

**IBM @server xSeries 440  
with  
Microsoft SQL Server 2000**

TPC-H Rev 1.3.0

Report Date: Mar. 11, 2002

Total System Cost

Composite Query-per-Hour Metric

Price/Performance

**\$181,248**

**1,486.0  
QphH @ 100GB**

**\$122  
per QphH@100GB**

Database Size

Database Manager

Operating System

Other

Availability Date

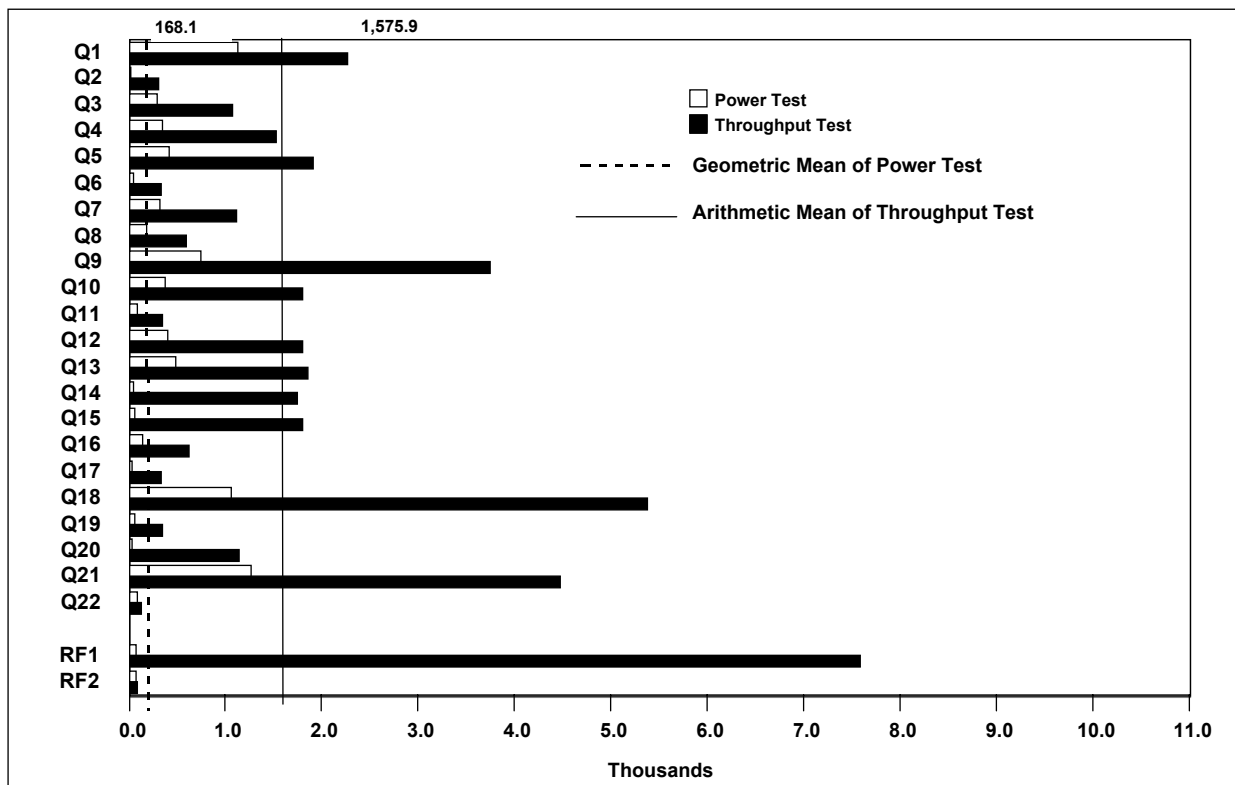
**100GB**

**Microsoft  
SQL Server 2000  
Enterprise Edition  
with SP2**

**Microsoft  
Windows 2000  
Advanced Server  
with SP2**

**Visual Studio  
Professional  
6.0**

**Sept. 10, 2002**



Database Load Time: 06:11:30

Load Included Backup: Y

Total Data Storage /  
Database Size: 23.18

RAID (Base Tables Only): N

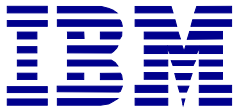
RAID (Base Tables and  
Auxiliary Data Structures): N

