



# Bull Novascale 3045

TPC-H Rev. 2.6.0

Report Date:  
March 6, 2007

Total System Cost

**\$151,870**

Composite Query per Hour Metric

**12,087.4**  
QphH @ 1000GB

Price / Performance

**12.56**  
\$ / QphH@1000GB

Database size

**1000 GB**

Database Manager

**Microsoft SQL Server 2005  
Enterprise IA64 Edition SP1**

Operating System

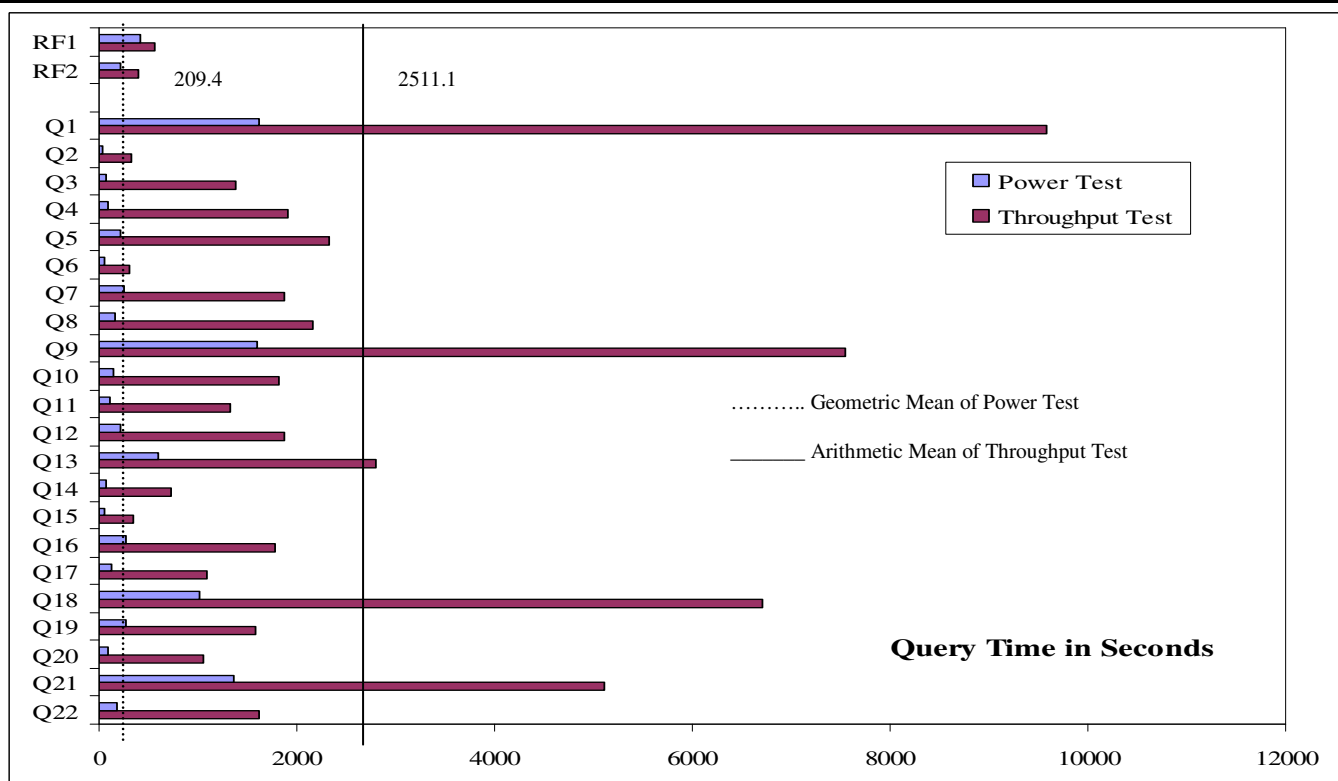
**Microsoft Windows  
Server 2003 Enterprise IA64  
Edition SP1**

