



# HP ProLiant DL585 Cluster 48P

TPC-H Rev. 2.1.0

Report Date:  
**October 22, 2004**

Total System Cost

**\$2,106,123**

Composite Query per Hour Metric

**35141.0**  
QphH@1000GB

Price / Performance

**\$60**  
\$/ QphH@1000GB

Database Size

**1000GB**

Database Manager

**Oracle Database 10g  
Enterprise Edition with  
Real Application Clusters  
and Partitioning**

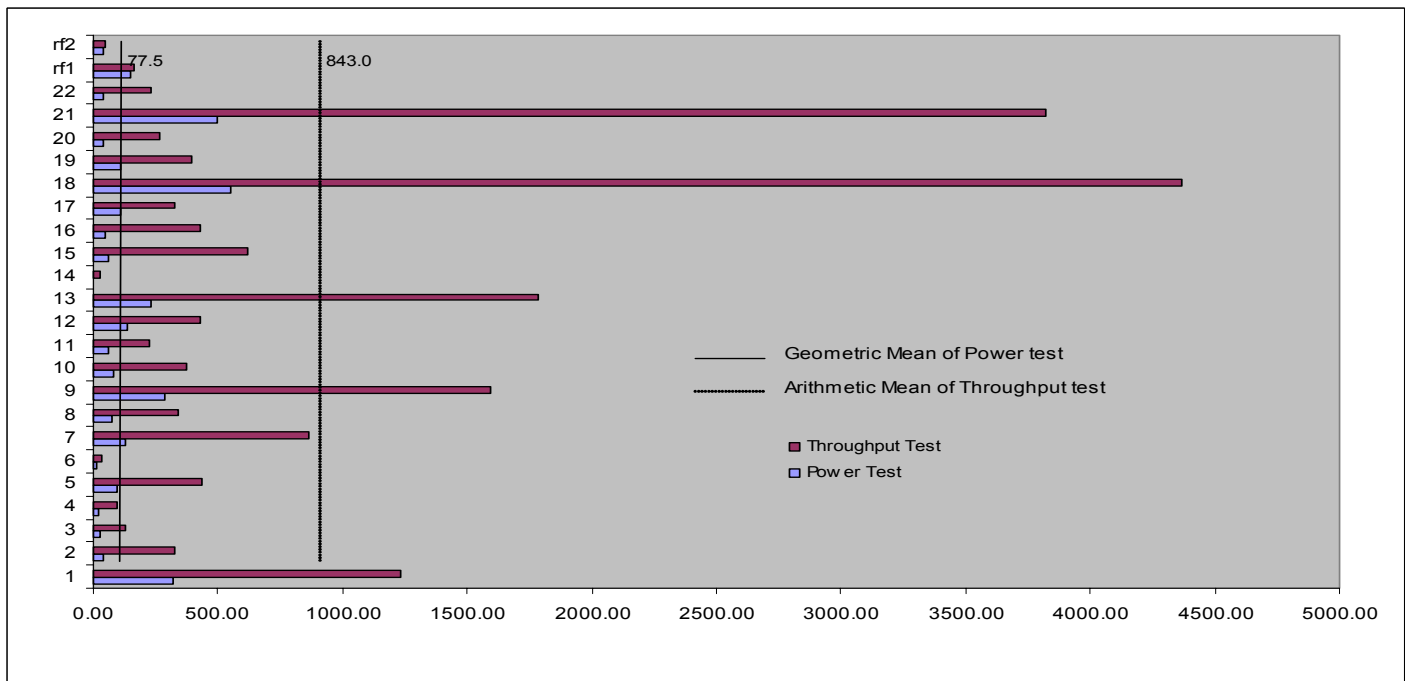
Operating System

**Red Hat Enterprise  
Linux AS 3**

Other  
Software

Availability Date

**October 21, 2004**



Database Load Time = 4:12:23

Load Included Backup: Y

Total Data Storage / Database Size = 14.69

RAID (Base tables only): N

RAID (Base tables and auxiliary data structures): N

RAID (All): N

### 12 Node Cluster Configuration :

- Processors (per node) : 4 x 2.2GHz/1MB AMD Opteron Model 848
- Memory (per node) : 8 GB
- OS Disk Drives (per node) : 2 x 36GB 15krpm HDD Ultra320
- NICs (per node) : 2 x on-board
- Cluster interconnect (per node) : 1 x InfiniCon Systems InfiniServ 7000 HCA  
(interconnected using InfiniCon Systems InfinIO 3016 switch)
- Disk Controllers (per node) : 6 x hp StorageWorks fca 2214DC
- Storage Area Network : 12 x hp StorageWorks SAN Switch 2/16  
48 x hp StorageWorks MSA1000  
408 x 36GB 15krpm HDD Ultra320
- Total Storage : 14688GB



