

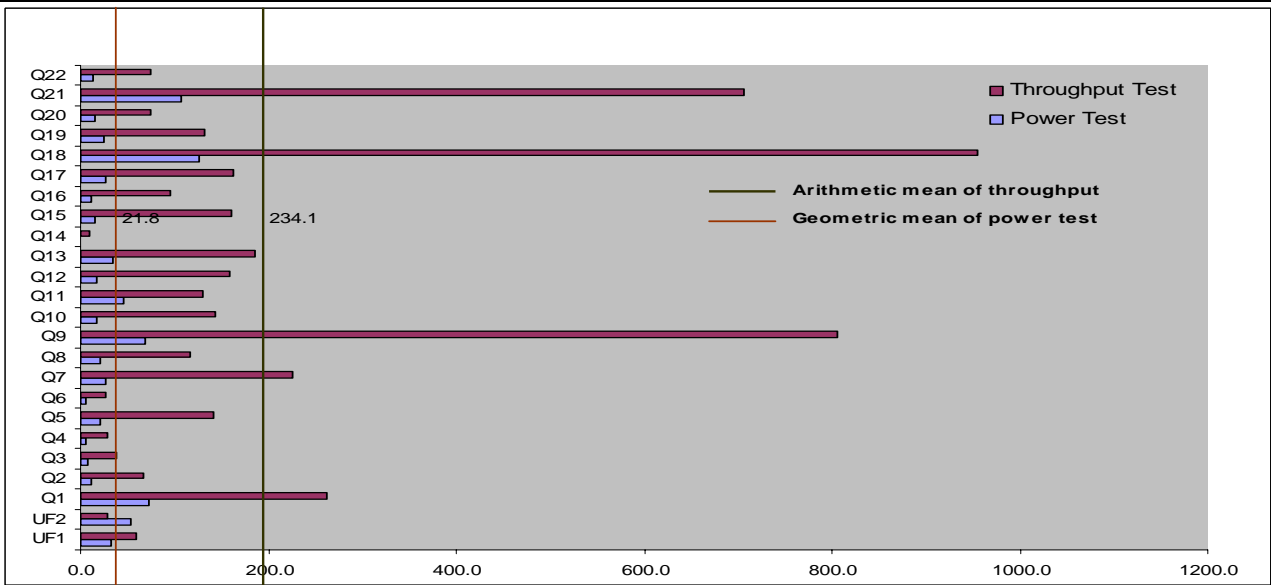


HP BladeSystem c-Class ProLiant BL460c IB Cluster 16P DC

TPC-H Rev. 2.6.1

Report Date:
August 9, 2007

Total System Cost		Composite Query per Hour Metric		Price / Performance	
\$497,869USD		39,613.6 QphH@300GB		\$12.57 USD \$/ QphH@300GB	
Database Size	Database Manager	Operating System	Other Software	Availability Date	
300GB	Oracle Database 10g Release 2, Enterprise Edition with Oracle Real Application Clusters and Partitioning	Red Hat Enterprise Linux 4		September 15, 2007	



Database Load Time = 1:29:24	Load Included Backup: N	Total Data Storage / Database Size = 17.28
RAID (Base tables only): Y	RAID (Base tables and auxiliary data structures): Y	RAID (All): Y

	System Components	Total	Per Node
	HP BladeSystem c7000 Enclosure:	1	n.a.
	HP ProLiant BL460c (Database Server):	8	n.a.
Processors (Dual-Core Intel Xeon X5160, 3.0 GHz, 1333 MHz FSB)/Cores/Threads:		16/32/32	2/4/4
Memory:		128GB	16GB
HP 36GB 10K SAS 2.5 Hot Plug HDD (OS)		16	2
On board Dual-Port NIC:		8	1
HP GbE2 Switch:		1	n.a.
HP 4X DDR InfiniBand Mezzanine HCA:		16	2
HP 4X DDR InfiniBand Switch (Oracle Cluster Interconnect):		2	n.a.
	Storage Components		
	HP BladeSystem c7000 Enclosure:	2	
	HP 4X DDR InfiniBand Switch (Storage Interconnect):	2	
HP ProLiant BL465c (1 x Dual-Core AMD Opteron 2214 HE, 2.2 GHz, 2GB Main Memory,			
2x HP 36GB 15k 2.5 SAS drive, 1 x HP 4X DDR InfiniBand Mezzanine HCA (Storage Server)		16	
HP StorageWorks SB40c with 6 x HP 36GB 15k 2.5 SAS drive (Storage Blade):		16	
	Total Storage:	5184 GB	



