

IBM @server p655 with DB2 UDB 8.1

TPC-H Rev. 2.1.0

Report Date: Dec. 8, 2003

Total System Cost

Composite Query per Hour Rating

Price/Performance

\$1,403,446

20,221.0
QphH@1000GB

69
\$/QphH@1000GB

Database Size

Database Manager

Operating System

Other Software

Availability Date

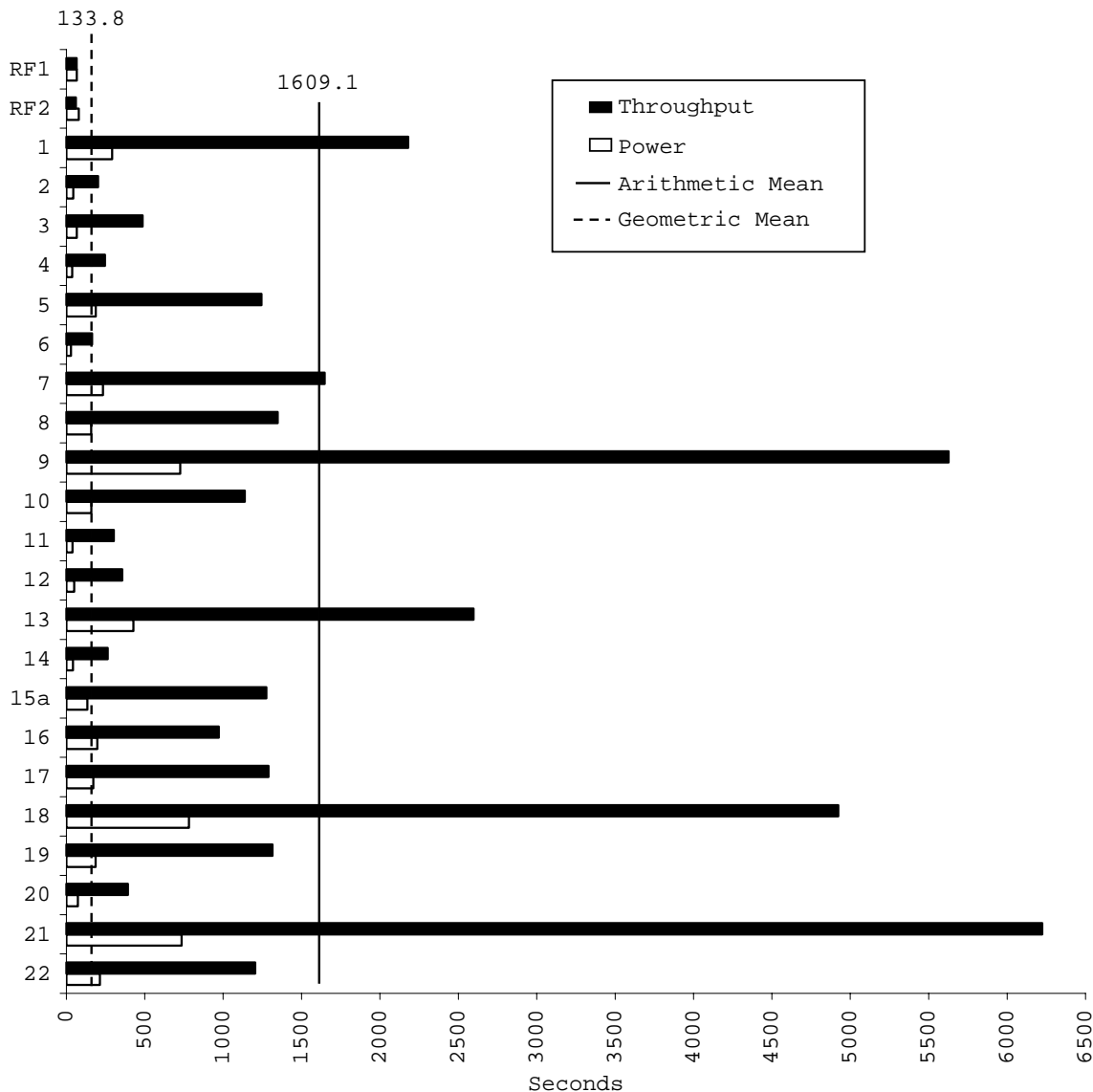
1000GB

DB2 UDB 8.1

AIX 5L V5.2

none

June 8, 2004



Database Load Time: 3:56:39

Load included backup: N

Total Data Storage/Database Size: 7.01

RAID (base tables): N

RAID (Base Tables and Auxiliary Data Structures): N

RAID (All): Y

System Configuration

4 IBM @server p655 servers, each server with

Processors 4 x 1700MHz POWER4+ with 128MB L3 Cache

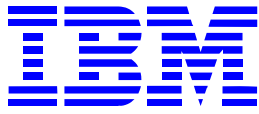
Memory 32GB

Disk Controllers 8 x 2 Gigabit Fibre Channel PCI-X Adapter

Disk Drives 48x 36.4GB 15K 2Gb FC drives – 2x 36.4 GB 10K Ultra3 SCSI drivers with 2 additional on node1

