



# HP 9000 Superdome Enterprise Server

TPC-H Rev 2.0

Report Date: June 24, 2002  
Updated October 29, 2002

Total System Cost

Composite Query per Hour Metric

Price/Performance

**\$5,249,167**

**25,805.4**  
QphH@1000GB

**\$203**  
QphH@1000GB

Database Size

Database Manager

Operating System

Other Software

Availability Date

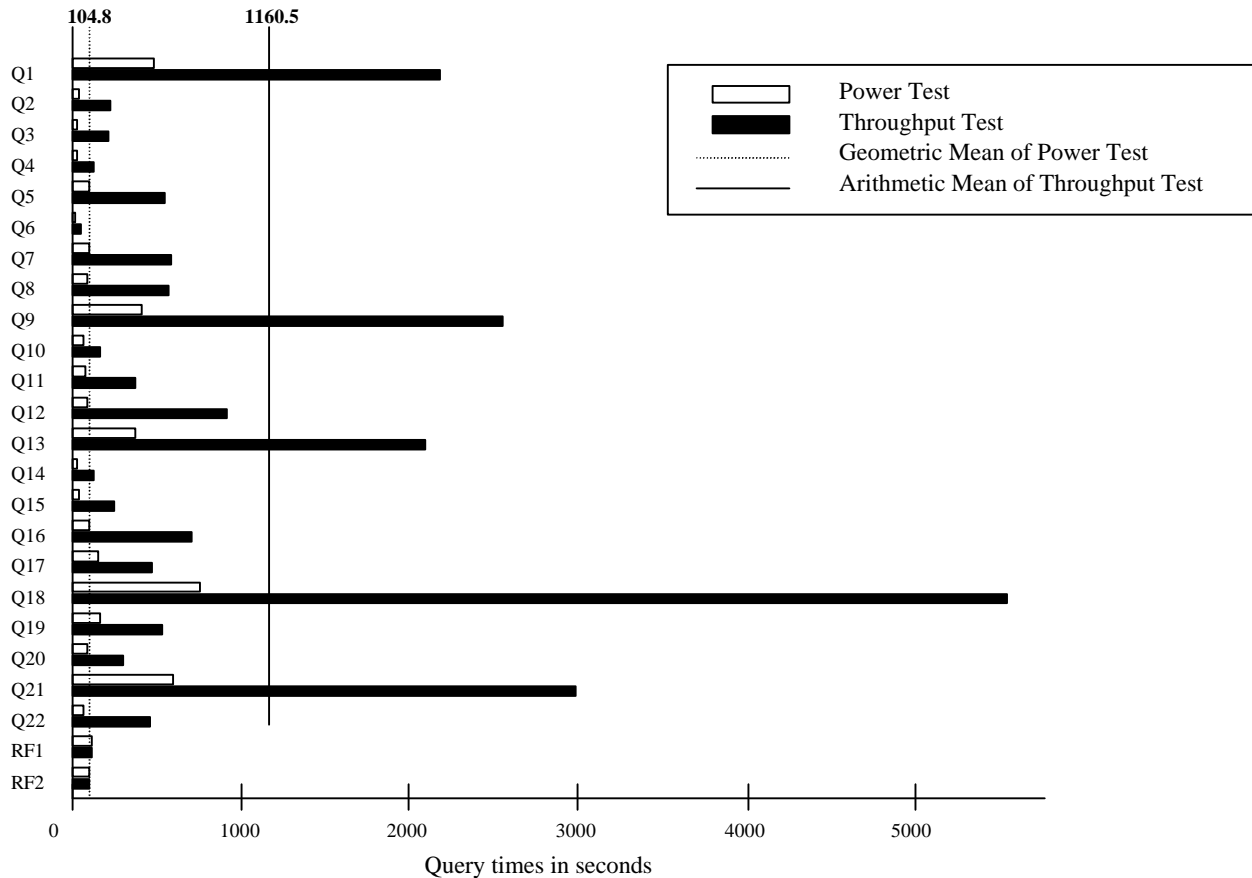
**1000 GB\***

**Oracle9i Database  
Enterprise Edition with  
Partitioning v9.2.0.2.0**

**HP-UX 11.i 64-bit**

**None**

**October 30, 2002**



Database Load Time = 02:22

Load Includes Backup: N

Total Data Storage/Database Size = 22.73

RAID (Base Tables Only): N

RAID (Base Tables and Auxiliary Data Structures): N

RAID (All): Y

### System Configuration

Processors: 64 PA-RISC 8700 875MHz, .75MB I-cache, 1.5MB D-cache  
 Memory: 128 GB  
 Disk Drives: 1 hp surestore disk system 2100 with 3 - 18GB Ultra 3 SCSI LVD disks and 84 SureStore VA7100 (with a total of 1260 18GB 15K RPM LVD disks)  
 Total Disk Storage: 22734GB (In this calculation one GB is defined as 1024\*1024\*1024 bytes)  
 Lan Controllers: 1 HP 10/100 Base-T Lan Adapter

