

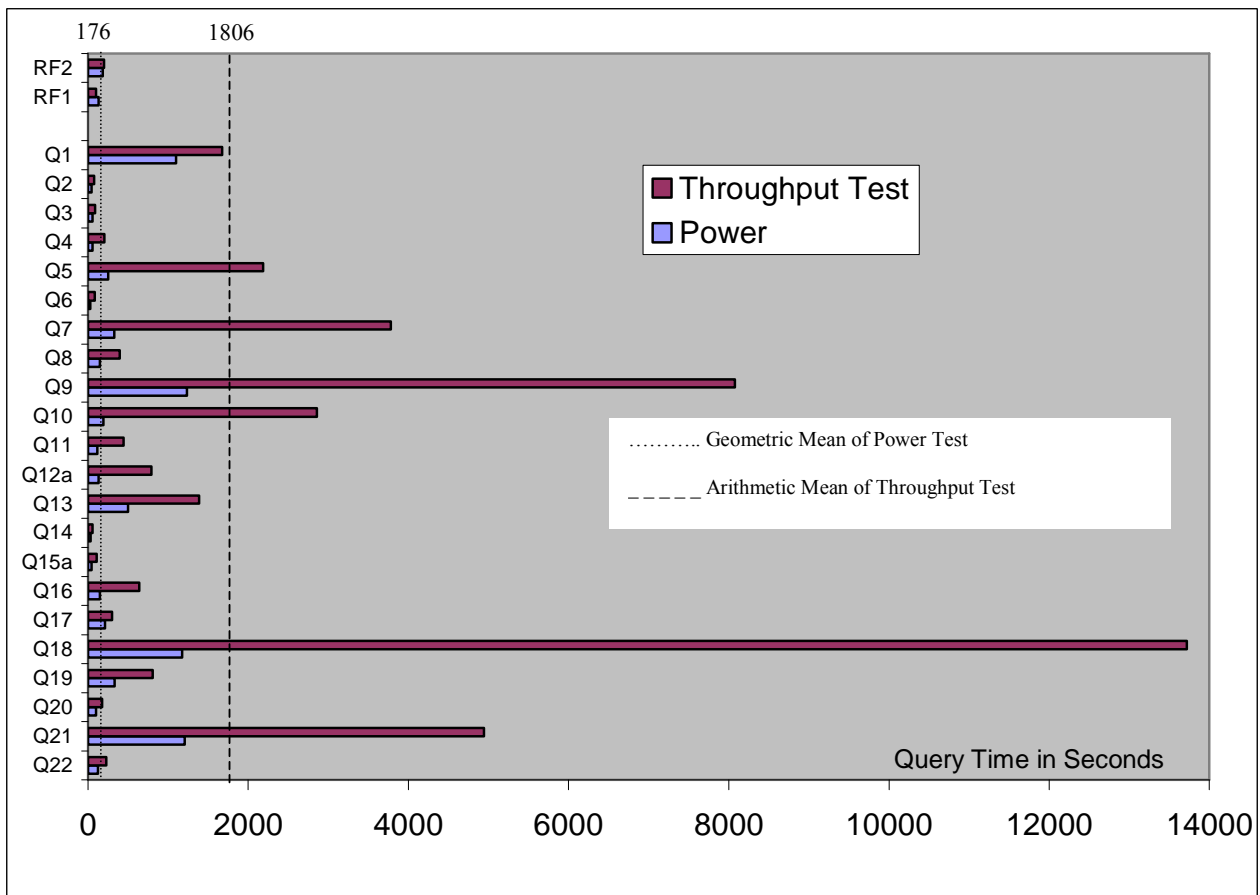


Bull Novascale 5160

TPC-H Rev. 2.1.0

Report Date
June 20, 2005

Total System Cost		Composite Query per Hour Rating		Price Performance	
\$667,962		15069.9 QphH @ 1000GB		\$44.33 / QphH @ 1000GB	
Database size	Database Manager	Operating System	Other Software	Availability Date	
1000 GB*	Oracle Database 10g Release 2 with Oracle Automatic Storage Management	Microsoft Windows Server 2003, Datacenter Edition for 64-bit Itanium-based Systems	gcc-c++-3.2.3-20	December 20, 2005	