RAID (All): N

**Configuration:**

Processors 4  
Memory 8  
Disk Controllers 4  
Disk Drives 136  
Total Disk Storage 1

Intel Xeon MP 1.6GHz / 1MB ECC L3 Cache  
512MB ECC SDRAM RDIMM  
Mylex eXtremeRAID 2000 Adapter  
18.2GB 15K Ultra160 SCSI Drive  
18.2GB 10K Ultra160 SCSI Drive  
2318.04GB



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Description	Part Number	Source	Unit Price	Qty	Ext. Price	5-Yr. Maint.
<b>Server Hardware</b>						
IBM @server xSeries 440 2 x 1.6GHz/1MB Xeon MP 4 x 512MB ECC SDRAM RDIMM	8687-3RX	1	27,099	1	27,099	6,780
1.6GHz / 1MB Xeon MP Processor	32P8707	1	6,599	2	13,198	0
512MB SDRAM ECC RDIMM II	33L3324	1	499	4	1,996	0
Mylex eXtremeRAID 2000 Adapter*	08P3834	3	1,293	6	7,758	0
Netfinity 4.2M Ultra2 SCSI Cable	03K9311	1	105	11	1,155	0
IBM UPS 500	33L3477	1	99	1	99	0
E54 15" (13.8" Viewable) Display	633147N	1	149	1	149	270
Netfinity Rack	9306421	1	1,610	1	1,610	1,308
<b>Subtotal</b>					<b>\$53,064</b>	<b>\$8,358</b>
<b>Server Storage</b>						
EXP300 Rack Storage Enclosure	35311RU	1	3,179	10	31,790	7,580
18.2GB 10K Ultra160 SCSI Drive	06P5754	1	275	1	275	0
18.2GB 15K Ultra160 SCSI Drive	06P5767	1	549	136	74,664	0
<b>Subtotal</b>					<b>\$106,729</b>	<b>\$7,580</b>
<b>Server Software</b>						
Microsoft SQL Server 2000 Enterprise Edition	810-00652	2	5,549	1	5,549	10,475
Microsoft SQL Server 2000 Client Licenses	359-00532	2	7,300	1	7,300	InclAbove
Microsoft Windows 2000 Advanced Server	C10-00475	2	2,399	1	2,399	InclAbove
Visual Studio Professional 6.0 Win32	659-00390	2	1,079	1	1,079	InclAbove
<b>Subtotal</b>					<b>\$16,327</b>	<b>\$10,475</b>
<b>Large volume discount of 14% on IBM Hardware; prices will vary if purchased separately.</b>					<b>(21,285)</b>	
<b>Total</b>					<b>\$154,835</b>	<b>\$26,413</b>

**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 - IBM List Price; 2 - Microsoft Corp.; 3 - Computer Giants  
**Audited by Brad Askins of InfoSizing, Inc.**

**5-Year Cost of Ownership: \$181,248**  
**QpH @ 100GB: 1,486.0**  
**\$/ QpH @ 100GB: \$122**

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](mailto:pricing@tpc.org). Thank you.



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Measurement Results:

Database Scale Factor	100
Total Data Storage/Database Size	23.18
Start of Database Load	15:57:12
End of Database Load	22:08:42
Database Load Time	06:11:30
Query Streams for Throughput Test	5
TPC-H Power	2,142.1
TPC-H Throughput	1,030.8
TPC-H Composite Query-per-Hour (QphH@100GB)	1,486.0
Total System Price over 5 Years	\$181,248
TPC-H Price/Performance Metric (\$/QphH@100GB)	\$122

Measurement Interval:

Measurement Interval in Throughput Test (Ts) = 38,416 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
<b>Stream 00</b>	303220841	03/03/02 / 23:21:41	03/03/02 / 23:20:04	03/04/02 / 1:29:43	2:10:56
		03/04/02 / 1:29:42	03/03/02 / 23:21:22	03/04/02 / 1:30:59	
<b>Stream 01</b>	303220842	03/04/02 / 01:31:02	03/04/02 / 01:31:02	03/04/02 / 11:57:35	10:25:08
		03/04/02 / 11:56:10	03/04/02 / 11:57:34	03/04/02 / 11:59:04	
<b>Stream 02</b>	303220843	03/04/02 / 01:31:02	03/04/02 / 11:59:06	03/04/02 / 12:00:32	9:58:15
		03/04/02 / 11:29:17	03/04/02 / 12:00:30	03/04/02 / 12:02:03	
<b>Stream 03</b>	303220844	03/04/02 / 01:31:02	03/04/02 / 12:02:04	03/04/02 / 12:03:35	9:01:18
		03/04/02 / 10:32:20	03/04/02 / 12:03:33	03/04/02 / 12:05:06	
<b>Stream 04</b>	303220845	03/04/02 / 01:31:03	03/04/02 / 12:05:08	03/04/02 / 12:06:41	10:01:11
		03/04/02 / 11:32:14	03/04/02 / 12:06:39	03/04/02 / 12:08:08	
<b>Stream 05</b>	303220846	03/04/02 / 01:31:03	03/04/02 / 12:08:09	03/04/02 / 12:09:47	8:43:18
		03/04/02 / 10:14:21	03/04/02 / 12:09:45	03/04/02 / 12:11:18	



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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	1,133.8	18.3	297.4	355.8	415.1	48.8	326.1	182.9	747.7	376.9	91.6	403.2
Stream 01	988.5	261.0	1,408.8	351.6	1,470.0	225.9	1,358.8	651.2	2,643.2	1,738.9	449.9	2,048.2
Stream 02	2,796.2	329.3	972.7	1,745.2	1,521.7	312.5	1,035.2	901.8	4,092.4	1,271.2	339.5	2,182.8
Stream 03	2,398.6	182.3	1,186.2	3,127.0	2,073.8	332.9	1,253.2	339.2	3,371.3	1,565.2	357.1	1,712.8
Stream 04	2,774.2	378.8	883.4	1,089.2	2,334.4	499.2	956.4	267.9	5,417.3	2,048.7	306.4	1,472.2
Stream 05	2,365.9	418.2	925.7	1,317.8	2,138.1	303.3	976.4	804.8	3,203.8	2,408.5	291.5	1,573.1
Minimum	988.5	18.3	297.4	351.6	415.1	48.8	326.1	182.9	747.7	376.9	91.6	403.2
Average	2,264.7	313.9	1,075.4	1,526.2	1,907.6	334.8	1,116.0	593.0	3,745.6	1,806.5	348.9	1,797.8
Maximum	2,796.2	418.2	1,408.8	3,127.0	2,334.4	499.2	1,358.8	901.8	5,417.3	2,408.5	449.9	2,182.8

Stream ID	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
Stream 00	482.0	43.9	64.1	146.6	34.1	1,056.8	58.3	32.5	1,274.3	90.8	78.1	76.1
Stream 01	3,134.2	1,138.3	3,032.1	422.2	406.1	5,829.6	63.7	4,829.8	4,964.5	91.5	37,592.2	88.8
Stream 02	1,691.9	4,152.6	1,918.4	656.0	393.0	6,115.3	67.5	210.9	3,047.2	141.7	84.3	91.0
Stream 03	2,186.1	1,338.2	329.7	1,177.2	440.3	4,129.3	69.8	134.0	4,608.5	165.1	88.3	91.5
Stream 04	1,188.0	1,735.1	1,909.1	370.4	212.3	5,783.3	1,236.2	419.8	4,671.0	118.0	90.9	86.8
Stream 05	1,079.0	381.2	1,830.8	466.8	200.9	5,058.0	340.9	116.5	5,081.6	114.8	95.2	91.0
Minimum	482.0	43.9	64.1	146.6	34.1	1,056.8	58.3	32.5	1,274.3	90.8	78.1	76.1
Average	1,855.8	1,749.1	1,804.0	618.5	330.5	5,383.1	355.6	1,142.2	4,474.6	126.2	7,590.2	89.8
Maximum	3,134.2	4,152.6	3,032.1	1,177.2	440.3	6,115.3	1,236.2	4,829.8	5,081.6	165.1	37,592.2	91.5