

**IBM® @server™ xSeries™ 440
with
IBM DB2® UDB 8.1**

TPC-H Rev 2.0

Report Date: April 21, 2003

Total System Cost

Composite Query-per-Hour Metric

Price/Performance

\$392,523

**3861.4
QphH @ 100GB**

**\$102
per QphH@100GB**

Database Size

Database Manager

Operating System

Other Software

Availability Date

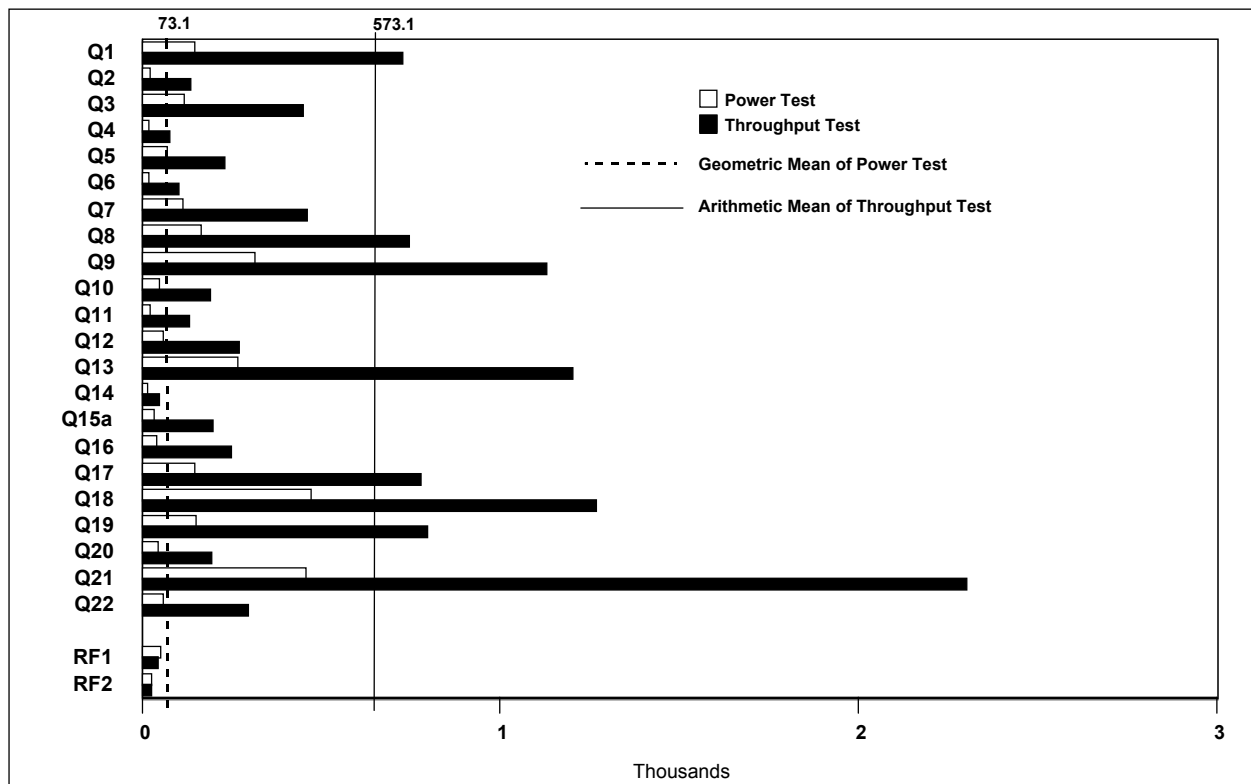
100GB

IBM DB2 UDB 8.1

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

**Microsoft
Visual
Studio
Professional**

July 15, 2003



Database Load Time: 01:38:13

Load Included Backup: Y

Total Data Storage / Database Size: 19.65

RAID (Base Tables Only): N

RAID (Base Tables and Auxiliary Data Structures): N

RAID (All): N

Configuration

Processors

8

Intel Xeon MP 2.0GHz / 2MB ECC L3 Cache

Memory

32

512MB PC133 CL3 ECC SDRAM RDIMM

Disk Controllers

4

ServeRAID SCSI Adapter

Disk Drives

112

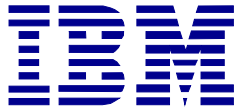
18.2GB 15K Ultra160 SCSI Drive

2

36.4GB 15K Ultra160 SCSI Drive

Total Disk Storage

1965.08GB



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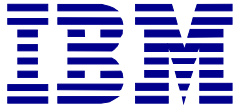
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Description	Part Number	Source	Unit Price	Qty	Ext. Price	3-Yr. Maint.
Server Hardware						
xSeries 440 w / 4 x 2.0GHz/2MB L3 Xeon MP and 4 x 512MB Memory	8687-7RX	1	40,299	1	40,299	3,221
2.0GHz / 2MB L3 Cache Xeon MP	59P5173	1	6,599	4	26,396	0
xSeries SMP Expansion Module	59P5188	1	5,199	1	5,199	0
512MB PC133 ECC SDRAM RDIMM	33L3324	1	499	28	13,972	0
ServeRAID SCSI Adapter	32P0033	2	1,099	4	4,396	0
36.4GB 15K Ultra160 SCSI Drive	06P5768	1	549	2	1,098	0
4.2M Ultra2 SCSI Cable	03K9311	1	105	8	840	0
APC Smart-UPS Model 1400	32P1020	1	855	1	855	0
IBM Preferred Pro Full-Size Keyboard	31P7415	1	29	1	29	0
