| | **HP ProLiant DL585 G1**<br>**2.6GHz 4P** | TPC-H Rev. 2.1.0 |
|---|---|---|
| | | Report Date:<br>**May 17, 2005** |

| Total System Cost | Composite Query per Hour Metric | Price / Performance |
|---|---|---|
| **$254,586** | **8435.2**<br>**QphH @ 300GB** | **$31 USD**<br>**per QphH @ 300GB** |

| Database Size | Database Manager | Operating System | Other Software | Availability Date |
|---|---|---|---|---|
| **300GB** | **IBM DB2 UDB 8.2** | **Red Hat Enterprise Linux 4 AS** | **none** | **May 17, 2005** |



| Power Test |
| Throughput Test |
| Geometric Mean of Power Test |
| Arithmetic Mean of Throughput Test |

93.8   997.6

Query Time in Seconds
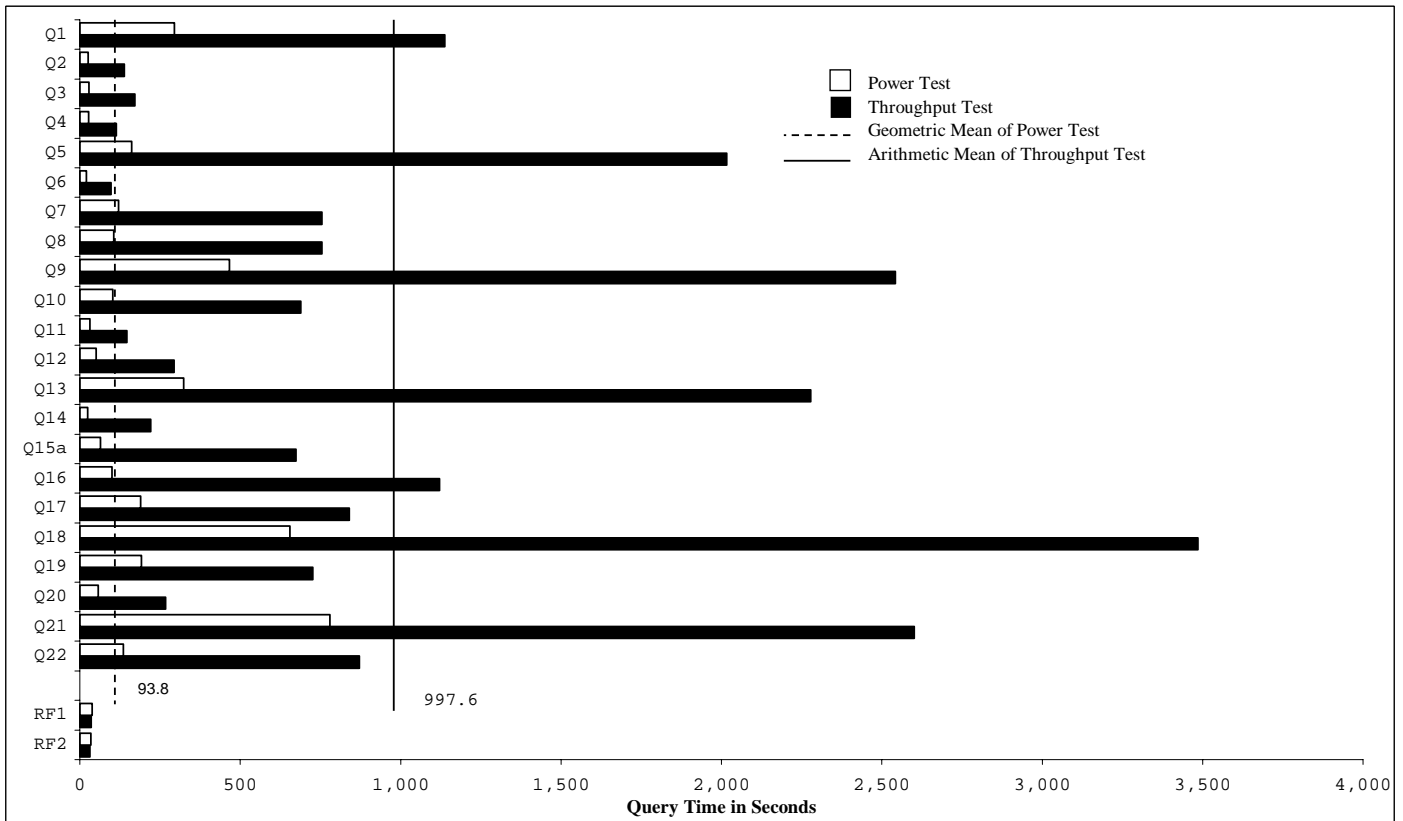
| Database Load Time = 4:01:10 | Load Included Backup: Y | Total Data Storage / Database Size = 13.8 |
|---|---|---|
| RAID (Base tables only): N | RAID (Base tables and auxiliary data structures): N | RAID (All): N |

