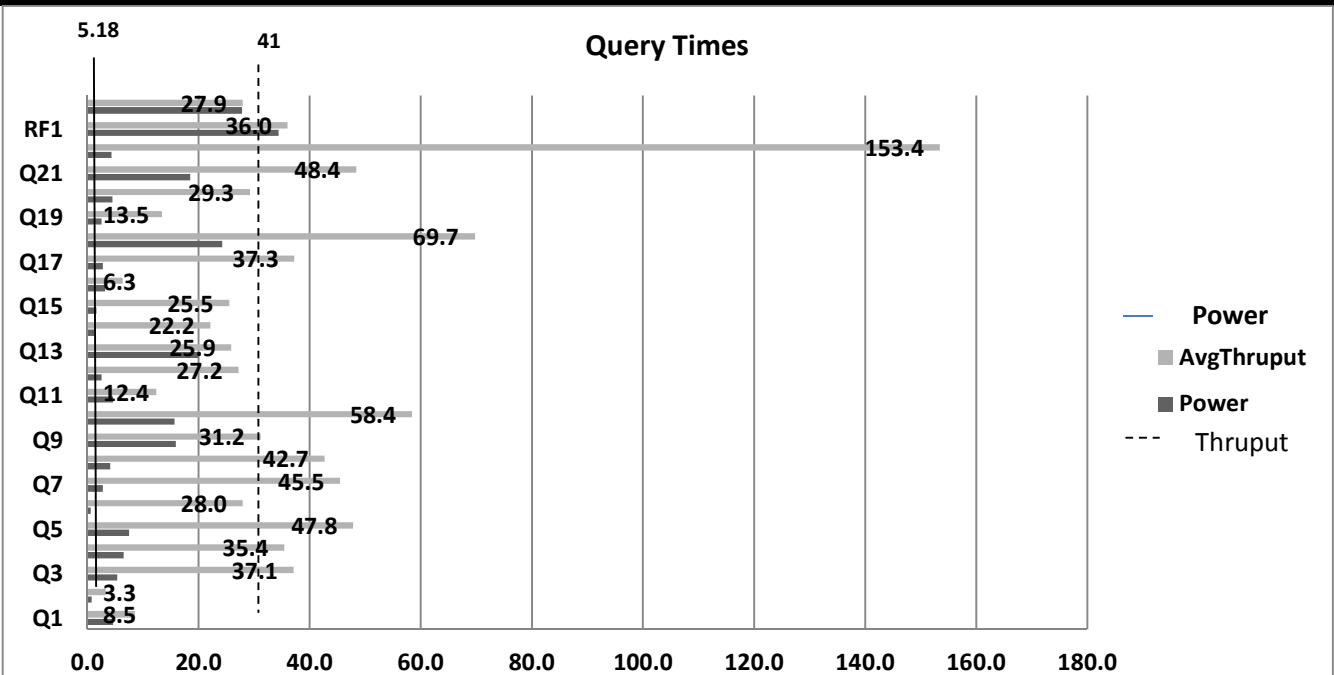
	IBM® System x® 3850 X6 Microsoft® SQL Server® 2014			TPC-H Rev. 2.16.0 TPC-Pricing 1.7.0																																							
				Report Date 4/16/14																																							
Total System Cost	Composite Query-per-Hour Metric			Price/Performance																																							
\$705,444 USD	519,976.1 QphH @ 1000GB			\$1.36 per QphH @1000GB																																							
Database Size	Database Manager	Operating System	Other software	Availability																																							
1000GB	Microsoft SQL Server 2014 Enterprise Edition	Microsoft Windows Server® 2012R2 Standard Edition	n.a.	April 16, 2014																																							
 <table border="1"> <caption>Query Times Data</caption> <thead> <tr> <th>Query</th> <th>Power</th> <th>AvgThruput</th> </tr> </thead> <tbody> <tr><td>RF1</td><td>5.18</td><td>27.9</td></tr> <tr><td>Q21</td><td>36.0</td><td>48.4</td></tr> <tr><td>Q19</td><td>13.5</td><td>29.3</td></tr> <tr><td>Q17</td><td>6.3</td><td>37.3</td></tr> <tr><td>Q15</td><td>25.5</td><td>22.2</td></tr> <tr><td>Q13</td><td>25.9</td><td>27.2</td></tr> <tr><td>Q11</td><td>12.4</td><td>58.4</td></tr> <tr><td>Q9</td><td>31.2</td><td>42.7</td></tr> <tr><td>Q7</td><td>28.0</td><td>45.5</td></tr> <tr><td>Q5</td><td>35.4</td><td>47.8</td></tr> <tr><td>Q3</td><td>3.3</td><td>37.1</td></tr> <tr><td>Q1</td><td>8.5</td><td></td></tr> </tbody> </table>					Query	Power	AvgThruput	RF1	5.18	27.9	Q21	36.0	48.4	Q19	13.5	29.3	Q17	6.3	37.3	Q15	25.5	22.2	Q13	25.9	27.2	Q11	12.4	58.4	Q9	31.2	42.7	Q7	28.0	45.5	Q5	35.4	47.8	Q3	3.3	37.1	Q1	8.5	
Query	Power	AvgThruput																																									
RF1	5.18	27.9																																									
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Q5	35.4	47.8																																									
Q3	3.3	37.1																																									
Q1	8.5																																										
Database Load Time: 06:48:50		Total Data Storage / Database Size: 13.8	Load Included Backup: Y	Memory Ratio=153.6%																																							
RAID (Base Tables Only): N		RAID (Base Tables and Auxiliary Data Structures): N	RAID (All): N																																								
Configuration																																											
Processors/Cores/Threads	4/60/120	Intel Xeon Processor E7-4890 v2, 2.80GHz, 37.5MB L3 Cache																																									
Memory	96	16GB PC3L-12800 ECC DDR3 1600MHz LP RDIMM																																									
Disk Controllers	1	IBM ServeRAID-M5210 SAS/SATA Controller																																									
Disk Drives	2	200GB SATA 2.5" MLC G3HS Enterprise SSD																																									
	2	400GB SATA 2.5" MLC G3HS Enterprise SSD																																									
	2	IBM 786GB High IOPS MLC Mono Adapter																																									
	5	IBM 1.2TB High IOPS MLC Mono Adapter																																									
	2	IBM 2.4TB High IOPS MLC Duo Adapter																																									
Total Disk Storage		13829GB																																									



