

**IBM® @server® xSeries® 365
with
IBM DB2® UDB 8.2**

TPC-H Rev 2.1.0

Report Date: Oct. 26, 2004
Amended: Feb. 8, 2005

Total System Cost

Composite Query-per-Hour Metric

Price/Performance

\$233,410 USD

**5,090.0
QphH @ 300GB**

**\$46 USD
per QphH @ 300GB**

Database Size

Database Manager

Operating System

Other Software

Availability Date

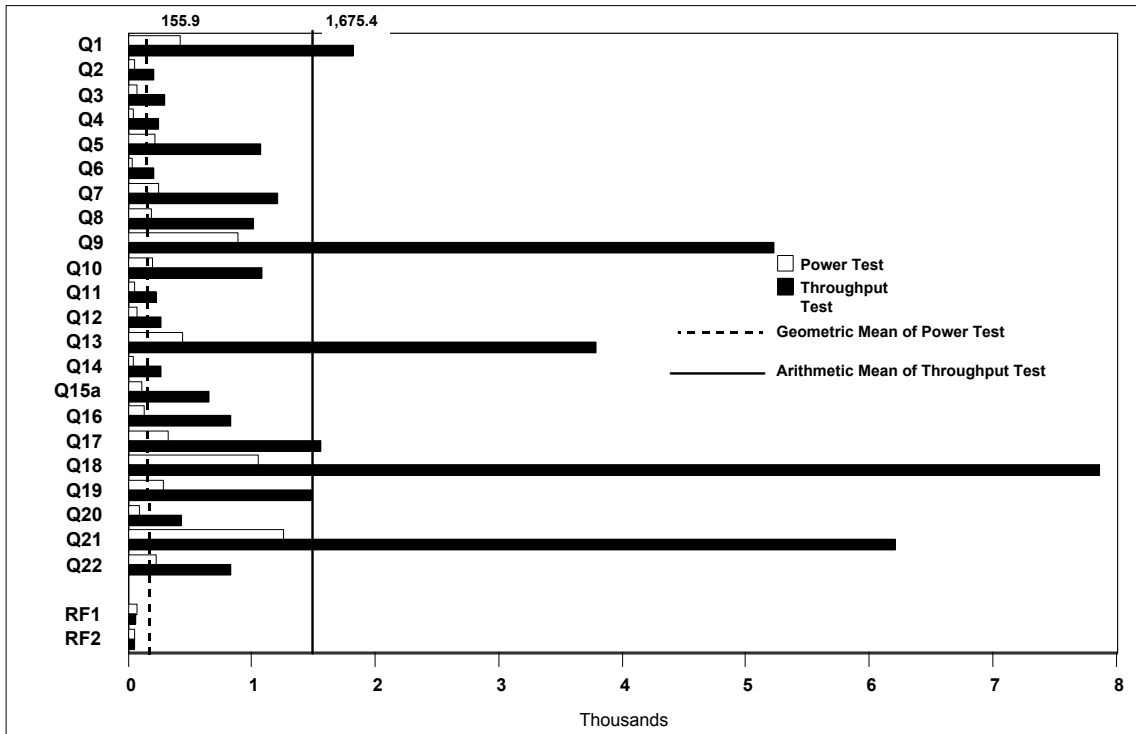
300GB

IBM DB2 UDB 8.2

**SUSE®
Linux® Enterprise
Server 9**

None

Jan. 31, 2005



Database Load Time: 04:59:16

Load Included Backup: Y

Total Data Storage /
Database Size: 12.77

RAID (Base Tables Only): N

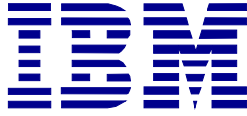
RAID (Base Tables and Auxiliary
Data Structures): N

RAID (All): N

Configuration

Processors/Cores/Threads 4/4/8
Memory 16
Disk Controllers 4
Disk Drives 112
Total Disk Storage 1

Intel Xeon MP 3.0GHz / 4MB ECC L3 Cache
1GB PC2100 DDR ECC SDRAM RDIMM
ServeRAID-6M Ultra320 SCSI Adapter
36.4GB 15K Ultra320 SCSI Drive
36.4GB 15K Ultra320 SCSI Drive
3830.7GB