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



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| Description                                                                           | Part Number      | Source | Reference Price                                              | Qty  | Extended Price   | 3 yr. Maint. Price |
|---------------------------------------------------------------------------------------|------------------|--------|--------------------------------------------------------------|------|------------------|--------------------|
| <b>Server Hardware</b>                                                                |                  |        |                                                              |      |                  |                    |
| Super Dome left chassis<br>(support includes hardware, services, and support)         | A5201A, Opt. 429 | 1      | 205,840                                                      | 1    | 205,840          | 268,626            |
| Super Dome right chassis                                                              | A5202A, Opt. 429 | 1      | 218,435                                                      | 1    | 218,435          |                    |
| Memory module - 2 GB                                                                  | A5198A, Opt. 0D1 | 1      | 14,000                                                       | 64   | 896,000          |                    |
| I/O enclosures                                                                        | A4856A, Opt. 0D1 | 1      | 14,805                                                       | 8    | 118,440          |                    |
| PDCA Redundant Power Source                                                           | A5800A, Opt. 0D1 | 1      | 578                                                          | 2    | 1,156            |                    |
| Cell Board with 4 PA-8700 875MHz Processors                                           | A6862A           | 1      | 10,080                                                       | 16   | 161,280          |                    |
| ICOD right to use processor                                                           | A6885A, Opt. 104 | 1      | 23,000                                                       | 64   | 1,472,000        | 403,392            |
| Super Dome PCI Core I/O card                                                          | A6855A, Opt. 0D1 | 1      | 1,045                                                        | 1    | 1,045            |                    |
| PCI Dual FWD SCSI-2 Card                                                              | A5159A, Opt 0D1  | 1      | 1,245                                                        | 2    | 2,490            |                    |
| PCI 1000BT Lan Adapter                                                                | A4926A, Opt. 0D1 | 1      | 2,135                                                        | 1    | 2,135            |                    |
| PCI Fibre Channel 2X                                                                  | A5158A, Opt 0D1  | 1      | 2,240                                                        | 84   | 188,160          |                    |
| RackInstallation Kit                                                                  | A5170A, Opt 0D1  | 1      | 410                                                          | 1    | 410              |                    |
| DVD-ROM<br>(includes SCSI-2 card, cables, enclosures)                                 | C7499A           | 1      | 3,503                                                        | 1    | 3,503            |                    |
| HP9000 A500 Support Management Station<br>(includes memory,CPU,lan card,disk,OS, etc) | A5570B           | 1      | 11,780                                                       | 1    | 11,780           |                    |
| hp surestore disk system 2100                                                         | A5675A           | 1      | 700                                                          | 1    | 700              |                    |
| 1-18GB FWD disk module                                                                | A6537A           | 1      | 525                                                          | 3    | 1,575            |                    |
| 5m SCSI-2 Cable                                                                       | C2978B           | 1      | 99                                                           | 1    | 99               |                    |
|                                                                                       |                  |        | <b>Subtotal</b>                                              |      | <b>3,285,048</b> | <b>672,018</b>     |
| <b>Server Software</b>                                                                |                  |        |                                                              |      |                  |                    |
| Oracle9i Database Enterprise Edition Release2,<br>Named User Plus for 3 years         |                  | 2      | 10,000                                                       | 64   | 640,000          |                    |
| Partitioning, Named User Plus for 3 years                                             |                  | 2      | 2,500                                                        | 64   | 160,000          |                    |
| Oracle Database Server Support Package for 3 years                                    |                  | 2      | 6,000                                                        | 1    |                  | 6,000              |
| HP-UX 11i LTU                                                                         | B9088AC, Opt AAF | 1      |                                                              | 1    | 0                |                    |
| HP-UX 11i Media                                                                       | B3920EA, Opt UM9 | 1      |                                                              | 1    | 0                |                    |
| HP-UX 11i                                                                             | B3920EA, Opt OD1 | 1      |                                                              | 1    | 0                |                    |
| HP-UX 11.i Factory Integration                                                        | B3920EA, Opt AAF | 1      | 520                                                          | 1    | 520              |                    |
|                                                                                       |                  |        | <b>Subtotal</b>                                              |      | <b>800,520</b>   | <b>6,000</b>       |
| <b>Storage</b>                                                                        |                  |        |                                                              |      |                  |                    |
| Surestore VA 7100 w/dual controllers 512MB cac                                        | A6262A           | 1      | 44,250                                                       | 84   | 3,717,000        | 308,616            |
| 18GB 15K RPM FC HDD                                                                   | A6191A, Opt. 0D1 | 1      | 914                                                          | 1260 | 1,151,640        |                    |
| 16 meter Fibre Optic Cable                                                            | A3531AR          | 1      | 170                                                          | 84   | 14,280           |                    |
| HP9000 Std. Rack System E41                                                           | A4902A           | 1      | 1,910                                                        | 7    | 13,370           |                    |
| Modular Power Dist.                                                                   | A5137AZ          | 1      | 145                                                          | 28   | 4,060            |                    |
| 200-240 Volts                                                                         | A5137AZ, Opt AW4 | 1      | 94                                                           | 28   | 2,632            |                    |
|                                                                                       |                  |        | <b>Subtotal</b>                                              |      | <b>4,902,982</b> | <b>308,616</b>     |
|                                                                                       |                  |        | <b>Total</b>                                                 |      | <b>8,988,550</b> | <b>986,634</b>     |
|                                                                                       |                  |        | Oracle Mandatory E-Business Discount on Licenses and Support |      | (161,200)        |                    |
|                                                                                       |                  |        | Large Configuration Discount and Support Prepayment*         |      | (4,186,820)      | (377,997)          |
|                                                                                       |                  |        | <b>Grand Total</b>                                           |      | <b>4,640,530</b> | <b>608,637</b>     |
|                                                                                       |                  |        | <b>3-yr Cost of Ownership: \$</b>                            |      |                  | <b>5,249,167</b>   |
|                                                                                       |                  |        | <b>QphH@1000GB:</b>                                          |      |                  | <b>25,805.4</b>    |
|                                                                                       |                  |        | <b>\$/QphH@1000GB: \$</b>                                    |      |                  | <b>203</b>         |