**System Configuration :**

| | |
|---|---|
| **Processors :** | 4 x  2.6GHz AMD Opteron 852 Processors w/ 1MB cache |
| **Memory :** | 64 GB memory |
| **Disk Controllers :** | 8 x HP SA6404-256 |
| **Disks** : | 112 x 36.4GB 15K U320 drives (external) |
| | 2 x 36.4GB 15K U320 drives (internal) |
| **Total Disk Storage:** | 4149.6 GB |

Database Size includes only raw data (e.g., no temp, index, redundant storage space, etc.).

| | | HP ProLiant DL585 G1 2.6GHz 4P | | TPC-H Rev. 2.1.0 | | |
|---|---|---|---|---|---|---|
| | | | | Report Date: | | 17-May-05 |

| Description | Part Number | Third Party Brand | Pricing | Unit Price | Qty | Extended Price | 3 yr. Maint. Price |
|---|---|---|---|---|---|---|---|
| **Server Hardware** | | | | | | | |
| ProLiant DL585 852 2.6GHz (1 MB) x 2 | 380124-001 | | 1 | 12,699 | 1 | 12,699 | |
| - 2 GB PC2100 DDR, Integrated Smart Array Controller 5i, | | | | | | | |
| - Embedded NC7782 Dual Port PCI-X 10/100/1000T Gigabit NIC | | | | | | | |
| | | | | | | | |
| DL585 852 2.6GHz/PC2700 8 socket processor option kit | 381476-B21 | | 1 | 4,049 | 2 | 8,098 | |
| 4 GB PC2700 DDR SDRAM DIMM 2x2048 WW | 371049-B21 | | 1 | 2,499 | 16 | 39,984 | |
| HP s7540 17in CRT Monitor | PF997AA#ABA | | 1 | 149 | 1 | 149 | |
| HP PS/2 Scroll Mouse Carbonite | DG169AV | | 1 | 5 | 1 | 5 | |
| PS/2 Standard Keyboard | DG170AV#ABA | | 1 | 10 | 1 | 10 | |
| HP 5642 Unassembled Rack | 358254-B21 | | 1 | 689 | 1 | 689 | |
| 3YR 24X7 4HR 500 SERIES SVR | U4608E | | 1 | 1,575 | 1 | | 1,575 |
| | | | | Subtotal | | 61,634 | 1,575 |
| | | | | | | | |
| **Storage** | | | | | | | |
| HP Smart Array 6404/256MB Controller | 273914-B21 | | 1 | 1,899 | 8 | 15,192 | |
| HP Storageworks MSA 30 DB Storage | 302970-B21 | | 1 | 3,209 | 8 | 25,672 | |
| HP 36GB 15K U320 Pluggable Hard Drive (internal) | 286776-B22 | | 1 | 299 | 2 | 598 | |
| HP 36GB 15K U320 Pluggable Hard Drive | 286776-B22 | | 1 | 299 | 112 | 33,488 | |
| HP 36GB 15K U320 Pluggable Hard Drive (10% spares) | 286776-B22 | | 1 | 299 | 12 | 3,588 | |
| FM-4E724-36   3YR 24X7/4HR EMPTY DISK ENCL | 171242-002 | | 1 | 157 | 8 | | 1,256 |
| | | | | Subtotal | | 78,538 | 1,256 |
| | | | | | | | |
| **Hardware and Maintence Discount** | | | | | | | |
| Large Purchase and Net 30 discount | 16.0% | | 1 | | | ($22,428) | ($453) |
| | | | | Hardware Subtotal | | 117,744 | 2,378 |
| | | | | | | | |
| **Software** | | | | | | | |
| DB2 UDB Enterprise Server Edition (ESE) License incl 1-yr Maint | | IBM | 2 | 22,608 | 4 | 90,432 | |
| DB2 UDB Enterprise Server Edition (ESE) Support - 1-yr/proc | | IBM | 2 | 1,077 | 8 | | 8,616 |
| DB2 UDB Data Partitioning Feature (DPF) License incl 1-yr Maint | | IBM | 2 | 6,791 | 4 | 27,164 | |
| DB2 UDB Data Partitioning Feature (DPF) Support - 1-yr/proc | | IBM | 2 | 323 | 8 | | 2,584 |
| HP Red Hat Ent Linux AS 4 w/PRM 24x7 3yr sw tech sprt umlim. | 392381-B26 | | 1 | 6,747 | 1 | 6,747 | included |
| | | | | Subtotal | | 124,343 | 11,200 |
| | | | | | | | |
| **HP Software and Maintence Discount** | | | | | | | |
| Large Purchase and Net 30 discount | 16.0% | | 1 | | | ($1,080) | |
| | | | | Software Subtotal | | 123,263 | 11,200 |
| | | | | | | | |
| | | | | Total | | $241,008 | $13,578 |