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9-Aug-07

Description	Part Number	Brand	Pricing	Unit Price	Qty	Extended Price	3 yr. Maint. Price
Server Hardware							
HP ProLiant BL460c CTO Blade	404867-B21		1	1462	8	11696	
Dual-Core Intel Xeon Processor 5160 (3.00 GHz, 1333 MHz FSB) Option Kit	416673-L21		1	1499	16	23984	
HP 4GB FBD PC2-5300 2x2GB Kit	397413-B21		1	749	32	23968	
HP 4X DDR InfiniBand Mezzanine HCA for HP BladeSystem c-Class	410533-B21		1	579	16	9264	
HP 36GB 10K SAS 2.5 Hot Plug Hard Drive	375859-B21		1	269	16	4304	
HP 3y 4h 24x7 c-Class Svr Blade HW Supp	UE459E		1	369	8		2952
HP BLc7000 3 PH 6 Fan NA/Jp Trl ICDC Kit	412133-B21		1	6699	1	6699	
HP BLc Bnt 1GbE2 Switch Opt Kit	410917-B21		1	1399	1	1399	
HP BLc 4X DDR InfiniBand Switch Option Kit	410398-B21		1	5999	2	11998	
HP 3y 4h 24x7 c7000 Enclosure HW Supp	UE479E		1	927	1		927
HP 5642 Pallet Unassembled Rack	358254-B21		1	689	1	689	
HP CAT5 KVM USB 1 Pack Interface Adapter	336047-B21		1	99	1	99	
HP s7540 CRT Monitor	PF997AA#ABA		1	139	1	139	
HP USB Standard Keyboard	DX752AV#ABA		1	12	1	12	
HP USB 2-Button Optical Scroll Mouse	PT951AV		1	5	1	5	
					Subtotal	94,256	3,879
Storage							
HP ProLiant BL465c CTO Blade	403435-B21		1	1362	16	21792	
AMD Opteron processor Model 2210 (1.8 GHz, 95W) Processor Option Kit, FIO Base	414210-L21		1	249	16	3984	
HP 1GB Reg PC2-5300 2x512M Kit	408850-B21		1	189	32	6048	
HP 4X DDR InfiniBand Mezzanine HCA for HP BladeSystem c-Class	410533-B21		1	579	16	9264	
HP 3y 4h 24x7 c-Class Svr Blade HW Supp	UE459E		1	369	16		5904
HP BLc SB40c Storage Blade	411243-B21		1	1599	16	25584	
HP 36GB 15k 2.5 single port SAS drive	431933-B21		1	369	128	47232	
HP 3y 4h 24x7 BLcSB40c StrgBlade HW Supp	UF207E		1	343	16		5488
HP BLc7000 3 PH 6 Fan NA/Jp Trl ICDC Kit	412133-B21		1	6699	2	13398	
RHEL 5 Media Only SW	452561-B21		1	50	1	50	
HP 3y 24x7 RH 8pack SW Support	UH226E		1	6718	2		13,436
HP BLc7000 3 PH 6 Fan NA/Jp Trl ICDC Kit	412133-B21		1	6699	2	13398	
HP 3y 4h 24x7 c7000 Enclosure HW Supp	UE479E		1	927	2		927
HP 2M 4X DDR IB Copper Cable	410123-B23		1	68	6	408	
					Subtotal	141,158	25,755
Software							
Oracle Database 10g Enterprise Edition Release 2, Named User Plus for 3 Years	run-time	Oracle	2	10000	16 **	160,000	
Oracle Real Application Clusters, Named User Plus for 3 Years	run-time	Oracle	2	5000	16 **	80,000	
Partitioning, Named User Plus for 3 Years	run-time	Oracle	2	2500	16 **	40,000	
Database Server Support Package for 3 Years	run-time	Oracle	2	6000	8		48,000
RHEL 4 AS Pm 3YR 24x7	384958-B21		1	1909	8	15,272	Included
					Subtotal	295,272	48,000
HP Large Purchase and Net30 discount			1			(40,110)	(4,741)
Oracle Mandatory E-Business Discount on Licenses and Support		Oracle	2			(65,600)	
					Total	424,976	72,893
Pricing: 1- HP Direct at 16% discount 800-203-7648 Pricing: 2- Oracle pricing contact: MaryBeth Pierantoni, mary.beth.pierantoni@oracle.com, 916-315-5081 (***) 16 = 32 x 0.50. Explanation: for the purposes of counting the number of processors which require licensing for Intel multicorechips, "n" cores shall be determined by multiplying the total number of cores by a core processor licensing factor of .50. Oracle Price quote is in Appendix G. All discounts are based on US list prices and for similar quantities and configurations. 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 section 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					3-Year Cost of Ownership in USD:		\$497,869 USD
					QpH Rating:		39,613.6
					USD\$ / QpH@300GB:		\$12.57 USD