Network 1 IBM Gigabit Ethernet-SX PCI-X Adapter

Total Disk Storage 7,012.18GB (GB is defined as 1024 * 1024 * 1024 bytes)



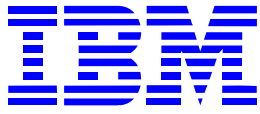
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Part Number	Description	Source	Unit Price	Qty	Ext Price	3 Yr Maint.
Server Hardware						
7039-651pSeries 655 Model 651 CEC		1	9,440	4	37,760	7,968
3168 RIO-2 (Remote I/O-2) Cable, 2.5M		1	400	8	3,200	0
3273 36.4 GB 10,000 RPM Ultra3 SCSI Disk Drive Assembly		1	1,540	10	15,400	0
4458 16GB Memory Card		1	23,600	8	188,800	0
5518 4-Way 1.7GHz POWER4+ Processor, 128MB L3 Cache and Syster		1	19,755	4	79,020	15,552
3800 Power Cable Group, Left, Drawer Position #4609		1	75	2	150	0
3800 Power Cable Group, Left, Drawer Position #4619		1	75	2	150	0
5700 IBM Gigabit Ethernet-SX PCI-X Adapter		1	1,700	4	6,800	0
6199 DC Power Converter Assembly, CEC		1	3,500	4	14,000	0
6430 Pluggable Service Processor		1	5,000	4	20,000	0
6569 ULTRA320 SCSI Backplane, two position		1	350	4	1,400	0
6591 Dual CEC side by side Mounting Enclosure		1	450	4	1,800	0
8121 Attachment Cable, Hardware Management Console to Host, 15-Me		1	75	4	300	0
7040-61D I/O Drawer 1:Model 61D I/O Drawer		1	3,980	4	15,920	16,320
2456 LC-SC 50 Micron Fibre Converter Cable		1	100	4	400	0
3146 RIO-2 (Remote I/O-2) Cable, 1.2M		1	500	12	6,000	0
3801 Power Cable Group, Left, Drawer Position #4605		1	75	1	75	0
3811 Power Cable Group, Right, Drawer Position #4605		1	75	1	75	0
3802 Power Cable Group, Left, Drawer Position #4605		1	75	1	75	0
3812 Power Cable Group, Right, Drawer Position #4605		1	75	1	75	0
3805 Power Cable Group, Left, Drawer Position #4627		1	75	1	75	0
3815 Power Cable Group, Right, Drawer Position #4627		1	75	1	75	0
3804 Power Cable Group, Left, Drawer Position #4623		1	75	1	75	0
3814 Power Cable Group, Right, Drawer Position #4623		1	75	1	75	0
6172 Power Converter Assembly, I/O Drawer		1	4,000	8	32,000	0
6239 2 Gigabit Fibre Channel PCI-X Adapter		1	3,100	32	99,200	0
6564 Ultra3 SCSI 4-Pack Hot Swap Back Plane		1	500	16	8,000	0
6571 I/O Drawer PCI-X Planar, 10 Slot, 2 Integrated Ultra3 SCSI Ports		1	8,000	8	64,000	0
7040-W42MODEL W42 RACK		1	2,000	1	2,000	8,400
6076 Front Door, Black with Copper Accent, Primary Rack		1	3,000	1	3,000	0
6078 Rear Door, Slim Line, Primary Rack		1	750	1	750	0
6186 Bulk Power Regulator		1	4,000	6	24,000	0
6187 Power Controller, Four Cooling Fans, Three DC Power Converter C		1	1,900	2	3,800	0
6188 Power Distribution Assembly		1	3,500	2	7,000	0
8123 Attachment Cables, Hardware Management Console to 7040-W42,		1	275	1	275	0
8688 Line Cord, 6AWG/Type W, 14ft, IEC309 60A Plug		1	1,500	2	3,000	0
8690 Bulk Power Assembly, Redundant		1	5,000	1	5,000	0
7315-C02 Hardware Management Console, mouse, keyboard, monitor, cable:		1	5,586	1	5,586	696
Server Subtotal					649,311	48,936
Storage						
7014-T42 System Rack Model T42 (6081,6098)		1	3,970	2	7,940	1,776
7176 Additional Power Distribution Unit		1	1,200	6	7,200	0
1740-1RU IBM FAStT EXP700 Expansion Unit		1	6,000	16	96,000	23,040
2210 (19K1271) 2Gb Fibre Channel Short Wave GBIC		1	499	32	15,968	0
5212 (06P5772) 2Gb FC, 36.4GB/15K Drive		1	1,115	192	214,080	0
1742-90U TotalStorage FAStT900 Storage Server		1	66,500	8	532,000	16,480
2210 (19K1271) 2 Gbps Fibre Channel Short Wave GBIC		1	499	64	31,936	0
3507 (19K1269) FAStT 2 Gbps miniHUB (LC)		1	899	32	28,768	0
5605 (19K1248) Fiber Cable 5m Multimode (LC-LC)		1	129	32	4,128	0
5702 (19K1250) LC-SC Fibre Channel Adapter Cable		1	199	32	6,368	0
DASD Storage Subtotal					929,248	41,296
RACK Hardware Subtotal					15,140	