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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 365 w/3.0GHz Xeon MP w/2 x 3.0GHz/4MB Xeon MP Processors w/4 x 512MB ECC SDRAM RDIMMs Integrated Dual-Channel Gigabit Ethernet | 8862-6RX | IBM | | 1 | 15,599 | 15,599 | |
| ServicePac for 3-Year 24x7x4 Support | 96P2253 | IBM | | 1 | 1,000 | | 1,000 |
| xSeries 3.0GHz/4MB Processor | 13N0710 | IBM | | 1 | 5,499 | 10,998 | |
| 1GB PC2100 DDR ECC SDRAM RDIMM | 73P2031 | IBM | | 1 | 619 | 9,904 | |
| Memory Upgrade Card | 73P9710 | IBM | | 1 | 999 | 999 | |
| 36.4GB 15K Ultra320 SCSI Hot-Swap Drive | 90P1318 | IBM | | 1 | 349 | 349 | |
| ServeRAID-6M Ultra320 SCSI Controller | 32P0033 | IBM | | 1 | 999 | 3,996 | |
| IBM Preferred Pro Full-Size Keyboard | 31P7415 | IBM | | 1 | 29 | 29 | |
| IBM Sleek 2-Button Mouse | 28L3673 | IBM | | 1 | 15 | 15 | |
| E54 15" (13.8" Viewable) Color Monitor | 633147N | IBM | | 1 | 119 | 119 | |
| ServicePac for 3-Year 24x7x4 Support | 30L9183 | IBM | | 1 | 90 | | 90 |
| Subtotal | | | | | | 42,008 | 1,090 |
| Server Storage | | | | | | | |
| IBM EXP400 Rack Storage Exp. Enclosure | 17331RU | IBM | | 1 | 3,099 | 24,792 | |
| ServicePac for 3-Year 24x7x4 Support | 41L2768 | IBM | | 1 | 760 | | 6,080 |
| 36.4GB 15K Ultra320 SCSI Hot-Swap Drive | 90P1318 | IBM | | 1 | 349 | 39,088 | |
| Netfinity 2M Ultra2 SCSI Cable | 03K9310 | IBM | | 1 | 75 | 600 | |
| NetBAY4SX Rack | 93074SX | IBM | | 1 | 1,489 | 1,489 | |
| ServicePac for 3-Year 24x7x4 Support | 41L2762 | IBM | | 1 | 300 | | 300 |
| Subtotal | | | | | | 65,969 | 6,380 |
| Server Software | | | | | | | |
| DB2 UDB ESE 8.2 SW Lic. & Maintenance 12 Months | | IBM | | 2 | 22,260 | 89,040 | |
| SW Maintenance Renewal - 1 Year | | IBM | | 2 | 1,060 | | 8,480 |
| DPF SW License & Maintenance 12 Months | | IBM | | 2 | 6,686 | 26,744 | |
| DPF SW Maintenance Renewal - 1 Year | | IBM | | 2 | 318 | | 2,544 |
| SUSE Linux Enterprise Server 9 Annual Upgr. License | 874-002960-001 | SUSE | | 3 | 899 | 2,697 | |
| SUSE Linux Enterprise Server 9 24x7 Support - 1 Year | 051-002673-001 | SUSE | | 3 | 900 | | 2,700 |
| Subtotal | | | | | | 118,481 | 13,724 |
| Discount | | | | | | 13,345 | 897 |
| Total | | | | | | \$213,113 | \$20,297 |

Three-Year Cost of Ownership USD: \$233,410

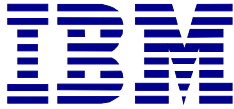
Pricing: 1 - Compsat Technology; 2 - IBM; 3 - Novell
Warranty and Maintenance: The standard warranty has been upgraded to 3 years of 24x7x4 coverage.

QphH@300GB: 5,090.0

\$USD/QphH@300GB: \$46

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 | 12:77 |
| Start of Database Load | 21:55:57 |
| End of Database Load | 02:55:13 |
| Database Load Time | 04:59:16 |
| Query Streams for Throughput Test | 6 |
| TPC-H Power | 6,926.5 |
| TPC-H Throughput | 3,740.4 |
| TPC-H Composite Query-per-Hour (QphH@300GB) | 5,090.0 |
| Total System Price over 3 Years | \$233,410 USD |
| TPC-H Price/Performance Metric (\$/QphH@300GB) | \$46 USD |

Measurement Interval:

Measurement Interval in Throughput Test (Ts) = 38,114

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 | 1009025513 | 10/09/04 04:03:34 10/09/04 05:53:17 | 10/09/04 04:03:34 10/09/04 04:04:43 | 10/09/04 05:52:28 10/09/04 05:53:17 | 1:49:43 |
| Stream 01 | 1009025514 | 10/09/04 05:53:21 10/09/04 16:15:48 | 10/09/04 05:53:32 10/09/04 16:18:24 | 10/09/04 16:18:24 10/09/04 16:19:18 | 10:22:27 |
| Stream 02 | 1009025515 | 10/09/04 05:53:21 10/09/04 15:42:35 | 10/09/04 16:19:18 10/09/04 16:20:13 | 10/09/04 16:20:13 10/09/04 16:21:08 | 9:49:15 |
| Stream 03 | 1009025516 | 10/09/04 05:53:21 10/09/04 16:15:35 | 10/09/04 16:21:08 10/09/04 16:22:06 | 10/09/04 16:22:06 10/09/04 16:23:00 | 10:22:14 |
| Stream 04 | 1009025517 | 10/09/04 05:53:21 10/09/04 16:17:18 | 10/09/04 16:23:00 10/09/04 16:23:58 | 10/09/04 16:23:58 10/09/04 16:24:51 | 10:23:57 |
| Stream 05 | 1009025518 | 10/09/04 05:53:21 10/09/04 16:13:34 | 10/09/04 16:24:51 10/09/04 16:25:48 | 10/09/04 16:25:48 10/09/04 16:26:42 | 10:20:13 |
| Stream 06 | 1009025519 | 10/09/04 05:53:21 10/09/04 16:01:03 | 10/09/04 16:26:42 10/09/04 16:27:41 | 10/09/04 16:27:41 10/09/04 16:28:35 | 10:08:42 |