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Numerical Quantities

Measurement Results:

Database Scale Factor	= 300
Total Data Storage / Database Size	= 17.28
Start of Database Load	= 8/3/2007 14:34:44
End of Database Load	= 8/3/2007 16:04:08
Database Load Time	= 1:29:24
Query Streams for Throughput Test	= 9
TPC-H Power	= 49,541.3
TPC-H Throughput	= 31,675.3
TPC-H Composite Query-per-Hour Metric (QphH@300GB)	= 39,613.6
Total System Price Over 3 Years	= \$497,869USD
TPC-H Price/ Performance Metric (\$/QphH@300GB)	= \$12.57USD

Measurement Intervals:

Measurement Interval in Throughput Test (Ts)	= 6751.0 seconds
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Duration of Stream Execution:

Power Stream	Seed	RF1 Start Time	Query Start Time	RF2 Start Time	Duration
		RF1 End Time	Query End Time	RF2 End Time	
	803160408	8/3/2007 16:17:52	8/3/2007 16:18:46	8/3/2007 16:30:28	0:13:09
		8/3/2007 16:18:46	8/3/2007 16:30:28	8/3/2007 16:31:01	

Throughput Stream	Seed	Query Start Time	Duration	RF1 Start Time	RF2 Start Time
		Query End Time		RF1 End Time	RF2 End Time
1	803160409	8/3/2007 16:31:09	1:38:10	8/3/2007 18:10:27	8/3/2007 18:11:05
		8/3/2007 18:09:19		8/3/2007 18:11:05	8/3/2007 18:11:37
2	803160410	8/3/2007 16:31:09	1:34:15	3/5/2007 18:11:37	8/3/2007 18:12:26
		8/3/2007 18:05:24		8/3/2007 18:12:26	8/3/2007 18:12:54
3	803160411	8/3/2007 16:31:09	1:39:18	8/3/2007 18:12:54	8/3/2007 18:13:43
		8/3/2007 18:10:27		8/3/2007 18:13:43	8/3/2007 18:14:14
4	803160412	8/3/2007 16:31:09	0:58:01	8/3/2007 18:14:14	8/3/2007 18:15:16
		8/3/2007 17:29:10		8/3/2007 18:15:16	8/3/2007 18:15:46
5	803160413	8/3/2007 16:31:09	1:35:25	8/3/2007 18:15:46	8/3/2007 18:16:58
		8/3/2007 18:06:34		8/3/2007 18:16:58	8/3/2007 18:17:26
6	803160414	8/3/2007 16:31:09	1:31:43	8/3/2007 18:17:26	8/3/2007 18:18:38
		8/3/2007 18:02:52		8/3/2007 18:18:38	8/3/2007 18:19:05
7	803160415	8/3/2007 16:31:09	1:26:14	8/3/2007 18:19:05	8/3/2007 18:20:12
		8/3/2007 17:57:23		8/3/2007 18:20:12	8/3/2007 18:20:42
8	803160416	8/3/2007 16:31:09	1:16:37	8/3/2007 18:20:42	8/3/2007 18:21:51
		8/3/2007 17:47:46		8/3/2007 18:21:51	8/3/2007 18:22:19
9	803160417	8/3/2007 16:31:09	1:12:48	8/3/2007 18:22:19	8/3/2007 18:23:18
		8/3/2007 17:43:57		8/3/2007 18:23:18	8/3/2007 18:23:40



