

IBM @server p5 575 with DB2 UDB 8.2

TPC-H Rev. 2.1.0

Report Date: May 20, 2005

Total System Cost

Composite Query per Hour Rating

Price/Performance

6,367,595 USD

104,100.1
QphH@10000GB

61 USD
Price/QphH@10000GB

Database Size

Database Manager

Operating System

Other Software

Availability Date

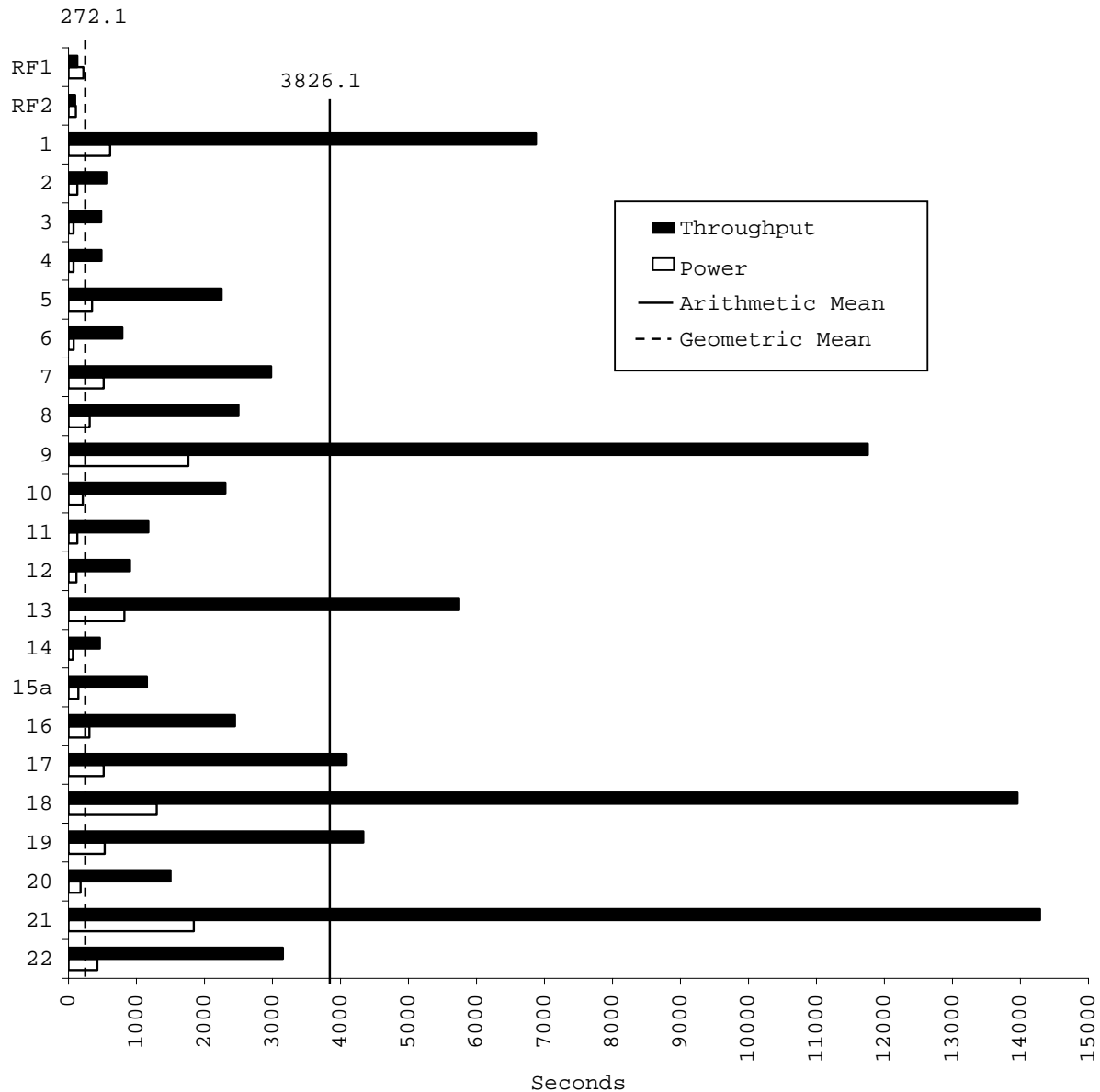
10000GB

DB2 UDB 8.2

AIX 5L V5.3

None

August 15, 2005



Database Load Time: 6:35:14

Load included backup: N

Total Data Storage/Database Size: 6.65

RAID (base tables): Y

RAID (Base Tables and Auxiliary Data Structures): Y

RAID (All): N

System Configurations

8 IBM @server p5 575 servers, each server with

Processors 8 x 1900MHz POWER5 with 8 x 36MB L3 Cache

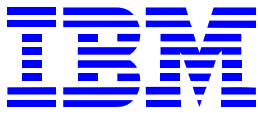
Memory 128GB

Disk Controllers 12 x 2Gigabit Fibre Channel PCI-X Adapter & 3 x IBM TotalStorage DS4500 dual controllers

