



**IBM® @server® xSeries® 445
with
IBM DB2® UDB 8.1**

TPC-H Rev 2.1.0

Report Date: March 2, 2004

Total System Cost

Composite Query-per-Hour Metric

Price/Performance

\$431,836

**6551.8
QphH @ 300GB**

**\$66
per QphH @ 300GB**

Database Size

Database Manager

Operating System

Other Software

Availability Date

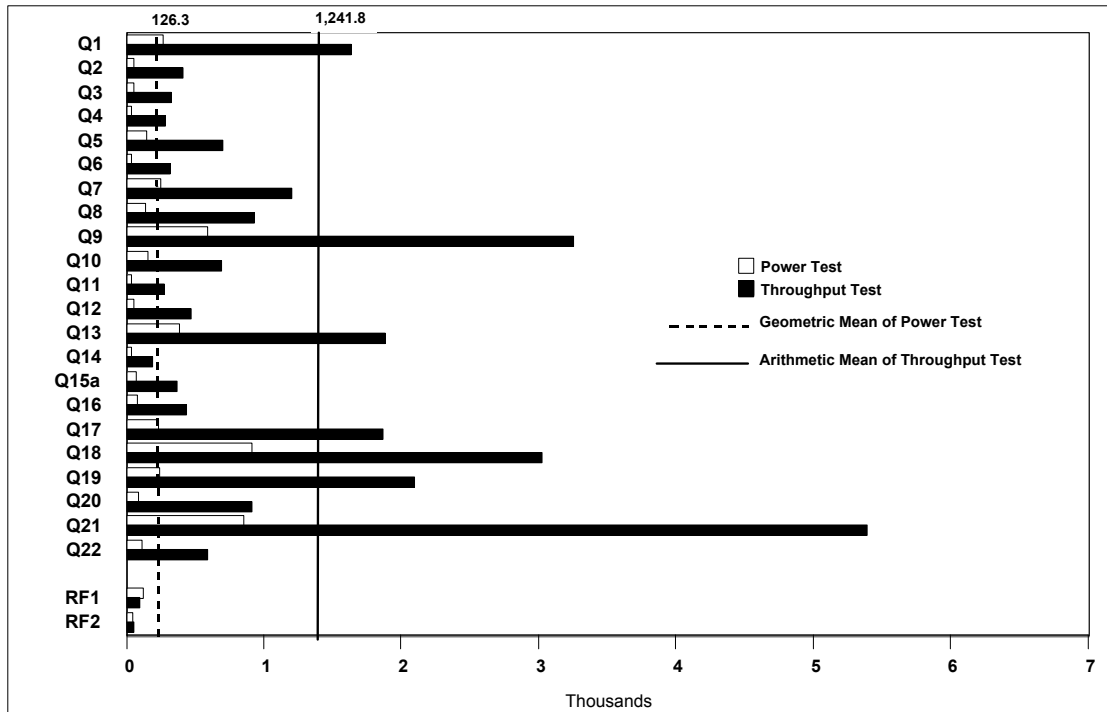
300GB

IBM DB2 UDB 8.1

**Microsoft®
Windows® Server
2003 Enterprise
Edition**

**Microsoft
Visual C++
.NET
Standard**

Aug. 31, 2004



Database Load Time: 03:26:00

Load Included Backup: Y

Total Data Storage /
Database Size: 15.59

RAID (Base Tables Only): N

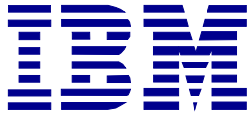
RAID (Base Tables and Auxiliary
Data Structures): N

RAID (All): N

Configuration

Processors/Cores/Threads 8/8/16
Memory 32
Disk Controllers 5
Disk Drives 136
Total Disk Storage 2

Intel Xeon MP 3.0GHz / 4MB ECC L3 Cache
512MB PC2100 DDR ECC SDRAM RDIMM
ServeRAID-6M Ultra320 SCSI Adapter
36.4GB 15K Ultra160 SCSI Drive
36.4GB 15K Ultra320 SCSI Drive
4678.2GB



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TPC-H 2.1.0 Executive Summary