| | |
|---|---|
| Three-Year Cost of Ownership: | $254,586 |
| **QphH @ 300GB:** | **8435.2** |
| **$ / QphH @ 300GB:** | **$31  USD** |

Pricing: 1=HP; 2=IBM

Note: The benchmark results and test methodology were audited by Lorna Livingtree of Performance Metrics, Inc. (www.perfmetrics.com); Rev.1.02 submission on 5/16/2005.

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 the stated prices are not available according to these terms, please inform at pricing@tpc.org. Thank you.

# Numerical Quantities

**Measurement Results:**

| | |
| --- | --- |
| Database Scale Factor | = 300 |
| Total Data Storage / Database Size | = 13.8 |
| Start of Database Load | = 5/6/2005 12:16:50 |
| End of Database Load | = 5/6/2005 16:18:00 |
| Database Load Time | = 4:01:10 |
| Query Streams for Throughput Test | = 6 |
| TPC-H Power | = 11511.2 |
| TPC-H Throughput | = 6181.1 |
| TPC-H Composite Query-per-Hour Metric (QphH@300GB) | = 8435.2 |
| Total System Price Over 5 Years | = $254586 USD |
| TPC-H Price/ Performance Metric ($/QphH@300GB) | = $31 USD |

**Measurement Intervals:**

| | |
| --- | --- |
| Measurement Interval in Throughput Test (Ts) | = 23064 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 | 506161800 | 05/07/05 12:07:34 05/07/05 13:13:37 | 05/07/05 12:06:55 05/07/05 12:07:34 | 05/07/05 13:13:37 05/07/05 13:14:12 | 1:06:03 |
| Stream 01 | 506161801 | 05/07/05 13:14:15 05/07/05 19:00:44 | 05/07/05 19:32:14 05/07/05 19:32:54 | 05/07/05 19:32:54 05/07/05 19:33:30 | 5:46:29 |
| Stream 02 | 506161802 | 05/07/05 13:14:15 05/07/05 19:15:47 | 05/07/05 19:33:30 05/07/05 19:34:04 | 05/07/05 19:34:04 05/07/05 19:34:35 | 6:01:32 |
| Stream 03 | 506161803 | 05/07/05 13:14:15 05/07/05 19:32:14 | 05/07/05 19:34:35 05/07/05 19:35:09 | 05/07/05 19:35:09 05/07/05 19:35:40 | 6:18:00 |
| Stream 04 | 506161804 | 05/07/05 13:14:15 05/07/05 19:30:43 | 05/07/05 19:35:40 05/07/05 19:36:14 | 05/07/05 19:36:14 05/07/05 19:36:44 | 6:16:28 |
| Stream 05 | 506161805 | 05/07/05 13:14:15 05/07/05 19:28:25 | 05/07/05 19:36:44 05/07/05 19:37:17 | 05/07/05 19:37:17 05/07/05 19:37:47 | 6:14:10 |
| Stream 06 | 506161806 | 05/07/05 13:14:15 05/07/05 19:12:17 | 05/07/05 19:37:47 05/07/05 19:38:21 | 05/07/05 19:38:21 05/07/05 19:38:51 | 5:58:02 |