IBM Sleek 2-Button Mouse	28L3673	1	19	1	19	0
E54 15" (13.8" Viewable) Display	633147N	1	129	1	129	90
NetBAY42S Enterprise Rack	9306421	1	1,439	1	1,439	168
Subtotal					\$94,671	\$3,479
Server Storage						
EXP300 Rack Storage Expansion Enclosure	35311RU	1	3,179	8	25,432	1,600
18.2GB 15K Ultra160 SCSI Drive	06P5767	1	329	112	36,848	0
Subtotal					\$62,280	\$1,600
Server Software						
DB2 UDB ESE 8.1License/1-Yr Maint.	D518GLL	1	21,242	8	169,936	
DB2 UDB ESE 8.1 Support -1Yr/Proc.	E00BILL	1	4,721	16		75,536
Microsoft Windows Server 2003 Enterprise Edition	P72-00264	3	2,399	1	2,399	InclBelow
Visual Studio Professional	659-00844	3	1,079	1	1,079	Incl Below
Operating System Support Package	N/A	3	1,950	3		5,850
Subtotal					\$173,414	\$81,386
Compsat Technology discount of 15.42%.					\$23,524	\$783
Total					\$306,841	\$85,682

Notes: Standard 3-Year and extended warranties upgraded to 7x24, 4-hour response time coverage. *10% or minimum 2 spares are added in place of on-site service; product has a 5-year return-to-vendor warranty.
Pricing: 1 - Compsat Technology; 2 - IBM; 3 - Microsoft Corp.
Audited by Francois Raab of InfoSizing, Inc.

3-Year Cost of Ownership: \$392,523
QphH @ 100GB: 3,861.4
\$/ QphH @ 100GB: \$102

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 specification. 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	100
Total Data Storage/Database Size	19.65
Start of Database Load	09:54:11
End of Database Load	11:32:24
Database Load Time	01:38:13
Query Streams for Throughput Test	5
TPC-H Power	4,922.7
TPC-H Throughput	3,028.9
TPC-H Composite Query-per-Hour (QphH@100GB)	3,861.4
Total System Price over 3 Years	\$392,523
TPC-H Price/Performance Metric (\$/QphH@100GB)	\$102

Measurement Interval:

Measurement Interval in Throughput Test (Ts) = 13,074 seconds

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	4151133224	04/15/03 12:11:11	04/15/03 12:11:11	04/15/03 12:59:10	0:48:25
		04/15/03 12:59:10	04/15/03 12:12:03	04/15/03 12:59:36	
Stream 01	4151133225	04/15/03 12:59:39	04/15/03 16:31:24	04/15/03 16:32:13	3:33:01
		04/15/03 16:30:17	04/15/03 16:32:13	04/15/03 16:32:40	
Stream 02	4151133226	04/15/03 12:59:39	04/15/03 16:32:40	04/15/03 16:33:20	3:33:41
		04/15/03 16:31:24	04/15/03 16:33:20	04/15/03 16:33:47	
Stream 03	4151133227	04/15/03 12:59:39	04/15/03 16:33:47	04/15/03 16:34:30	3:35:23
		04/15/03 16:25:28	04/15/03 16:34:30	04/15/03 16:35:02	
Stream 04	4151133228	04/15/03 12:59:40	04/15/03 16:35:02	04/15/03 16:35:51	3:36:37
		04/15/03 16:31:10	04/15/03 16:35:51	04/15/03 16:36:17	
Stream 05	4151133229	04/15/03 12:59:40	04/15/03 16:36:17	04/15/03 16:37:02	3:37:53
		04/15/03 16:30:38	04/15/03 16:37:02	04/15/03 16:37:33	



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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	147.1	24.3	119.1	19.6	69.7	20.3	114.9	166.4	317.3	48.8	24.8	60.5
Stream 01	653.6	142.9	545.7	49.5	272.0	156.1	572.3	988.8	1,226.6	252.9	191.0	215.4
Stream 02	721.7	192.4	463.2	83.8	287.0	101.0	534.0	1,168.0	1,414.3	153.0	126.4	316.8
Stream 03	789.2	121.9	608.3	79.5	201.2	100.5	494.5	810.6	1,313.0	259.7	88.4	320.0
Stream 04	604.3	185.7	397.1	148.9	218.0	157.1	545.7	493.0	1,305.6	191.5	261.2	368.2
Stream 05	880.0	148.3	570.2	85.0	336.6	99.8	514.5	855.3	1,211.9	243.0	107.6	351.0
Minimum	604.3	121.9	397.1	49.5	201.2	99.8	494.5	493.0	1,211.9	153.0	88.4	215.4
Average	729.8	135.9	450.6	77.7	230.8	105.8	462.7	747.0	1,131.5	191.5	133.2	272.0
Maximum	880.0	192.4	608.3	148.9	336.6	157.1	572.3	1,168.0	1,414.3	259.7	261.2	368.2

Stream ID	Q13	Q14	Q15a	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
Stream 00	268.7	15.1	33.8	43.5	147.4	474.7	150.0	45.4	456.8	58.7	51.5	26.6
Stream 01	1,185.6	32.0	255.4	217.5	767.4	1,234.0	709.4	351.7	2,316.9	301.5	49.0	26.6
Stream 02	1,102.9	60.6	170.0	184.2	723.9	1,441.9	740.5	178.0	2,115.8	425.9	39.8	26.9
Stream 03	1,261.8	56.8	210.2	173.5	748.5	1,225.7	712.9	113.1	2,401.3	257.7	43.6	31.3
Stream 04	1,311.1	44.0	190.1	407.9	1,000.2	1,247.9	849.8	94.0	2,417.6	251.8	49.4	26.4
Stream 05	1,164.5	47.1	165.4	273.1	662.6	1,196.4	988.3	232.5	2,264.4	260.1	44.5	30.9
Minimum	1,102.9	32.0	165.4	173.5	662.6	1,196.4	709.4	94.0	2,115.8	251.8	39.8	26.4
Average	1,205.2	48.1	198.2	251.2	780.5	1,269.2	800.2	193.9	2,303.2	299.4	45.3	28.4
Maximum	1,311.1	60.6	255.4	407.9	1,000.2	1,441.9	988.3	351.7	2,417.6	425.9	49.4	31.3