Database Load Time = 11:33:52		Load included backup: N		Total Data Storage / Database Size = 12.64	
RAID (Base tables): Y		RAID (Base tables and Auxiliary Data Structures): Y		RAID (All): N	
System Configuration					
Processors	16 x 1.6 GHz Intel® Itanium2™ with 6MB Level 3 Cache				
Memory	64 GB Main Memory				
Disk Controllers	15 LSI 7202XP -LC				
Disk Drives	2 184	73GB FB 10K73GB SCSI 15K (1GB = 10 ⁹ byte)			
Total Disk Storage	12645 GB (1GB = 2 ³⁰ bytes)				
* Database size includes only raw data (eg, no temp, index, redundant storage space, etc.)					



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Description	Part Number	Brand	Pricing	Unit Price	Qty	Extended Price	3 yr. Maint. Price
Server Hardware							
NovaScale 5160 System Quad Itanium 2 1.6GHz/6MB Including: 1 Rack 36U/19" with Power Distribution Unit (PDU) 1 Platform Administrator Processor (PAP) 1 Keyboard/Video/Mouse (KVM) 8-port switch 1 LCD console drawer with keyboard and mouse 1 CPU kit: 4 x Itanium2 1.6GHz/6MB L3 1 I/O Box (11 PCI-X slots) CPU Kit: 4x Itanium 2 1.6GHz/6MB L3, 1 CPU/M Box 16GB (16x1024MB DIMMS, SDRAM DDR) kit for one CPU/Memory box One additional I/O Box including 11 add'l PCI slots PCI fibre optical 2 Gb/s host connection kit, w/o cable - Windows and HPC Linux FDA 1300 Fiber RAID 15-slot disks subsystem FDA 1300 Storage Manager Base 73GB Raid 2G Fiber Disk (10Krpm) For FDA One dummy disk module for FDA Additional Power Distribution Unit	CPXU404-1606	Bull	1	100 138	1	100 138	36 501
	Included	Bull					
	Included	Bull					
	Included	Bull					
	Included	Bull					
	Included	Bull					
	Included	Bull					
	CPKU307-1606	Bull	1	29 108	3	87 324	27 658
	CMMU303-0000	Bull	1	18 767	4	75 068	0
	DRWU300-0000	Bull	1	15 400	1	15 400	5 006
	CKTU213-0000	Bull	1	1 817	1	1 817	574
	DSSU070-1300	Bull	1	8 712	1	8 712	2 753
	EXSU400-WK00	Bull	1	1 980	1	1 980	959
	MSUU302-0FDA	Bull	1	517	2	1 034	584
	MSUU30D-0FDA	Bull	1	40	13	525	
	PSSU200-0000	Bull	1	924	1	924	0
					Subtotal	292 923	74 036
Storage Hardware							
Rack 1100H 40U/19" w/o Power Distribution Unit 7-outlet Power Distribution Unit (7x C13) Dual Channel HBA PCI-X to fiber 16-slot fiber JBOD disk rack drawer SFP for disk drawer FC multimode optical LC to LC 2 Gb SAN connection cable - 5 73GB/15k Fiber disk	RCKU209-1140	Bull	1	3 681	1	3 681	1 163
	PSSU211-00M7	Bull	1	266	4	1 063	336
	LSI 7402	LSI	3	1 132	17	19 244	
	NS39-S05A134	Bull	1	3 807	15	57 105	18 047
	NS39-S05A136	Bull	1	92	33	3 036	
	CBLH008-0500	Bull	1	200	30	6 006	
	NS39-S05A135	Bull	1	708	203	143 724	
					Subtotal	233 859	19 546
Server Software							
Novascale Master Windows Server 2003 DTC Ed. (up to 16-CPU) & 5CAL Oracle Database 10g Release 2, Enterprise Edition, Named User Plus for 3 years Partitioning, Named User Plus for 3 years Database Server Support Package for 3 years Visual C++ Standard Edition Microsoft Problem Resolution Service	Included	Bull	1				
	EXSU264-NA0H	Microsoft	1	29 543	1	29 543	3 445
		Oracle	4	10 000	16	160 000	<i>Inc. Below</i>
		Oracle	4	2 500	16	40 000	<i>Inc. Below</i>
		Oracle	4	2 000	3	6 000	<i>6 000</i>
	254-00170	Microsoft	2	109	1	109	<i>Inc. Below</i>
		Microsoft	2		1		<i>245</i>
					Subtotal	229 652	9 690
Large Volume HW, SW & Maintenance Discount					Discounts	157 784	33 960
					TOTAL	598 649	69 313
Notes: Pricing : 1-Bull, 2-Microsoft, 3-LSI, 4-Oracle (*) Spares = 10% spare disks, SFP and PCI-X HBA added in place of onsite service Used 15 HBA, 30 SFP, 184x73Gb disks - Spares are 2 HBA, 3 SFP, 19x73Gb disks Result and methodology audited by François Raab of InfoSizing Inc. (www.sizing.com)					Three-Year Cost of Ownership : \$667 962 QphH @ 1000GB : 15 069		
					\$ / QphH@1000GB : 44,33		
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 Summary