**TPC-H Timing Intervals (in seconds)**

| Query | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 |
|---|---|---|---|---|---|---|---|---|
| Stream 00 | 295.4 | 26.2 | 29.3 | 28.0 | 161.7 | 21.0 | 120.3 | 105.5 |
| Stream 01 | 1,148.0 | 112.7 | 199.0 | 116.1 | 2,176.5 | 84.3 | 781.9 | 855.1 |
| Stream 02 | 1,521.4 | 170.9 | 252.7 | 152.5 | 1,806.2 | 110.4 | 497.2 | 635.2 |
| Stream 03 | 1,073.7 | 182.0 | 30.3 | 121.0 | 2,165.6 | 78.4 | 907.6 | 851.0 |
| Stream 04 | 1,413.5 | 59.4 | 31.7 | 48.9 | 2,431.6 | 67.8 | 668.4 | 672.2 |
| Stream 05 | 882.1 | 180.8 | 236.7 | 131.2 | 1,035.0 | 98.8 | 1,236.7 | 444.8 |
| Stream 06 | 787.9 | 125.2 | 281.7 | 110.4 | 2,487.4 | 143.9 | 440.8 | 1,075.5 |
| minimum | 787.9 | 59.4 | 30.3 | 48.9 | 1,035.0 | 67.8 | 440.8 | 444.8 |
| average | 1,137.8 | 138.5 | 172.0 | 113.4 | 2,017.1 | 97.3 | 755.4 | 755.6 |
| maximum | 1,521.4 | 182.0 | 281.7 | 152.5 | 2,487.4 | 143.9 | 1,236.7 | 1,075.5 |
| Query | Q9 | Q10 | Q11 | Q12 | Q13 | Q14 | Q15a | Q16 |
| Stream 00 | 467.3 | 103.1 | 31.4 | 51.1 | 324.5 | 24.7 | 65.1 | 99.7 |
| Stream 01 | 2,545.3 | 453.7 | 308.3 | 173.3 | 1,815.3 | 173.0 | 493.0 | 1,219.5 |
| Stream 02 | 2,363.2 | 761.7 | 99.2 | 534.2 | 2,408.8 | 319.8 | 551.5 | 1,069.2 |
| Stream 03 | 2,799.9 | 564.1 | 115.1 | 51.1 | 2,298.7 | 67.5 | 989.8 | 246.6 |
| Stream 04 | 2,258.0 | 751.2 | 81.7 | 571.0 | 2,607.7 | 247.7 | 508.0 | 1,088.6 |
| Stream 05 | 2,982.2 | 878.6 | 120.4 | 271.2 | 1,778.5 | 305.8 | 905.6 | 1,726.6 |
| Stream 06 | 2,308.1 | 721.3 | 155.1 | 162.3 | 2,766.2 | 210.1 | 599.5 | 1,376.9 |
| minimum | 2,258.0 | 453.7 | 81.7 | 51.1 | 1,778.5 | 67.5 | 493.0 | 246.6 |
| average | 2,542.8 | 688.4 | 146.6 | 293.9 | 2,279.2 | 220.7 | 674.6 | 1,121.2 |
| maximum | 2,982.2 | 878.6 | 308.3 | 571.0 | 2,766.2 | 319.8 | 989.8 | 1,726.6 |
| Query | Q17 | Q18 | Q19 | Q20 | Q21 | Q22 | RF1 | RF2 |
| Stream 00 | 189.7 | 654.3 | 192.0 | 57.1 | 779.3 | 136.2 | 38.9 | 35.0 |
| Stream 01 | 710.9 | 3,264.9 | 480.0 | 284.7 | 2,484.7 | 909.2 | 39.8 | 35.5 |
| Stream 02 | 735.1 | 2,858.8 | 679.5 | 348.4 | 2,408.0 | 1,408.4 | 34.6 | 30.6 |
| Stream 03 | 716.0 | 4,669.8 | 880.2 | 212.6 | 2,977.3 | 681.5 | 34.0 | 31.2 |
| Stream 04 | 650.4 | 4,387.4 | 743.3 | 57.2 | 2,717.7 | 525.0 | 34.0 | 29.6 |
| Stream 05 | 1,146.6 | 3,719.9 | 672.7 | 337.5 | 2,507.5 | 850.5 | 33.7 | 29.7 |
| Stream 06 | 1,083.3 | 2,010.6 | 900.2 | 365.5 | 2,514.2 | 856.0 | 33.9 | 30.1 |
| minimum | 650.4 | 2,010.6 | 480.0 | 57.2 | 2,408.0 | 525.0 | 33.7 | 29.6 |
| average | 840.4 | 3,485.2 | 726.0 | 267.7 | 2,601.6 | 871.8 | 35.0 | 31.1 |
| maximum | 1,146.6 | 4,669.8 | 900.2 | 365.5 | 2,977.3 | 1,408.4 | 39.8 | 35.5 |