IBM System x3850 X6 Microsoft SQL Server 2014

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Description	Part Number	Price Source	Unit Price	Quantity	Extended Price	3-Yr. Maint. Price
Server Hardware						
IBM System x3850 X6 Configure-To-Order, includes:	3837AC1		293,834	1	293,834	
x3850 X6 4U Chassis + Midplane	A4BL, A4A4			1		
X6 Compute Book with Intel Xeon Processor E7-4890 v2	A4AU, A4BA			4		
X6 Primary I/O Book + X6 Storage Book	A4A0, A4A1			1		
X6 Half-length I/O Book	A4A2			2		
4x 2.5" HDD Riser	A4A6			2		
ServeRAID M5210 SAS/SATA Controller for IBM System x	A3YZ			1		
S3700 400GB SATA 2.5" MLC G3HS Enterprise SSD	A4U4			2		
S3700 200GB SATA 2.5" MLC G3HS Enterprise SSD	A4U3			2		
Intel X540 ML2 Dual Port 10GbaseT Adapter	A40P			1		
IBM 1400W HE Redundant Power Supply	A54E			4		
IBM System x Rail Kit	A4AA			1		
Power Cable	6311			4		
16GB PC3L-12800 CL11 ECC DDR3 1600MHz LP RDIMM	A3QM			96		
IBM 785GB High IOPS MLC Mono Adapter	A3J4			2		
IBM 1.2TB High IOPS MLC Mono Adapter	A3DY			5		
IBM 2.4TB High IOPS MLC Duo Adapter	A3DZ			2		
IBM Pref. Pro Keyboard USB - US English 103P RoHS v2	00AM600	1	29	1	29	
IBM 2-Button Optical Mouse - Black - USB	40K9200	1	19	1	19	
X6 Full-length I/O Book	44X4051	1	409	1	409	
ServicePac for 3-Year 24x7x4 Support (x3850 X6)	00GW689	1	1,500	1		1500
Hanns-G 16" Widescreen LED LCD Monitor (2 spares)	HL161ABB	3	90	3	270	
Subtotal					294,561	1,500
Server Software						
SQL Server 2014 Enterprise Edition	7JQ-00750	2a	13,472.50	30	404,175	
Windows Server 2012 R2 Standard Edition	P73-06284	2	1,123	2	2,246	
Windows Server 2012 R2 Client Access License	R18-04280	2	35	70	2,450	
Microsoft Problem Resolution Services	N/A	2a	259	1		259
Subtotal					408,871	259
Infrastructure						
IBM S2 42U Standard Rack	93074RX	1	1,459	1	1,459	
ServicePac for 3-Year 24x7x4 Support (Rack)	41L2760	1	315	1		315
Subtotal					1,459	315
Total					704,891	2,074
Microsoft Open Program Discount Schedule	32.39%	2			1,521	

Pricing: 1 - IBM 1-866-883-8901; 2 - Microsoft; 3 - newegg.com

Three-Year Cost of Ownership USD: \$705,444
QpH@1000GB: 519,976.10
\$ USD/QpH@1000GB: \$1.36

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.



**IBM System x3850 X6
Microsoft SQL Server 2014**

TPC-H Rev.
2.16.0
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Measurement Results

Database Scale Factor	1000
Total Data Storage/Database Size	13.8
Memory/Database Size	153.6
Start of Database Load	04/09/14 23:11:59
End of Database Load	04/10/14 06:00:49
Database Load Time	06:48:50
Query Streams for Throughput Test	7
TPC-H Power	695,445.5
TPC-H Throughput	388,779.8
TPC-H Composite Query-per-Hour (QphH@1000GB)	519,976.1
Total System Price over 3 Years	\$705,444 USD
TPC-H Price/Performance Metric (\$/QphH@1000GB)	\$ 1.36 USD

Measurement Interval

Measurement Interval in Throughput Test (Ts) = 1,426

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
	410060049	2014-04-10 06:35:27	00 00:02:35	2014-04-10 06:34:52	2014-04-10 06:38:02
		2014-04-10 06:38:02		2014-04-10 06:35:28	2014-04-10 06:38:30
Throughput Stream	Seed	Query Start Time Query End Time	Duration (sec)	RF1 Start Time RF1 End Time	RF2 Start Time RF2 End Time
1	410060050	2014-04-10 06:38:29	00 00:15:00	2014-04-10 06:54:43	2014-04-10 06:55:19
		2014-04-10 06:53:29		2014-04-10 06:55:19	2014-04-10 06:55:47
2	410060051	2014-04-10 06:38:29	00 00:16:08	2014-04-10 06:55:48	2014-04-10 06:56:23
		2014-04-10 06:54:37		2014-04-10 06:56:23	2014-04-10 06:56:52
3	410060052	2014-04-10 06:38:29	00 00:16:14	2014-04-10 06:56:52	2014-04-10 06:57:28
		2014-04-10 06:54:43		2014-04-10 06:57:27	2014-04-10 06:57:56
4	410060053	2014-04-10 06:38:29	00 00:14:53	2014-04-10 06:57:56	2014-04-10 06:58:30
		2014-04-10 06:53:22		2014-04-10 06:58:30	2014-04-10 06:58:58
5	410060054	2014-04-10 06:38:29	00 00:13:39	2014-04-10 06:58:58	2014-04-10 06:59:37
		2014-04-10 06:52:08		2014-04-10 06:59:37	2014-04-10 07:00:05
6	410060055	2014-04-10 06:38:29	00 00:14:05	2014-04-10 07:00:05	2014-04-10 07:00:44
		2014-04-10 06:52:34		2014-04-10 07:00:44	2014-04-10 07:01:11
7	410060056	2014-04-10 06:38:29	00 00:15:24	2014-04-10 07:01:11	2014-04-10 07:01:47
		2014-04-10 06:53:53		2014-04-10 07:01:47	2014-04-10 07:02:15