Measurement Results

Scale Factor	1000 GB
Total Data Storage / Database Size	12.64
Start of Database Load	08/06/05 14:37:36
End of Database Load	09/06/05 02:11:23
Database Load Time	11:33:47
Query Streams for Throughput Test	7
TPC-H Power	20385.3
TPC-H Throughput	11140.4
Composite Query per Hour Rating (QphH@1000GB)	15069.9
Total System Price Over 3 Years	\$667,962
TPC-H Price Performance Metric	\$44.33

Measurement Intervals

Measurement Interval in Throughput Test (Ts) 49765 seconds (13:49:25)

Duration of Stream Execution:

	Seed	Query Start Date/Time	RF1 Start Date/Time	RF2 Start Date/Time	Duration
		Query End Date/Time	RF1 End Date/Time	RF2 End Date/Time	
Stream 00	609021123	06/09/05 03:28:59 2005	06/09/05 03:26:45 2005	06/09/05 05:35:29 2005	2:11:52
		06/09/05 05:35:29 2005	06/09/05 03:28:58 2005	06/09/05 05:38:37 2005	
Stream 01	609021124	06/09/05 05:38:37 2005	06/09/05 18:52:41 2005	06/09/05 18:54:17 2005	11:43:40
		06/09/05 17:22:17 2005	06/09/05 18:54:17 2005	06/09/05 18:57:20 2005	
Stream 02	609021125	06/09/05 05:38:42 2005	06/09/05 18:57:20 2005	06/09/05 18:59:05 2005	13:12:55
		06/09/05 18:51:37 2005	06/09/05 18:59:05 2005	06/09/05 19:02:22 2005	
Stream 03	609021126	06/09/05 05:38:56 2005	06/09/05 19:02:22 2005	06/09/05 19:04:02 2005	9:40:06
		06/09/05 15:19:02 2005	06/09/05 19:04:02 2005	06/09/05 19:07:40 2005	
Stream 04	609021127	06/09/05 05:38:55 2005	06/09/05 19:07:40 2005	06/09/05 19:09:20 2005	12:34:45
		06/09/05 18:13:40 2005	06/09/05 19:09:20 2005	06/09/05 19:12:50 2005	
Stream 05	609021128	06/09/05 05:39:02 2005	06/09/05 19:12:50 2005	06/09/05 19:14:34 2005	12:39:00
		06/09/05 18:18:02 2005	06/09/05 19:14:34 2005	06/09/05 19:18:10 2005	
Stream 06	609021129	06/09/05 05:39:10 2005	06/09/05 19:18:10 2005	06/09/05 19:19:49 2005	13:13:31
		06/09/05 18:52:41 2005	06/09/05 19:19:49 2005	06/09/05 19:22:58 2005	
Stream 07	609021130	06/09/05 05:39:08 2005	06/09/05 19:22:58 2005	06/09/05 19:24:36 2005	10:38:40
		06/09/05 16:17:48 2005	06/09/05 19:24:36 2005	06/09/05 19:28:02 2005	