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22-Oct-04

Description	Part Number	Brand	Pricing	Unit Price	Qty	Extended Price	3 yr. Maint. Price
<b>Server Hardware</b>							
ProLiant DL585 AMD Opteron™ 2.2GHz/ 1MB, 2GB - 2P Model	366820-B21		1	11,999	12	143,988	
Two AMD 848 Opteron™ 2.2GHz/1MB processors	359708-2PR		1	9,398	12	112,776	
1GB of Advanced ECC PC2100 DDR SDRAM DIMM memory kit	300679-B21		1	459	72	33,048	
36GB, 15krpm HDD Ultra320 HP	286776-B22		1	349	24	8,376	
S5500 15" Monitor	261602-001		1	129	12	1,548	
Scroll Mouse-Carbon	231947-B21		1	5	12	60	
PS/2 Easy Access Internet Keyboard	265977-001		1	12	12	144	
hp StorageWorks fca 2214DC 2Gb, 64-bit/133Mhz PCI-X FC HBA	321835-B21		1	2,500	72	180,000	
Servers 500 Series CarePak, 3yr 7x24, 4hr resp.	401782-002		1	1,795	12		21,540
Rack Model 9142 (42U - Opal) - Flat Pallet	120663-B21		1	1,321	9	11,889	
Rack Sidewall Kit	120670-B21		1	207	1	207	
UPS T1500 XR	204155-002		1	621	1	621	
hp ProCurve Switch 4148gl	J4888A		1	1,934	2	3,868	
hp ProCurve Switch gl 100/1000-T module	J4863A		1	812	4	3,248	
hp ProCurve Switch gl 100/1000-T module Support 3YR 24X7 4HR	U2866E		1	1,080	2		2,160
InfiniCon InfiniIO 3016 - 32 Port InfiniBand Switch (Inc. 2 spares, 2 Addl. Yrs Warranty)	3016-SW1	InfiniCon	4	8,769	3	26,307	1,830
InfiniCon InfiniServ 7000 Low Profile HCA 128 MB Std. (Inc. 2 spares, 2 Addl. Yrs Warrant)	7104-HCA-128LP	InfiniCon	4	707	14	9,898	900
InfiniCon Systems InfiniView embedded subnet manager	SW79-SM-V2K	InfiniCon	4	1,000	1	1,000	1,050
InfiniCon 4x-4x cable 5m (Inc. 2 spares)	7104-SM-CABLE	InfiniCon	4	128	14	1,792	
					<b>Subtotal</b>	<b>538,770</b>	<b>27,480</b>
<b>Storage</b>							
hp Storageworks Modular SAN Array 1000	201723-B22		1	9,995	48	479,760	
hp StorageWorks Modular SAN Array 1000 Support 3YR 24x7 4HR	402164-002		1	3,538	48		169,824
hp StorageWorks SAN switch 2/16-EL	322120-B21		1	6,400	12	76,800	
hp SAN Switch 2/32 Support 3YR 24X7 4HR	161299-002		1	3,399	12	40,788	
5m LC to LC Cable Kit	221692-B22		1	82	96	7,872	
15m LC to LC Cable Kit	221692-B23		1	103	96	9,888	
2Gb SFF-SW Tmocr Kit	221470-B21		1	199	192	38,208	
2Gb SFF-SW Tmocr Kit (10% spares)	221470-B21		1	199	20	3,980	
36GB, 15krpm HDD Ultra320 HP	286776-B22		1	349	408	142,392	
36GB, 15krpm HDD Ultra320 HP (10% spares)	286776-B22		1	349	41	14,309	
					<b>Subtotal</b>	<b>813,997</b>	<b>169,824</b>
<b>Software</b>							
Oracle Database 10g Enterprise Edition Named User Plus for 3 years	run-time	Oracle	2	10,000	48	480,000	
Real Application Clusters Named User Plus for 3 Yrs	run-time	Oracle	2	5,000	48	240,000	
Partitioning Named User Plus for 3 Yrs	run-time	Oracle	2	2,500	48	120,000	
Database Server Support Package (12 servers, 3 Yrs)	run-time	Oracle	2	24,000	3		72,000
Red Hat Enterprise Linux AS 3.0 (Premium Edition for x86)	SVC0084	Red-Hat	3	2,499	12	29,988	
2 Addl. Yrs Subs. to Red Hat Enterprise Linux AS 3.0 (Premium Edition x86)	SVC0084	Red-Hat	3	2,499	24		59,976
					<b>Subtotal</b>	<b>869,988</b>	<b>131,976</b>
*hp Large Purchase discount			1			(229,970)	(33,542)
Oracle Mandatory E-Business Discount			2			(182,400)	
					<b>Total</b>	<b>1,810,385</b>	<b>295,738</b>
						<b>3-Year Cost of Ownership:</b>	<b>\$2,106,123</b>
						<b>QphH Rating:</b>	<b>35141.0</b>
Price Key: 1-HP at 17% discount, 2-Oracle, 3-Red Hat, 4- InfiniCon Systems, Oracle pricing contact: Mary Beth Pierantoni, mary.beth.pierantoni@oracle.com, 916-315-5081. *All discounts are based on US list prices and for similar quantities and configurations.						<b>\$ / QphH@1000GB:</b>	<b>\$60</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 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 the TPC at pricing@tpc.org. Results independently audited by Lorna Livingtree of Performance Metrics Inc. Thank you.