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Software

5765-E62 AIX 5.2 (Media only)	1	50	1	50	
5771-SPTAIX SW SUPPORT 1YR	1	708	48	0	33,984
5771-SUBAIX SW SUB 1YR	1	200	48	9,600	0
5631-SB1 HMC Software SUB	1	275	3	825	0
5631-ST1 HMC Software Support	1	525	3	0	1,575
D5A1DLL AIX C Compiler (E1A1FLL)	1	539	1	539	104
D518GLL DB2 UDB ESE License/1-yr. Maint.	1	20,451	16	327,216	
E00BILL DB2 UDB ESE Support 1Yr/Proc	1	974	32		31,168
D518JLL DB2 UDB ESE DPF License/1-yr. Maint.	1	6,143	16	98,288	
E00BJLL DB2 UDB ESE DPF Support 1Yr/Proc	1	293	32		9,376
Software Subtotal				436,518	76,207

Third Party Hardware

CDW48656 CISCO SFP GLC-SX-MM	2	399	4	1,596	0
CDW15192 Cisco SMARTnet Onsite 1 Year 24x7 4 Hour	2	1,300	3		3,900
CDW52826 Cisco Catalyst 3750G-12S (WS-C3750G-12S-S)	2	5,867	1	5,867	0
Third Party Hardware Subtotal				7,463	3,900

Subtotal

2,037,680 170,339

Total

2,208,019

Discounts

All IBM hardware & AIX one time volume Discount	47%	(754,215)
Storage Service Discount	40%	(16,518)
Server Service Discount	40%	(33,840)

Total

(804,573) 1,403,446

Notes (Source):

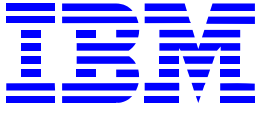
	3 Year Cost of Ownership	\$	1,403,446
1. IBM	QphH @ 1000 GB		20,221
2. CDW.com web pricing	\$/QphH @ 1000 GB	\$	69.41

For assistance with any of these prices or their applicability to any customer's requirements, please contact one of the following:
 Frederick C. Bothwell, eServer pSeries Offering Manager, email: fbothwell@us.ibm.com, phone 1-512-838-6594
 Paul Rivot, Director Database Servers and Business Intelligence Software, email: pivot@us.ibm.com, phone 1-914-766-1325

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

The system as configured for the test will be available June 8, 2004

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:

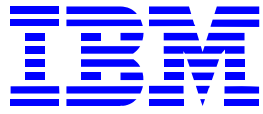
Database Scaling (SF/Size)	=	1000
Total Data Storage/Database Size	=	7.01
Start of Database Load	=	11/23/2003 15:51:08
End of Database Load	=	11/23/2003 19:47:47
Database Load Time	=	3:56:39
Query Streams for Throughput Test	=	7
TPC-H Power Metric (QppH@1000GB)	=	26,905.9
TPC-H Throughput Metric (QthH@1000GB)	=	15,197.1
Composite Query-per-Hour Rating (QphH@1000GB)	=	20,221.0
Total System Price over 3 years	=	\$1,403,446
TPC-H Price/Performance Metric (\$/QphH@1000GB)	=	69