Disk Drives 240 x 36.4GB 15K 2Gb FC drives ; 2 x 73.4GB 15K Ultra4 SCSI drives, with 4 additional on server1

Network 2 Integrated dual Gigabit Ethernet

Total Disk Storage 66,455.18 GB (GB is defined as 1024 * 1024 * 1024 bytes)

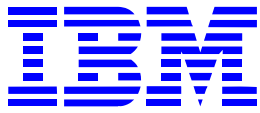


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Description	Part No.	Source	Unit Price	Qty	Ext Price	Maint Price
Server Hardware						
Server 9118 Model 575	9118-575	1	4,565	8	36,520	42,720
RIO-2(Remote I/O-2)Cbl, 1.2M	3146	1	420	16	6,720	
73.4 GB 10,000 RPM Ultra320 SCSI Disk Drive	3274	1	900	20	18,000	
Pwr.Cbl.Grp, 09U(or 09U Lft)	3800	1	75	8	600	
8192MB (4x2048MB) DIMMs, 208-pin, 8NS	4454	1	17,695	128	2,264,960	
2 Gigabit Fibre Channel PCI-X Adapter	5716	1	2,720	96	261,120	
System Rack	5793	1	10,000	2	20,000	16,800
I/O Drawer, 20 Slots, 8 Disk Bays	5794	1	30,000	8	240,000	31,680
Bulk Power Regulator	6186	1	4,000	12	48,000	
Slim Line Doors	6251	1	6,000	2	12,000	
Weight Distribution Plate	6855	1	750	2	1,500	
I/O Assembly with PCI-X and RIO-2 capability	7210	1	4,300	8	34,400	
Ethernet Cable, 15M, HMC Console to System	7802	1	31	2	62	
Bulk Power Controller Assembly	7803	1	4,000	4	16,000	
8-Way 1.9GHz POWER5 Processor, 288 MB L3	7836	1	40,000	8	320,000	70,656
Bulk Power Distribution Assembly	7837	1	2,500	4	10,000	
Power Cables, 4x, 05U	7854	1	650	8	5,200	
Ethernet Cables, Node to Hubs, EIA01 through EIA17	7920	1	100	8	800	
RIO-2(Remote I/O-2)Cbl, 0.6M	7924	1	300	8	2,400	
Line Cord, 6AWG/Type W, 14ft, IEC309 60A	8688	1	1,500	4	6,000	
HMC 1:7310-C03 Desktop Hardw.Mgmt.Console	7310-C03	1	1,830	1	1,830	1,152
IBM ThinkVision C170 17-inch Color Monitor	3631	1	250	1	250	
10/100 Mbps Ethernet PCI Adapter II	4962	1	412	1	412	
Power Cord (6-foot), To Wall (125V, 15A),	6470	1	14	2	28	
Ethernet Cable, 6M, Hardware Management	7801	1	12	1	12	
			Subtotal		3,306,814	163,008
Storage						
DS4500 Disk System	1742-90U	1	49,900	24	1,197,600	
DS4000 EXP710 Storage Expansion	1740-710	1	6,000	144	864,000	
2Gb FC, 36.4GB/15K Drive	5212	1	1,115	1,920	2,140,800	
Short Wave SFP	2210	1	499	672	335,328	
Fiber Cable 25m	5625	1	189	96	18,144	
Fiber Cable 1m	5601	1	79	288	22,752	
2Gb Mini HUB	3507	1	899	96	86,304	
NetBay42 Standard Rack	9307-4SX	1	1,489	14	20,846	4,200
3 Year Warranty Service Upgrade 1740-1RU 24x7x4	1740-710W24	1	760	144		109,440
3 Year Warranty Service Upgrade 1742-90U 24x7x4	1742-90UW24	1	1,087	24		26,088
			Subtotal		4,685,774	139,728



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Server Software

AIX 5.3 (media only)	5962-A5L	1	50	1	50	
AIX Software	5765-G03	1	1,225	64	78,400	
AIX Software Maintenance (1Y)	5771-496	1	725	192		139,200
AIX Software Maintenance 24x7 Upgrade (1Y)	5771-498	1	183	192		35,136
HMC Software Support 1 Year	5771-612	1	250	3		750
HMC Software Support 24x7 1 Year	5771-614	1	87	3		261
C for AIX user Lic+SW maint 12 MO	D5A1DLL	1	515	1	515	
C for AIX user annual SW maint renewal	E1A1FLL	1	103	2		206
DB2 UDB ESE License/1-yr. Maint.		1	22,608	64	1,446,912	
DB2 UDB ESE Support 1Yr/Proc		1	1,077	128		137,856
DB2 UDB ESE DPF License/1-yr. Maint.		1	6,791	64	434,624	
DB2 UDB ESE DPF Support 1Yr/Proc		1	323	128		41,344
			Subtotal		1,960,501	354,753