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Description	Part Number	Third Party Brand	Pricing	Unit Price	Quantity	Extended Price	3-Yr. Maint. Price
Server Hardware							
IBM e(logo)server xSeries 445 w/3.0GHz Xeon MP w/4 x 3.0GHz/4MB Xeon MP Processors w/4 x 512MB ECC SDRAM RDIMMs	8870-42X	IBM		40,799	1	40,799	3,221
xSeries 3.0GHz/4MB Processor	13N0721	IBM		6,599	4	26,396	
xSeries 445 SMP Expansion Module	02R1870	IBM		4,849	1	4,849	
512MB PC2100 DDR ECC SDRAM RDIMM	33L5038	IBM		249	28	6,972	
36.4GB 15K Ultra320 SCSI Hot-Swap Drive	32P0734	IBM		495	2	990	
ServeRAID-6M Ultra320 SCSI Contoller	32P0033	IBM		999	5	4,995	
APC Smart-UPS Model 1400	32P1020	IBM		855	1	855	
Netfinity 4.2M Ultra2 SCSI Cable	03K9311	IBM		105	10	1,050	
IBM Preferred Pro Full-Size Keyboard	31P7415	IBM		29	1	29	
IBM Sleek 2-Button Mouse	28L3673	IBM		15	1	15	
E54 15" (13.8" Viewable) Color Monitor	633147N	IBM		119	1	119	90
NetBAY42S Enterprise Rack	9306421	IBM		1,439	1	1,439	168
Subtotal						88,508	3,479
Server Storage							
IBM RXE-100 Remote Expansion Enclosure	8684-2RX	IBM		4,569	1	4,569	1,330
IBM EXP400 Rack Storage Exp. Enclosure	17331RU	IBM		3,099	10	30,990	7,600
36.4GB 15K Ultra320 SCSI Hot-Swap Drive	32P0734	IBM		495	136	67,320	
Subtotal						102,879	8,930
Server Software							
DB2 UDB ESE 8.1 SW Lic.& Maintenance 12 Months	D518GLL	IBM		21,425	8	171,400	
SW Maintenance Renewal - 1 Year	E00BILL	IBM		1,020	16		16,320
DPF SW License & Maintenance 12 Months	D518JLL	IBM		6,436	8	51,488	
DPF SW Maintenance Renewal - 1 Year	E00BILL	IBM		306	16		4,896
Microsoft Windows Server 2003 Enterprise Edition	P7200264	Microsoft		2,399	1	2,399	Incl Below
Operating System Support Package	PRO-PRORS-16U-01	Microsoft		1,950	3		5,850
Microsoft Visual C++ .NET Standard		Microsoft		92	1	92	
Subtotal						225,379	27,066
Compsat Technology discount						Discount	1,329
Total						393,690	38,146

Three-Year Cost of Ownership: 431,836

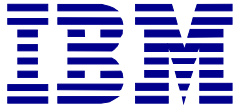
Pricing: 1 - Compsat Technology; 2 - IBM 919-254-0367; 3 - Microsoft; 4 - Amazon.com
Warranty and Maintenance: The standard warranty has been upgraded to 3 years of 24x7x4 coverage.

QpH@300GB: 6,551.8

\$/QpH@300GB: \$66

Audited by Francois Raab, InfoSizing, Inc.

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 sections 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:

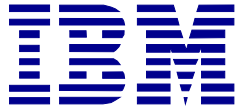
Database Scale Factor	300
Total Data Storage/Database Size	15:59
Start of Database Load	23:54:27
End of Database Load	03:19:43
Database Load Time	03:26:00
Query Streams for Throughput Test	6
TPC-H Power	8,551.1
TPC-H Throughput	5,019.9
TPC-H Composite Query-per-Hour (QphH@300GB)	6,551.8
Total System Price over 3 Years	\$431,836
TPC-H Price/Performance Metric (\$/QphH@300GB)	\$66

Measurement Interval:

Measurement Interval in Throughput Test (Ts) = 28,399

Duration of Stream Execution:

	Seed	Query Start Date/Time Query End Date/Time	RF1 Start Date/Time RF1 End Date/Time	RF2 Start Date/Time RF2 End Date/Time	Duration
Stream 00	222031943	02/20/04 03:54:56 02/20/04 05:18:52	02/20/04 03:54:56 02/20/04 03:56:55	02/20/04 05:18:03 02/20/04 05:18:52	01:23:56
Stream 01	222031944	02/20/04 05:18:56 02/20/04 12:52:01	02/20/04 05:18:56 02/20/04 12:58:17	02/20/04 12:58:17 02/20/04 12:59:14	07:33:05
Stream 02	222031945	02/20/04 05:18:56 02/20/04 12:55:46	02/20/04 12:59:14 02/20/04 13:00:50	02/20/04 13:00:50 02/20/04 13:01:46	07:36:50
Stream 03	222031946	02/20/04 05:18:56 02/20/04 12:54:22	02/20/04 13:01:46 02/20/04 13:03:27	02/20/04 13:03:27 02/20/04 13:04:29	07:35:26
Stream 04	222031947	02/20/04 05:18:56 02/20/04 12:51:14	02/20/04 13:04:29 02/20/04 13:06:11	02/20/04 13:06:11 02/20/04 13:07:04	07:32:18
Stream 05	222031948	02/20/04 05:18:56 02/20/04 12:55:12	02/20/04 13:07:04 02/20/04 13:08:40	02/20/04 13:08:40 02/20/04 13:09:36	07:36:16
Stream 06	222031949	02/20/04 05:18:56 02/20/04 12:56:57	02/20/04 13:09:36 02/20/04 13:11:19	02/20/04 13:11:19 02/20/04 13:12:15	07:38:01



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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	269.9	54.4	55.3	37.1	150.6	34.1	249.5	141.5	594.5	154.1	41.1	59.4
Stream 01	1,538.5	263.2	229.8	147.4	938.8	279.1	986.2	925.3	2,930.2	803.3	261.3	394.2
Stream 02	1,535.2	578.0	878.7	200.8	635.8	246.2	1,718.5	823.6	3,424.5	607.8	249.0	412.3
Stream 03	1,766.8	390.0	133.9	162.5	668.4	194.1	787.4	866.7	3,750.4	741.2	352.5	354.5
Stream 04	1,494.8	337.2	189.5	823.1	563.4	686.9	823.4	1,269.6	3,322.2	424.0	206.0	464.4
Stream 05	1,884.5	280.8	347.3	187.9	556.8	311.0	1,167.9	855.4	2,694.6	1,031.5	322.5	604.8
Stream 06	1,603.9	624.0	208.9	202.5	821.3	206.1	1,731.0	843.7	3,431.6	545.8	294.3	624.3
Minimum	269.9	54.4	55.3	37.1	150.6	34.1	249.5	141.5	594.5	154.1	41.1	59.4
Average	1,637.3	412.2	331.4	287.4	704.9	320.6	1,202.4	930.7	3,258.9	692.3	280.9	475.8
Maximum	1,884.5	624.0	878.7	823.1	983.8	686.9	1,731.0	1,269.6	3,750.4	1,031.5	352.5	624.3

Stream ID	Q13	Q14	Q15a	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
Stream 00	389.8	39.6	68.6	80.6	230.6	913.9	246.4	86.8	852.8	117.3	119.3	48.4
Stream 01	1,511.8	134.1	328.8	571.5	2,276.0	3,128.2	1,733.2	1,489.5	5,519.3	750.4	80.0	57.1
Stream 02	1,895.5	157.9	640.6	486.0	1,771.8	2,670.8	1,509.0	962.0	5,325.8	680.6	96.0	56.6
Stream 03	2,511.7	95.8	426.3	229.6	1,392.9	3,550.9	1,798.0	668.3	5,917.0	567.5	100.3	62.7
Stream 04	1,707.8	238.1	267.2	350.1	2,088.5	2,097.4	3,164.7	673.1	5,471.3	465.7	101.6	53.2
Stream 05	1,485.7	122.7	317.4	503.4	1,594.8	3,434.4	2,776.6	1,016.1	5,350.2	529.8	96.0	56.2
Stream 06	2,213.9	397.9	254.9	492.1	2,072.9	3,287.6	1,590.3	697.4	4,786.9	549.2	102.7	56.0
Minimum	389.8	39.6	68.6	80.6	230.6	913.9	246.4	86.8	852.8	117.3	80.0	48.4
Average	1,887.7	191.1	372.5	438.8	1,866.2	3,028.2	2,095.3	917.7	5,395.1	592.2	96.1	57.0
Maximum	2,511.7	397.9	640.6	571.5	2,276.0	3,550.9	3,164.7	1,489.5	5,917.0	750.4	102.7	62.7