**IBM System x3850 X6
Microsoft SQL Server 2014**

**TPC-H
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TPC-H Timing Intervals (in seconds)

Query	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Stream 00	4.6	0.8	5.4	6.5	7.5	0.6	2.8	4.1	15.9	15.7	4.6	2.5
Stream 01	11.0	4.6	51.8	11.3	53.0	43.8	91.8	18.0	19.2	51.7	11.4	56.7
Stream 02	13.1	4.5	32.0	30.7	49.6	42.6	52.2	37.9	32.6	61.5	16.9	25.8
Stream 03	8.0	1.6	5.4	34.2	64.8	29.2	56.3	81.3	21.8	99.7	14.8	16.0
Stream 04	4.7	5.7	33.6	51.6	34.4	43.5	42.1	57.6	40.5	52.8	16.7	3.5
Stream 05	5.4	1.5	68.1	48.7	54.0	27.5	45.1	20.0	44.7	84.8	17.4	22.3
Stream 06	16.1	3.1	66.8	38.4	41.5	22.5	17.9	71.7	48.6	70.0	8.6	60.8
Stream 07	5.2	4.6	33.9	62.0	77.6	14.0	55.7	51.1	26.2	31.0	8.6	29.7
Minimum	4.6	0.8	5.4	6.5	7.5	0.6	2.8	4.1	15.9	15.7	4.6	2.5
Average	8.5	3.3	37.1	35.4	47.8	28.0	45.5	42.7	31.2	58.4	12.4	27.2
Maximum	16.1	5.7	68.1	62.0	77.6	43.8	91.8	81.3	48.6	99.7	17.4	60.8

Query	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
Stream 00	20.0	1.2	1.6	3.2	2.8	24.3	2.5	4.5	18.5	4.3	34.4	27.8
Stream 01	24.9	35.2	26.4	6.8	9.2	37.0	5.1	56.2	60.5	213.7	35.8	28.0
Stream 02	26.6	44.2	45.7	5.5	62.8	85.3	11.8	14.7	29.0	242.3	35.5	28.5
Stream 03	21.1	33.0	28.0	5.5	85.7	72.0	4.3	28.9	30.3	231.8	35.3	28.1
Stream 04	24.3	18.8	38.5	4.4	19.5	55.1	22.9	11.9	71.3	238.4	33.7	28.1
Stream 05	37.0	16.5	25.1	9.6	21.6	77.7	24.7	34.5	89.7	41.7	39.1	27.5
Stream 06	28.5	26.8	34.7	6.0	84.4	100.2	31.5	32.9	25.5	7.6	38.5	27.5
Stream 07	24.8	1.6	4.1	9.6	12.0	106.2	5.0	50.6	62.3	247.4	35.5	27.9
Minimum	20.0	1.2	1.6	3.2	2.8	24.3	2.5	4.5	18.5	4.3	33.7	27.5
Average	25.9	22.2	25.5	6.3	37.3	69.7	13.5	29.3	48.4	153.4	36.0	27.9
Maximum	37.0	44.2	45.7	9.6	85.7	106.2	31.5	56.2	89.7	247.4	39.1	28.5