Third Party Hardware/Software

SMC 16 Port 10/100/1000 Layer 2 Gigabit Switch	587912	2	312	4	1,248	
			Subtotal		1,248	

Total 9,954,337 657,489

IBM Total System Discounts* -4,244,231

Three-Year Cost of Ownership 6,367,595

QphH 104,100.1

\$/QphH 61

*Discounts are based on US list prices for similar quantities & configurations

Pricing Sources:

1 IBM: Bill Casey, eServer pSeries Offering Manager, wr Casey@us.ibm.com, 1-512-838-1422

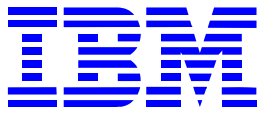
1 IBM DB2: Bernard Spang, Director, Database Market Management, spang@us.ibm.com, 1-914-766-1491

2: CDW.COM

Audited by: Francois Raab of Infosizing (www.infosizing.com)

The system as configured for the test will be available August 15, 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 the stated prices are not available according to these terms, please notify the TPC at pricing@tpc.org. Thank You.



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Numerical Quantities Summary

Measurement Results

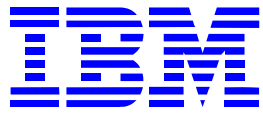
Database Scaling (SF/Size)	=	10000
Total Data Storage/Database Size	=	6.65
Start of Database Load	=	5/11/2005 2:58:04
End of Database Load	=	5/11/2005 9:33:18
Database Load Time	=	6:35:14
Query Streams for Throughput Test	=	9
TPC-H Power Metric (QppH@10000GB)	=	132,295.0
TPC-H Throughput Metric (QthH@10000GB)	=	81,914.1
Composite Query-per-Hour Rating (QphH@10000GB)	=	104,100.1
Total System Price over 3 years	=	6,367,595 USD
TPC-H Price/Performance Metric (\$/QphH@10000GB)	=	61 USD

Measurement Intervals

Measurement Interval in Throughput Test (Ts) = 87,018 seconds

Duration of Stream Execution

Date and Time Stamps								Duration
Stream Id	Seed Used	Query		RF1 Start		RF2 Start		Queries
		Query End	RF1 End	RF1 End	RF2 End	RF2 End	RFs	
00	511093318	5/ 11/ 2005	15:10:35	5/ 11/ 2005	15:06:57	5/ 11/ 2005	18:05:13	2:54:38
		5/ 11/ 2005	18:05:13	5/ 11/ 2005	15:10:35	5/ 11/ 2005	18:07:03	0:05:28
01	511093319	5/ 11/ 2005	18:07:28	5/ 12/ 2005	17:43:48	5/ 12/ 2005	17:46:35	23:25:28
		5/ 12/ 2005	17:32:56	5/ 12/ 2005	17:46:35	5/ 12/ 2005	17:48:04	0:04:16
02	511093320	5/ 11/ 2005	18:07:28	5/ 12/ 2005	17:48:04	5/ 12/ 2005	17:50:12	23:06:34
		5/ 12/ 2005	17:14:02	5/ 12/ 2005	17:50:12	5/ 12/ 2005	17:51:44	0:03:40
03	511093321	5/ 11/ 2005	18:07:28	5/ 12/ 2005	17:51:44	5/ 12/ 2005	17:53:51	23:33:42
		5/ 12/ 2005	17:41:10	5/ 12/ 2005	17:53:51	5/ 12/ 2005	17:55:24	0:03:40
04	511093322	5/ 11/ 2005	18:07:28	5/ 12/ 2005	17:55:24	5/ 12/ 2005	17:57:32	23:29:58
		5/ 12/ 2005	17:37:27	5/ 12/ 2005	17:57:32	5/ 12/ 2005	17:59:16	0:03:52
05	511093323	5/ 11/ 2005	18:07:28	5/ 12/ 2005	17:59:16	5/ 12/ 2005	18:01:28	23:23:50
		5/ 12/ 2005	17:31:18	5/ 12/ 2005	18:01:28	5/ 12/ 2005	18:03:01	0:03:45
06	511093324	5/ 11/ 2005	18:07:28	5/ 12/ 2005	18:03:01	5/ 12/ 2005	18:05:09	23:36:20
		5/ 12/ 2005	17:43:48	5/ 12/ 2005	18:05:09	5/ 12/ 2005	18:06:43	0:03:42
07	511093325	5/ 11/ 2005	18:07:28	5/ 12/ 2005	18:06:43	5/ 12/ 2005	18:08:43	23:03:58
		5/ 12/ 2005	17:11:26	5/ 12/ 2005	18:08:43	5/ 12/ 2005	18:10:23	0:03:40
08	511093326	5/ 11/ 2005	18:07:28	5/ 12/ 2005	18:10:23	5/ 12/ 2005	18:12:25	23:13:27
		5/ 12/ 2005	17:20:55	5/ 12/ 2005	18:12:25	5/ 12/ 2005	18:14:08	0:03:45
09	511093327	5/ 11/ 2005	18:07:28	5/ 12/ 2005	18:14:08	5/ 12/ 2005	18:16:11	23:32:44
		5/ 12/ 2005	17:40:13	5/ 12/ 2005	18:16:11	5/ 12/ 2005	18:17:46	0:03:38