2=Oracle (Pricing Contact: MaryBeth Pierantoni (See Appendix G)

\*All discounts are based on US list prices and for similar quantities and configurations

Audited By: Brad Askins for InfoSizing (www.sizing.com)

Prices used in TPC benchmarks reflect 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 the 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 Scaling (SF/size)                          | 1000                |
| Total Data Storage/Database Size                    | 22.73               |
| Start of Database Load Time                         | 2002-06-03 21:24:20 |
| End of Database Load Time                           | 2002-06-03 23:46:09 |
| Database Load Time                                  | 02:22               |
| Query Streams for Throughput Test (S)               | 7                   |
| TPC-H Power                                         | 34,362.6            |
| TPC-H Throughput                                    | 19,379.2            |
| TPC-H Composite Query-per-Hour Metric (QphH@1000GB) | 25,805.4            |
| Total System Price Over 3 Years                     | \$5,249,167         |
| TPC-H Price/Performance Metric (\$/QphH@1000GB)     | \$203               |

## Measurement Intervals

|                                              |        |
|----------------------------------------------|--------|
| Measurement Interval in Throughput Test (Ts) | 28,608 |
|----------------------------------------------|--------|

## Duration of Stream Execution:

|           | SEED      | Start Date/Time     | End Date/Time       | Duration |
|-----------|-----------|---------------------|---------------------|----------|
| Stream 00 | 603234609 | 06/04/2002 09:06:49 | 06/04/2002 10:15:51 | 1:09:02  |
| Stream 01 | 603234610 | 06/04/2002 10:16:05 | 06/04/2002 17:09:09 | 6:53:04  |
| Stream 02 | 603234611 | 06/04/2002 10:16:05 | 06/04/2002 17:33:08 | 7:17:03  |
| Stream 03 | 603234612 | 06/04/2002 10:16:05 | 06/04/2002 17:26:21 | 7:10:16  |
| Stream 04 | 603234613 | 06/04/2002 10:16:05 | 06/04/2002 17:06:01 | 6:49:56  |
| Stream 05 | 603234614 | 06/04/2002 10:16:05 | 06/04/2002 17:49:56 | 7:33:51  |
| Stream 06 | 603234615 | 06/04/2002 10:16:05 | 06/04/2002 16:22:17 | 6:06:12  |
| Stream 07 | 603234616 | 06/04/2002 10:16:05 | 06/04/2002 17:22:20 | 7:17:15  |
| Refresh   |           | 06/04/2002 10:16:05 | 06/04/2002 18:12:53 | 7:56:48  |



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## TPC-H Timing Intervals (in seconds)