Other Software

**Microsoft Visual C++  
STD  
Microsoft Visual Basic  
.Net Pro.**

Availability Date

**March 6, 2007**



Database Load Time = 27:58:04

Load included backup: Y


Total Data Storage / Database Size = 5.71

RAID (Base tables): N

RAID (Base tables and Auxiliary Data Structures): N

RAID (All): N

| System Components  | System Total | Per Node |
|--|--------------|----------|
| Node:  | 1            | n.a.     |
| Processors (Dual-Core Intel Itanium2 9040, 1.6GHz, 9MB L3 Cache per core): | 4            | 4        |
| Cores:   | 8            | 8        |
| Threads:   | 16           | 16       |
| Memory:  | 64GB         | 64GB     |
| OS Disk Drives (73GB 15krpm HDD SAS):                                      | 5            | 5        |
| Network Interfaces (on-board GigE):  | 1            | 1        |
| Host Bus Adapters (LSILogic SAS3442 series HBA):                           | 5            | 5        |
| Storage Switch:  | 0            | n.a.     |
| Storage Subsystem (Bull StoreWay OPTIMA RS-1603-E3-EBD-1-BATA):            | 10           | n.a.     |
| Storage Subsystem Disk Drives (36GB 15krpm HDD SAS):                       | 160          | n.a.     |
| Total Storage:   | 5704.35GB    | n.a.     |