Measurement Intervals

Measurement Interval in Throughput Test (Ts) = 36,481 seconds

Duration of Stream Execution

Stream Id	Seed Used	Start Date & Time	End Date & Time	Duration
Stream 00	1123194747	11/24/2003 09:37:06	11/24/2003 11:01:20	1:24:14
Stream 01	1123194748	11/24/2003 11:02:58	11/24/2003 20:56:07	9:53:09
Stream 02	1123194749	11/24/2003 11:02:58	11/24/2003 20:48:10	9:45:13
Stream 03	1123194750	11/24/2003 11:02:58	11/24/2003 20:53:51	9:50:53
Stream 04	1123194751	11/24/2003 11:02:58	11/24/2003 20:53:12	9:50:14
Stream 05	1123194752	11/24/2003 11:02:58	11/24/2003 20:51:17	9:48:19
Stream 06	1123194753	11/24/2003 11:02:58	11/24/2003 20:52:02	9:49:04
Stream 07	1123194754	11/24/2003 11:02:59	11/24/2003 20:56:17	9:53:18
Refresh		11/24/2003 11:02:59	11/24/2003 21:10:59	10:08:01



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Timing Intervals (in Seconds)

Stream ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Stream 0	292.0	43.4	66.7	37.8	187.6	29.6	233.4	158.5	726.1	159.2	39.1	49.6
Stream 01	1888.3	244.1	500.6	76.6	1159.3	156.0	1802.7	1795.7	5484.4	1070.9	296.9	446.1
Stream 02	2174.2	197.3	558.6	254.7	1375.4	213.5	1540.9	1370.9	5157.3	1115.8	326.9	431.2
Stream 03	1976.6	221.2	304.7	244.3	1161.8	144.6	1569.9	1399.7	5723.5	1140.5	319.7	343.7
Stream 04	2296.6	129.8	477.7	282.8	1362.3	166.4	1749.3	1291.5	5938.6	1124.1	312.6	414.9
Stream 05	2225.1	150.4	544.6	293.1	1247.0	168.4	1582.5	1235.5	5618.8	1090.5	264.2	374.0
Stream 06	2104.7	299.4	530.4	284.8	1229.5	143.7	1667.8	1109.5	5686.3	1160.3	314.3	384.8
Stream 07	2593.5	174.2	493.3	288.2	1175.7	156.4	1616.2	1237.1	5782.9	1260.9	289.1	99.1
Minimum	1888.3	129.8	304.7	76.6	1159.3	143.7	1540.9	1109.5	5157.3	1070.9	264.2	99.1
Average	2179.9	202.3	487.1	246.4	1244.4	164.1	1647.0	1348.6	5627.4	1137.6	303.4	356.3
Maximum	2593.5	299.4	558.6	293.1	1375.4	213.5	1802.7	1795.7	5938.6	1260.9	326.9	446.1
Stream ID	Q13	Q14	Q15a	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
Stream 0	428.1	42.3	134.1	197.5	171.9	782.0	186.6	73.3	735.1	214.0	66.7	79.0
Stream 01	2607.7	270.5	1311.1	1039.2	1391.0	4948.0	1263.6	387.0	6254.0	1195.0	66.5	58.3
Stream 02	2672.2	273.3	1281.0	883.4	1274.2	4635.5	1286.1	397.5	6469.0	1223.6	52.4	62.9
Stream 03	2778.3	286.1	1347.2	1164.1	1297.2	5107.7	1300.9	486.7	5902.7	1231.6	53.3	61.2
Stream 04	2601.5	270.0	1368.7	954.6	1271.4	4695.6	1405.6	221.6	5965.1	1112.7	54.7	61.1
Stream 05	2598.4	215.4	1330.9	920.8	1238.6	4967.9	1304.7	451.1	6264.9	1211.8	77.9	65.4
Stream 06	2533.5	248.7	1349.6	887.7	1016.8	5180.5	1202.0	423.3	6391.9	1194.0	69.5	55.6
Stream 07	2384.8	285.9	939.9	954.8	1536.1	4931.7	1439.6	377.0	6322.5	1258.9	82.8	61.2
Minimum	2384.8	215.4	939.9	883.4	1016.8	4635.5	1202.0	221.6	5902.7	1112.7	52.4	55.6
Average	2596.6	264.3	1275.5	972.1	1289.3	4923.8	1314.6	392.0	6224.3	1203.9	65.3	60.8
Maximum	2778.3	286.1	1368.7	1164.1	1536.1	5180.5	1439.6	486.7	6469.0	1258.9	82.8	65.4