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Timing Interval (in seconds)

Stream ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Stream 0	612.3	127.3	71.6	73.1	346.5	76.8	515.9	312.1	1761.5	210.5	128.5	116.4
Stream 01	7126.5	577.7	574.4	255.2	2222.4	2936.4	2648.0	2342.4	11364.4	1600.8	1142.0	966.7
Stream 02	6769.0	685.8	581.9	597.5	1980.9	667.2	2782.6	2584.3	12347.1	1583.8	1030.8	912.6
Stream 03	7093.3	377.0	164.7	548.2	2113.3	432.6	2840.9	2529.8	11313.8	1536.0	2136.4	418.1
Stream 04	7262.0	484.8	331.6	504.9	2760.4	540.6	3083.2	2335.5	11765.1	2557.8	1152.3	1077.2
Stream 05	6603.8	479.2	483.9	554.4	2199.2	397.9	3157.5	2461.1	12866.3	1751.4	1099.2	1078.4
Stream 06	6686.8	801.6	589.1	539.5	2092.2	735.1	2945.6	2615.1	13563.4	1679.9	1059.0	855.6
Stream 07	7228.3	471.1	541.9	448.5	2207.7	498.8	3033.8	2284.8	11237.4	1813.6	1056.2	908.1
Stream 08	6616.6	490.5	484.8	459.2	2580.6	401.3	3422.9	2811.3	10679.5	1598.8	726.7	939.7
Stream 09	6473.0	650.1	550.4	453.5	2104.0	487.7	2911.4	2532.5	10664.2	6622.3	1142.2	989.0
Minimum	6473.0	377.0	164.7	255.2	1980.9	397.9	2648.0	2284.8	10664.2	1536.0	726.7	418.1
Average	6873.3	557.5	478.1	484.5	2251.2	788.6	2980.7	2499.6	11755.7	2304.9	1171.6	905.0
Maximum	7262.0	801.6	589.1	597.5	2760.4	2936.4	3422.9	2811.3	13563.4	6622.3	2136.4	1078.4
Stream ID	Q13	Q14	Q15a	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
Stream 0	823.7	65.0	146.1	306.1	515.1	1297.2	530.7	177.5	1842.4	421.4	218.2	109.8
Stream 01	5204.2	445.1	1119.9	2549.2	3410.7	14107.5	4123.3	1573.0	14644.8	3393.2	166.8	88.6
Stream 02	5653.4	461.2	1112.5	2499.3	4087.3	12709.9	4669.1	1704.0	14965.8	2807.9	128.3	91.5
Stream 03	6567.0	455.0	977.2	2204.8	5470.3	14268.6	4249.0	1551.4	14990.8	2584.2	127.2	93.1
Stream 04	6380.7	538.2	1303.7	2536.4	4480.7	12925.7	4852.8	641.2	14119.5	2963.9	127.7	103.9
Stream 05	5508.8	447.3	1141.4	2931.8	4106.6	13143.5	4779.5	1579.6	14528.4	2930.9	132.6	92.9
Stream 06	5626.7	432.9	1179.0	2385.3	3919.1	17616.1	4064.2	1689.3	11021.4	2883.0	127.5	94.4
Stream 07	5729.5	429.5	1255.1	2926.8	3744.9	12908.5	4308.2	1366.0	15325.4	3313.8	120.5	99.4
Stream 08	5217.6	427.5	1185.3	2505.5	3623.2	14941.4	4229.2	1692.4	13977.1	4595.5	122.3	102.7
Stream 09	5810.4	493.2	1107.3	1486.2	3972.1	12970.7	3722.8	1714.6	14987.2	2919.3	123.4	94.6
Minimum	5204.2	427.5	977.2	1486.2	3410.7	12709.9	3722.8	641.2	11021.4	2584.2	120.5	88.6
Average	5744.3	458.9	1153.5	2447.3	4090.5	13954.7	4333.1	1501.3	14284.5	3154.6	130.7	95.7
Maximum	6567.0	538.2	1303.7	2931.8	5470.3	17616.1	4852.8	1714.6	15325.4	4595.5	166.8	103.9