|    | Bull Novascale 3045<br>4 Sockets / 64 GB |           |         |            | TPC-H REV 2.6.0                       |                |                    |
|---|--|-----------|---------|------------|---------------------------------------|----------------|--------------------|
|   |  |           |         |            | Report Date: March 6, 2007            |                |                    |
| Description   | Part Number                              | Brand     | Pricing | Unit Price | Qty                                   | Extended Price | 3 yr. Maint. Price |
| <b>Server Hardware</b>  |  |           |         |            |                                       |                |                    |
| NovaScale 3045 Server   | CPSU204-4U4S                             | Bull      | 1       | 8,356      | 1                                     | 8,356          |                    |
| 1x Socket Itanium 9040 1.6GHz/18MB L3 DC, FSB 533   | CPKU233-1618                             | Bull      | 1       | 4,477      | 4                                     | 17,908         |                    |
| 2x Memory Boxes for 3005 Series   | CMMU220-00MB                             | Bull      | 1       | 959        | 1                                     | 959            |                    |
| 16GB (8x2048MB DIMMs, DDR2 533) kit   | CMMU216-0016                             | Bull      | 1       | 8,065      | 4                                     | 32,260         |                    |
| DVD/CD R/W Drive IDE Slim   | MSUU243-CDVD                             | Bull      | 1       | 301        | 1                                     | 301            |                    |
| 19" LCD Monitor - SyncMaster  | LCDU002-1900                             | Bull      | 1       | 361        | 1                                     | 361            |                    |
| USB standard Keyboard (105 keys) + mouse pack   | CTKU208-0USB                             | Bull      | 1       | 167        | 1                                     | 167            |                    |
| SAS Internal Cable  | CBLU160-SA01                             | Bull      | 1       | 33         | 1                                     | 33             |                    |
| 73GB SAS Hot Swap Disk DRV w/ canister (3"5/15Krpm)   | OPTF107-0000                             | Bull      | 1       | 436        | 5                                     | 2,180          |                    |
| PCI-X SAS 4 Ports Host Connection Kit   | CKTU237-004P                             | Bull      | 1       | 406        | 1                                     | 406            |                    |
| Dummy disk canister   | DSKH103-FDA2                             | Bull      | 1       | 24         | 3                                     | 73             |                    |
|   |  |           |         |            | <b>Subtotal</b>                       | <b>63,003</b>  | <b>2,086</b>       |
| <b>Storage Hardware</b>   |  |           |         |            |                                       |                |                    |
| Rack 1100H 40U/19" w/o Power Distribution Unit  | RCKU209-1140                             | Bull      | 1       | 3,682      | 1                                     | 3,682          |                    |
| 7-outlet Power Distribution Unit (7x C13)   | PSSU211-00M7                             | Bull      | 1       | 266        | 4                                     | 1,065          |                    |
| LSILogic SAS3442E-R HBA Card 5-Pack (**)  | LSI00111                                 | LSILogic  | 3       | 1,140      | 1                                     | 1,140          | spares             |
| LSILogic SAS3442E-R HBA (**)  | LSI00110                                 | LSILogic  | 3       | 328        | 1                                     | 328            | spares             |
| SAS disks enclosure and connection cable (2 m)  | RS-1603-E3                               | Bull      | 1       | 3,100      | 10                                    | 31,000         |                    |
| SAS disks enclosure and cable (**)  | RS-1603-E3                               | Bull      | 1       | 3,100      | 2                                     | 6,200          | spares             |
| 73GB/15k SAS disk   | OPTF107-0000                             | Bull      | 1       | 420        | 160                                   | 67,200         |                    |
| 73GB/15k SAS disk (**)  | OPTF107-0000                             | Bull      | 1       | 420        | 16                                    | 6,720          | spares             |
|   |  |           |         |            | <b>Subtotal</b>                       | <b>117,335</b> | <b>0</b>           |
| <b>Server Software</b>  |  |           |         |            |                                       |                |                    |
| Novascale Master  | Included                                 | Bull      | 1       |            |                                       |                |                    |
| Windows Server 2003 Enterp. Ed. (up to 8-CPU) & 5CAL  | P72-00284                                | Microsoft | 2       | 2,334      | 1                                     | 2,334          |                    |
| SQL Server 2005 Enterprise Edition  | 810-04793                                | Microsoft | 2       | 8,487      | 1                                     | 8,487          |                    |
| SQL Server 2005 Client License  | 359-01911                                | Microsoft | 2       | 156        | 45                                    | 7,020          |                    |
| Microsoft Visual C++ Standard Edition   | 254-00170                                | Microsoft | 2       | 109        | 1                                     | 109            | Included           |
| Microsoft Visual Basic .Net Professional  | 046-00856                                | Microsoft | 2       | 109        | 1                                     | 109            | Included           |
| Microsoft Problem Resolution Services (1 incident)  |  | Microsoft | 2       | 245        | 1                                     |                | 245                |
|   |  |           |         |            | <b>Subtotal</b>                       | <b>18,059</b>  | <b>245</b>         |
| Large Volume HW, SW & Maintenance Discount (*)  |  |           |         |            | <b>Discounts</b>                      | <b>48,295</b>  | <b>563</b>         |
|   |  |           |         |            | <b>TOTAL</b>                          | <b>150,102</b> | <b>1,768</b>       |
| <b>Notes:</b>   |  |           |         |            | <b>Three-Year Cost of Ownership :</b> |                | <b>\$151,870</b>   |
| Pricing : 1-Bull, 2-Microsoft, 3-Heights Performance Supply<br>(* ) Discount: 27% on Bull catalog and on Maintenance<br>(** ) Spares = 10% spare disks, drawers and HBA added in place of onsite service<br>Used 4 HBA, 10 disk drawers, 160x73GB disks - Spares are 2 HBA, 2 drawers, 16x73GB disks  |  |           |         |            | <b>QphH @ 1000GB :</b>                |                | <b>12,087.4</b>    |
| <b>Result and methodology audited by François Raab of InfoSizing Inc. (www.sizing.com)</b>  |  |           |         |            | <b>\$ / QphH@1000GB :</b>             |                | <b>\$12.56</b>     |
| 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 reflects standard pricing policies for the listed components. For complete details, see the pricing sections of the TPC benchmark specifications. If you find that the stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org. Thank you. |  |           |         |            |                                       |                |                    |



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## Numerical Quantities

### Measurement Results

|   |                     |
|---|---------------------|
| Scale Factor                                  | = 1000              |
| Total Data Storage / Database Size            | = 5.71              |
| Start of Database Load                        | = 2/8/2007 18:35:40 |
| End of Database Load                          | = 2/9/2007 22:33:44 |
| Database Load Time                            | = 27:58:04          |
| Query Streams for Throughput Test             | = 7                 |
| TPC-H Power                                   | = 17195.2           |
| TPC-H Throughput                              | = 8496.9            |
| Composite Query per Hour Rating (QphH@1000GB) | = 12087.4           |
| Total System Price Over 3 Years               | = \$151,870         |
| TPC-H Price Performance Metric                | = \$12.56           |