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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 | 426.1 | 48.7 | 68.2 | 48.4 | 219.1 | 38.0 | 247.7 | 193.8 | 886.0 | 197.6 | 56.2 | 70.1 |
| Stream 01 | 1,271.1 | 209.4 | 383.0 | 108.5 | 940.8 | 132.2 | 913.0 | 1,105.7 | 5,917.5 | 1,157.7 | 190.7 | 357.6 |
| Stream 02 | 2,065.3 | 209.7 | 424.9 | 294.2 | 640.0 | 239.3 | 1,130.0 | 1,016.3 | 5,581.2 | 1,391.6 | 271.9 | 162.5 |
| Stream 03 | 2,082.4 | 189.9 | 225.1 | 363.0 | 1,236.6 | 239.5 | 1,569.7 | 1,092.3 | 4,374.6 | 521.7 | 274.8 | 191.2 |
| Stream 04 | 2,065.3 | 282.8 | 165.8 | 162.2 | 1,189.3 | 109.7 | 1,042.0 | 793.1 | 4,175.8 | 830.0 | 272.2 | 287.1 |
| Stream 05 | 1,700.9 | 185.9 | 250.9 | 410.2 | 1,433.1 | 291.4 | 1,578.9 | 1,070.0 | 4,915.1 | 1,374.5 | 156.1 | 294.3 |
| Stream 06 | 1,783.7 | 200.4 | 339.6 | 143.8 | 1,003.8 | 271.5 | 1,009.7 | 1,047.6 | 6,446.5 | 1,220.5 | 193.6 | 284.7 |
| Minimum | 426.1 | 48.7 | 68.2 | 48.4 | 219.1 | 38.0 | 247.7 | 193.8 | 886.0 | 197.6 | 56.2 | 70.1 |
| Average | 1,828.1 | 213.0 | 298.2 | 247.0 | 1,073.9 | 213.9 | 1,207.2 | 1,020.8 | 5,235.1 | 1,082.7 | 226.6 | 262.9 |
| Maximum | 2,082.4 | 282.8 | 424.9 | 410.2 | 1,433.1 | 291.4 | 1,578.9 | 1,105.7 | 6,446.5 | 1,391.6 | 274.8 | 357.6 |

| Stream ID | Q13 | Q14 | Q15a | Q16 | Q17 | Q18 | Q19 | Q20 | Q21 | Q22 | RF1 | RF2 |
|-----------|---------|-------|-------|---------|---------|---------|---------|-------|---------|-------|------|------|
| Stream 00 | 438.8 | 39.9 | 109.9 | 129.0 | 330.0 | 1,054.0 | 284.5 | 96.6 | 1,257.0 | 225.7 | 68.6 | 48.9 |
| Stream 01 | 2,390.7 | 337.7 | 643.9 | 578.1 | 1,446.3 | 9,322.7 | 1,726.0 | 335.2 | 6,935.2 | 944.4 | 66.0 | 54.2 |
| Stream 02 | 2,982.7 | 280.4 | 706.4 | 1,103.9 | 2,048.3 | 6,163.1 | 1,885.7 | 488.0 | 5,498.4 | 770.7 | 55.2 | 54.4 |
| Stream 03 | 3,818.1 | 188.6 | 495.0 | 760.7 | 1,830.7 | 9,179.1 | 1,135.0 | 564.8 | 6,158.0 | 843.6 | 58.1 | 54.0 |
| Stream 04 | 7,476.5 | 259.6 | 674.5 | 828.0 | 1,206.6 | 6,581.4 | 1,300.5 | 113.0 | 6,911.1 | 710.4 | 57.9 | 53.0 |
| Stream 05 | 2,584.1 | 284.8 | 755.5 | 671.4 | 1,491.2 | 8,076.5 | 1,311.2 | 554.2 | 6,922.7 | 900.3 | 57.4 | 54.1 |
| Stream 06 | 3,519.2 | 281.9 | 674.1 | 1,064.7 | 1,347.3 | 7,881.5 | 1,554.0 | 515.2 | 4,864.0 | 815.1 | 58.4 | 54.7 |
| Minimum | 438.8 | 39.9 | 109.9 | 129.0 | 330.0 | 1,054.0 | 284.5 | 96.6 | 1,257.0 | 225.7 | 55.2 | 48.9 |
| Average | 3,795.2 | 272.2 | 658.2 | 834.5 | 1,561.7 | 7,867.4 | 1,485.4 | 428.4 | 6,214.9 | 830.8 | 58.8 | 54.1 |
| Maximum | 7,476.5 | 337.7 | 755.5 | 1,103.9 | 2,048.3 | 9,322.7 | 1,885.7 | 564.8 | 6,935.2 | 944.4 | 66.0 | 54.7 |