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TPC-H Timing Intervals (in seconds)

Query	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Stream00	72.0	12.2	7.8	5.6	20.5	5.4	26.0	21.9
Stream01	89.2	127.1	104.3	10.0	353.5	19.7	341.5	114.2
Stream02	314.3	44.4	37.6	15.1	89.6	21.2	87.0	85.4
Stream03	635.9	121.5	6.5	22.7	109.2	19.0	507.6	131.2
Stream04	127.9	39.9	30.9	17.9	104.4	77.9	129.5	57.9
Stream05	121.8	26.0	26.9	54.9	92.7	47.5	341.2	84.3
Stream06	318.0	53.0	77.4	88.6	183.6	27.0	324.4	98.5
Stream07	336.5	77.6	27.9	34.0	64.0	16.9	291.2	146.5
Stream08	482.5	73.0	23.2	17.4	179.0	17.8	103.8	293.1
Stream09	120.3	104.2	47.7	17.6	215.6	18.3	101.5	141.1
Min Qi	72.0	12.2	6.5	5.6	20.5	5.4	26.0	21.9
Max Qi	635.9	127.1	104.3	88.6	353.5	77.9	507.6	293.1
Avg Qi	261.8	67.9	39.0	28.4	141.2	27.1	225.4	117.4
Query	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
Stream00	69.1	16.7	46.4	17.7	35.3	2.5	16.2	12.4
Stream01	368.1	212.5	208.4	308.6	119.1	6.2	170.4	194.6
Stream02	991.0	481.3	119.3	105.6	496.8	10.4	104.0	168.4
Stream03	1309.2	267.9	80.6	27.7	104.7	10.3	78.7	11.6
Stream04	516.5	86.1	132.2	271.0	169.2	7.5	337.7	51.0
Stream05	454.3	66.6	98.2	123.8	230.5	7.8	406.3	255.7
Stream06	873.7	72.0	203.6	336.0	243.8	7.2	140.6	43.5
Stream07	563.1	96.4	177.5	147.0	143.6	10.3	70.8	53.9
Stream08	1095.9	79.2	120.1	199.6	112.3	10.8	204.5	52.3
Stream09	1825.1	52.0	116.9	48.9	210.4	13.5	81.9	114.0
Min Qi	69.1	16.7	46.4	17.7	35.3	2.5	16.2	11.6
Max Qi	1825.1	481.3	208.4	336.0	496.8	13.5	406.3	255.7
Avg Qi	806.6	143.1	130.3	158.6	186.6	8.7	161.1	95.7
Query	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
Stream00	25.9	127.1	24.4	15.3	106.9	14.2	53.6	33.0
Stream01	132.1	1057.1	144.7	176.9	1598.0	34.1	38.4	31.2
Stream02	426.2	1513.8	187.9	48.0	232.1	75.9	49.2	27.7
Stream03	175.5	1465.1	55.3	63.5	628.7	125.9	49.8	31.0
Stream04	164.7	413.4	137.7	68.5	458.1	81.8	61.8	30.1
Stream05	155.5	1331.4	108.4	35.5	1503.9	151.5	71.2	28.5
Stream06	58.2	1414.2	81.1	68.4	738.6	52.2	71.8	27.5
Stream07	100.5	1472.6	123.8	104.6	1040.6	74.8	66.9	30.1
Stream08	238.6	430.1	326.0	49.2	397.9	90.8	68.4	27.9
Stream09	151.3	332.4	130.1	123.1	349.2	52.5	59.2	22.4
Min Qi	25.9	127.1	24.4	15.3	106.9	14.2	38.4	22.4
Max Qi	426.2	1513.8	326.0	176.9	1598.0	151.5	71.8	33.0
Avg Qi	162.9	955.7	131.9	75.3	705.4	75.4	59.0	28.9