### Measurement Intervals

|  |                   |
|--|-------------------|
| Measurement Interval in Throughput Test (Ts) | = 65247.6 seconds |
|--|-------------------|

### Duration of Stream Execution

| Power Stream | Seed      | RF1 Start Date/Time | Query Start Date/Time | RF2 Start Date/Time | Duration |
|--------------|-----------|---------------------|-----------------------|---------------------|----------|
|              |           | RF1 End Date/Time   | Query End Date/Time   | RF2 End Date/Time   |          |
|              | 209223344 | 02-12-2007 16:29:29 | 02-12-2007 16:36:35   | 02-12-2007 19:00:41 | 2:34:49  |
|              |           | 02-12-2007 16:36:35 | 02-12-2007 19:00:40   | 02-12-2007 19:04:18 |          |

| Throughput Stream | Seed      | Query Start Date/Time | Duration | RF1 Start Date/Time | RF2 Start Date/Time |
|-------------------|-----------|-----------------------|----------|---------------------|---------------------|
|                   |           | Query End Date/Time   |          | RF1 End Date/Time   | RF2 End Date/Time   |
| 1                 | 209223345 | 02-12-2007 19:04:19   | 16:08:22 | 02-13-2007 11:20:05 | 02-13-2007 11:28:57 |
|                   |           | 02-13-2007 11:12:41   |          | 02-13-2007 11:28:57 | 02-13-2007 11:35:00 |
| 2                 | 209223346 | 02-12-2007 19:04:19   | 15:20:43 | 02-13-2007 11:35:01 | 02-13-2007 11:44:14 |
|                   |           | 02-13-2007 10:25:02   |          | 02-13-2007 11:44:14 | 02-13-2007 11:50:34 |
| 3                 | 209223347 | 02-12-2007 19:04:19   | 15:19:33 | 02-13-2007 11:50:35 | 02-13-2007 12:00:34 |
|                   |           | 02-13-2007 10:23:52   |          | 02-13-2007 12:00:33 | 02-13-2007 12:07:02 |
| 4                 | 209223348 | 02-12-2007 19:04:19   | 16:15:45 | 02-13-2007 12:07:03 | 02-13-2007 12:16:39 |
|                   |           | 02-13-2007 11:20:04   |          | 02-13-2007 12:16:39 | 02-13-2007 12:23:12 |
| 5                 | 209223349 | 02-12-2007 19:04:19   | 14:33:57 | 02-13-2007 12:23:13 | 02-13-2007 12:32:52 |
|                   |           | 02-13-2007 09:38:16   |          | 02-13-2007 12:32:52 | 02-13-2007 12:39:17 |
| 6                 | 209223350 | 02-12-2007 19:04:19   | 15:55:08 | 02-13-2007 12:39:18 | 02-13-2007 12:49:02 |
|                   |           | 02-13-2007 10:59:27   |          | 02-13-2007 12:49:02 | 02-13-2007 12:56:10 |
| 7                 | 209223351 | 02-12-2007 19:04:19   | 13:51:42 | 02-13-2007 12:56:11 | 02-13-2007 13:05:04 |
|                   |           | 02-13-2007 08:56:01   |          | 02-13-2007 13:05:03 | 02-13-2007 13:11:46 |



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## TPC-H Timing Intervals (in seconds):