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### Numerical Quantities

#### Measurement Results:

Database Scale Factor = 1000  
Total Data Storage / Database Size = 14.69  
Start of Database Load = 7/7/2004 09:36:46  
End of Database Load = 7/7/2004 13:05:29  
Database Backup Elapse Time = 00:43:40  
Database Load Time + Backup = 04:12:23

Query Streams for Throughput Test = 7  
TPC-H Power = 46463.6  
TPC-H Throughput = 26577.6  
TPC-H Composite Query-per-Hour Metric (QphH@1000GB) = 35141.0  
Total System Price Over 3 Years = \$2,106,123  
TPC-H Price/ Performance Metric (\$/QphH@1000GB) = \$60

#### Measurement Intervals:

Measurement Interval in Throughput Test (Ts) = 20859.7 seconds

#### Duration of Stream Execution:

Stream ID	Seed	Start Date	Start Time	End Date	End Time	Duration
Stream00	707130529	7/7/2004	14:11:35	7/7/2004	15:01:10	0:49:35
Stream01	707130530	7/7/2004	15:01:53	7/7/2004	20:05:51	5:03:58
Stream02	707130531	7/7/2004	15:01:53	7/7/2004	20:24:51	5:22:58
Stream03	707130532	7/7/2004	15:01:53	7/7/2004	19:54:56	4:53:03
Stream04	707130533	7/7/2004	15:01:53	7/7/2004	19:56:57	4:55:04
Stream05	707130534	7/7/2004	15:01:53	7/7/2004	20:19:21	5:17:28
Stream06	707130535	7/7/2004	15:01:53	7/7/2004	20:22:15	5:20:22
Stream07	707130536	7/7/2004	15:01:54	7/7/2004	19:48:07	4:46:13
Refresh		7/7/2004	20:27:33	7/7/2004	20:49:32	0:21:59



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

Query	Stream00	Stream01	Stream02	Stream03	Stream04	Stream05	Stream06	Stream07	Min Qi	Max Qi	Avg Qi
1	317.48	407.67	1785.96	1003.33	1370.17	1192.35	1791.94	1079.10	407.67	1791.94	1232.93
2	41.28	345.15	377.29	332.84	317.87	273.16	300.48	336.57	273.16	377.29	326.19
3	24.58	122.09	183.07	100.31	38.00	177.98	137.73	131.89	38.00	183.07	127.30
4	17.53	30.50	37.97	91.46	143.71	113.00	124.72	102.50	30.50	143.71	91.98
5	92.06	554.51	524.37	466.58	301.84	339.08	355.00	486.95	301.84	554.51	432.62
6	12.87	19.23	21.55	62.40	22.61	22.65	16.71	70.67	16.71	70.67	33.69
7	132.66	747.32	968.54	836.97	797.13	772.12	801.19	1119.27	747.32	1119.27	863.22
8	71.78	320.90	282.72	559.59	292.75	225.33	391.94	304.55	225.33	559.59	339.68
9	287.59	1628.92	1775.06	1732.22	1626.55	384.70	1620.72	2389.82	384.70	2389.82	1594.00
10	78.69	467.46	403.19	409.39	389.17	125.74	365.93	439.84	125.74	467.46	371.53
11	62.68	234.64	265.42	201.01	229.30	216.28	225.03	190.43	201.01	265.42	223.16
12	133.26	303.54	370.21	509.00	487.14	210.44	574.11	542.51	210.44	574.11	428.14
13	234.69	1788.25	1997.18	1588.60	2072.81	1972.64	1464.37	1594.83	1464.37	2072.81	1782.67
14	8.32	30.29	20.02	19.59	18.93	22.02	39.60	62.06	18.93	62.06	30.36
15	58.88	593	513.5	634.8	740.3	793.7	483.3	575.1	483.30	793.70	619.10
16	49.50	541.16	338.17	357.05	369.57	353.23	664.62	371.35	338.17	664.62	427.88
17	106.77	200.18	647.49	409.52	215.11	123.13	528.47	173.01	123.13	647.49	328.13
18	550.85	4229.24	4830.85	4423.50	4015.34	5060.44	4768.80	3245.52	4015.34	5060.44	4367.67
19	112.17	340.03	298.88	330.57	286.32	659.42	266.81	602.42	266.81	659.42	397.78
20	38.77	747.28	184.34	228.59	57.14	250.78	201.66	170.32	57.14	747.28	262.87
21	499.63	4513.47	3299.78	3010.88	3725.67	5415.59	3815.86	2950.76	3010.88	5415.59	3818.86
22	42.54	72.39	251.72	274.62	185.67	343.76	282.74	233.76	72.39	343.76	234.95
rf1	149.35	162.3	182.7	166.8	161.7	153.6	156.4	161.3	153.6	182.7	163.5
rf2	39.38	48.8	58.7	39.8	43.3	54.5	50.4	41.2	39.8	58.7	48.1