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TPC-H Timing Intervals (in seconds)

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Stream 00	1100.0	46.6	58.6	57.0	251.2	28.8	330.0	147.9
Stream 01	1455.9	91.7	109.8	112.0	2726.4	78.9	2814.6	258.5
Stream 02	1355.0	82.0	95.8	137.8	2078.3	58.6	2061.6	249.0
Stream 03	2121.7	67.7	99.3	346.6	1964.5	118.4	3937.9	792.0
Stream 04	1517.7	98.5	73.2	260.6	2664.5	64.8	4246.7	518.7
Stream 05	1701.8	67.6	73.3	177.4	1146.4	65.8	4357.8	217.0
Stream 06	1962.7	57.3	95.9	197.3	2865.4	145.6	4649.4	470.2
Stream 07	1631.6	78.5	91.2	204.4	1865.0	53.6	4392.6	259.3
Min Qi	1355.0	57.3	73.2	112.0	1146.4	53.6	2061.6	217.0
Avg Qi	1678.0	77.6	91.2	205.1	2187.2	83.7	3780.1	394.9
Max Qi	2121.7	98.5	109.8	346.6	2865.4	145.6	4649.4	792.0
	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
Stream 00	1237.3	195.8	117.4	130.4	501.4	34.8	46.4	148.4
Stream 01	11587.1	2273.7	330.2	283.3	936.5	47.9	111.8	661.2
Stream 02	12001.6	4183.9	662.9	480.1	1172.4	71.1	96.2	747.1
Stream 03	3097.7	2581.6	343.2	352.8	1831.9	76.2	119.1	529.1
Stream 04	5997.5	2201.1	406.9	738.3	2087.8	54.6	97.7	674.9
Stream 05	6704.5	2850.8	452.9	497.9	1127.4	52.7	134.2	835.7
Stream 06	9923.2	4207.3	194.5	1608.2	1495.8	62.7	129.6	601.9
Stream 07	7222.1	1716.1	712.7	1603.9	1070.2	43.3	76.6	439.6
Min Qi	3097.7	1716.1	194.5	283.3	936.5	43.3	76.6	439.6
Avg Qi	8076.2	2859.2	443.3	794.9	1388.8	58.3	109.3	641.4
Max Qi	12001.6	4207.3	712.7	1608.2	2087.8	76.2	134.2	835.7
	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
Stream 00	213.7	1176.5	333.3	99.9	1211.1	124.0	133.0	187.8
Stream 01	241.4	10604.2	760.9	191.7	6364.6	177.6	95.9	183.4
Stream 02	492.3	17086.9	1154.4	165.2	2944.5	197.5	105.0	196.4
Stream 03	292.5	9928.8	862.9	174.2	4974.2	193.9	100.0	218.1
Stream 04	256.8	14804.9	687.6	173.0	7273.9	384.6	100.1	210.7
Stream 05	250.5	16994.9	909.0	183.8	6475.9	262.1	103.6	215.8
Stream 06	302.1	15029.5	608.6	166.8	2632.2	204.4	99.2	188.7
Stream 07	270.5	11598.5	669.8	179.6	3941.2	199.5	98.4	205.7
Min Qi	241.4	9928.8	608.6	165.2	2632.2	177.6	95.9	183.4
Avg Qi	300.9	13721.1	807.6	176.3	4943.8	231.4	100.3	202.7
Max Qi	492.3	17086.9	1154.4	191.7	7273.9	384.6	105.0	218.1