| Query | Stream 0 | Stream 1 | Stream 2 | Stream 3 | Stream 4 | Stream 5 | Stream 6 | Stream 7 | Min Qi | Max Qi  | Avg Qi |
|-------|----------|----------|----------|----------|----------|----------|----------|----------|--------|---------|--------|
| Q1    | 1623.8   | 9820.6   | 10885.0  | 6477.9   | 12151.7  | 6006.3   | 14430.3  | 7278.8   | 6006.3 | 14430.3 | 9578.7 |
| Q2    | 39.4     | 200.7    | 478.2    | 262.5    | 391.0    | 456.3    | 211.5    | 274.5    | 200.7  | 478.2   | 325.0  |
| Q3    | 69.0     | 2432.0   | 747.7    | 234.1    | 229.3    | 1001.8   | 4417.8   | 662.8    | 229.3  | 4417.8  | 1389.4 |
| Q4    | 96.9     | 154.2    | 1800.2   | 745.5    | 3060.2   | 2131.5   | 1999.9   | 3512.6   | 154.2  | 3512.6  | 1914.9 |
| Q5    | 226.6    | 2463.6   | 1374.0   | 4762.5   | 1255.6   | 2981.9   | 1749.6   | 1647.5   | 1255.6 | 4762.5  | 2319.2 |
| Q6    | 53.6     | 200.5    | 434.2    | 295.9    | 277.9    | 305.0    | 323.0    | 267.8    | 200.5  | 434.2   | 300.6  |
| Q7    | 259.1    | 2665.3   | 3287.4   | 1072.6   | 365.2    | 1867.2   | 1103.6   | 2685.0   | 365.2  | 3287.4  | 1863.8 |
| Q8    | 165.9    | 5286.7   | 1961.6   | 1644.2   | 3103.1   | 805.0    | 900.6    | 1484.1   | 805.0  | 5286.7  | 2169.3 |
| Q9    | 1602.0   | 8401.5   | 8271.8   | 9087.8   | 6672.1   | 7181.4   | 8080.5   | 5064.0   | 5064.0 | 9087.8  | 7537.0 |
| Q10   | 139.0    | 930.0    | 1960.8   | 799.3    | 4634.7   | 2749.5   | 627.8    | 1083.7   | 627.8  | 4634.7  | 1826.5 |
| Q11   | 104.3    | 2873.5   | 634.9    | 598.3    | 520.6    | 1162.3   | 767.3    | 2738.5   | 520.6  | 2873.5  | 1327.9 |
| Q12   | 222.6    | 911.6    | 1038.9   | 848.4    | 4205.4   | 3206.2   | 1425.5   | 1433.6   | 848.4  | 4205.4  | 1867.1 |
| Q13   | 596.2    | 2729.6   | 2993.9   | 3648.9   | 1424.5   | 3003.4   | 3347.9   | 2468.2   | 1424.5 | 3648.9  | 2802.3 |
| Q14   | 71.2     | 347.3    | 2320.7   | 389.1    | 530.6    | 415.3    | 421.9    | 651.7    | 347.3  | 2320.7  | 725.2  |
| Q15   | 53.6     | 448.8    | 203.3    | 266.6    | 249.6    | 479.8    | 559.0    | 252.9    | 203.3  | 559.0   | 351.4  |
| Q16   | 274.0    | 2210.6   | 1664.0   | 1321.7   | 2668.4   | 1589.3   | 1557.1   | 1489.0   | 1321.7 | 2668.4  | 1785.7 |
| Q17   | 120.1    | 346.3    | 1524.9   | 1456.5   | 1028.0   | 982.2    | 339.7    | 1976.5   | 339.7  | 1976.5  | 1093.4 |
| Q18   | 1025.6   | 6593.6   | 5498.0   | 7246.0   | 7517.4   | 6203.9   | 7082.5   | 6769.7   | 5498.0 | 7517.4  | 6701.6 |
| Q19   | 268.5    | 974.0    | 1590.8   | 1611.3   | 1185.2   | 3425.2   | 987.3    | 1298.4   | 974.0  | 3425.2  | 1581.7 |
| Q20   | 93.2     | 1959.3   | 507.5    | 2208.9   | 145.2    | 417.2    | 1035.5   | 1082.8   | 145.2  | 2208.9  | 1050.9 |
| Q21   | 1361.5   | 4110.6   | 4790.5   | 6503.4   | 6625.4   | 4145.3   | 4732.3   | 4908.8   | 4110.6 | 6625.4  | 5116.6 |
| Q22   | 179.6    | 2041.6   | 1274.4   | 3691.1   | 303.4    | 1920.5   | 1207.3   | 870.9    | 303.4  | 3691.1  | 1615.6 |
| RF1   | 425.6    | 532.9    | 552.5    | 598.9    | 575.6    | 578.8    | 583.6    | 532.6    | 532.6  | 598.9   | 565.0  |
| RF2   | 217.8    | 363.0    | 379.6    | 388.6    | 392.7    | 384.8    | 427.5    | 402.6    | 363.0  | 427.5   | 391.3  |