Duration of stream execution:

| Stream ID | Q1     | Q2    | Q3    | Q4    | Q5    | Q6   | Q7    | Q8    | Q9     | Q10   | Q11   | Q12   |
|-----------|--------|-------|-------|-------|-------|------|-------|-------|--------|-------|-------|-------|
| Stream 00 | 482.6  | 37.5  | 33.1  | 28.7  | 104.5 | 21.6 | 108.9 | 93.5  | 406.3  | 65.2  | 79.6  | 87.3  |
| Stream 01 | 2189.4 | 284.8 | 188.6 | 79.7  | 468.7 | 44.6 | 548.4 | 404.0 | 2185.3 | 329.7 | 279.9 | 607.9 |
| Stream 02 | 2573.5 | 297.5 | 94.0  | 216.3 | 535.2 | 86.4 | 572.5 | 492.4 | 2601.4 | 428.9 | 111.9 | 695.2 |
| Stream 03 | 2357.9 | 233.4 | 50.0  | 121.0 | 513.4 | 78.5 | 623.0 | 233.1 | 2051.7 | 352.5 | 307.3 | 289.3 |
| Stream 04 | 2286.2 | 300.2 | 167.6 | 190.6 | 831.9 | 49.4 | 389.8 | 447.3 | 2414.8 | 324.5 | 341.8 | 744.7 |
| Stream 05 | 2408.0 | 193.1 | 217.7 | 120.2 | 441.0 | 56.9 | 498.3 | 340.7 | 1315.9 | 246.2 | 373.0 | 390.4 |
| Stream 06 | 2174.9 | 230.8 | 217.8 | 128.3 | 552.1 | 53.8 | 584.7 | 573.1 | 2544.2 | 162.1 | 370.3 | 922.1 |
| Stream 07 | 2219.1 | 308.3 | 219.5 | 246.7 | 293.0 | 22.3 | 324.0 | 532.7 | 4410.6 | 226.3 | 383.1 | 315.7 |
| Minimum   | 2174.9 | 193.1 | 50.0  | 79.7  | 293.0 | 22.3 | 324.0 | 233.1 | 1315.9 | 162.1 | 111.9 | 289.3 |
| Average   | 2315.5 | 264.0 | 165.0 | 157.6 | 519.3 | 56.0 | 505.8 | 431.9 | 2503.4 | 295.7 | 309.6 | 566.5 |
| Maximum   | 2573.5 | 308.3 | 219.5 | 246.7 | 831.9 | 86.4 | 623.0 | 573.1 | 4410.6 | 428.9 | 383.1 | 922.1 |

| Stream ID | Q13    | Q14   | Q15a  | Q16    | Q17   | Q18    | Q19   | Q20   | Q21    | Q22    | RF1   | RF2  |
|-----------|--------|-------|-------|--------|-------|--------|-------|-------|--------|--------|-------|------|
| Stream 00 | 373.6  | 30.9  | 44.8  | 103.9  | 157.3 | 754.1  | 163.6 | 92.2  | 593.4  | 64.7   | 115.6 | 98.6 |
| Stream 01 | 4877.3 | 136.7 | 452.2 | 696.3  | 514.5 | 5298.6 | 624.6 | 242.7 | 3998.6 | 330.9  | 84.8  | 97.2 |
| Stream 02 | 6463.2 | 116.5 | 302.9 | 620.5  | 903.4 | 6411.9 | 658.1 | 217.0 | 1309.4 | 514.8  | 85.4  | 97.0 |
| Stream 03 | 8984.6 | 102.6 | 306.5 | 221.6  | 707.8 | 5201.3 | 563.5 | 313.0 | 3070.1 | 333.9  | 99.8  | 96.7 |
| Stream 04 | 3538.8 | 108.0 | 264.7 | 760.2  | 600.2 | 6171.5 | 625.1 | 279.5 | 3383.1 | 375.9  | 108.2 | 98.4 |
| Stream 05 | 5278.6 | 161.8 | 294.8 | 1056.1 | 391.0 | 6777.6 | 797.0 | 156.5 | 4814.0 | 901.5  | 104.7 | 96.7 |
| Stream 06 | 2090.5 | 124.6 | 251.2 | 704.6  | 469.2 | 5535.4 | 537.3 | 305.4 | 2979.7 | 459.2  | 109.5 | 97.3 |
| Stream 07 | 5035.7 | 43.9  | 106.0 | 347.4  | 582.6 | 4976.8 | 761.9 | 340.2 | 4188.6 | 1009.8 | 104.7 | 95.9 |
| Minimum   | 2090.5 | 43.9  | 106.0 | 221.6  | 391.0 | 4976.8 | 537.3 | 156.5 | 1309.4 | 330.9  | 84.8  | 95.9 |
| Average   | 5181.2 | 113.4 | 282.6 | 629.5  | 595.5 | 5767.6 | 652.5 | 264.9 | 3391.9 | 560.8  | 99.6  | 97.0 |
| Maximum   | 8984.6 | 161.8 | 452.2 | 1056.1 | 903.4 | 6777.6 | 797.0 | 340.2 | 4814.0 | 1009.8 | 109.5 | 98.4 |