

**IBM @server p5 595
with Oracle Database 10g Enterprise
Edition, Release 2**

TPC-H Rev. 2.3.0

Report Date:
September 19, 2005

Total System Cost

Composite Query per Hour Rating

Price/Performance

5,358,874 USD

100,512.3
QphH@3000GB

53 USD
Price/QphH@3000GB

Database Size

Database Manager

Operating System

Other Soft-

Availability Date

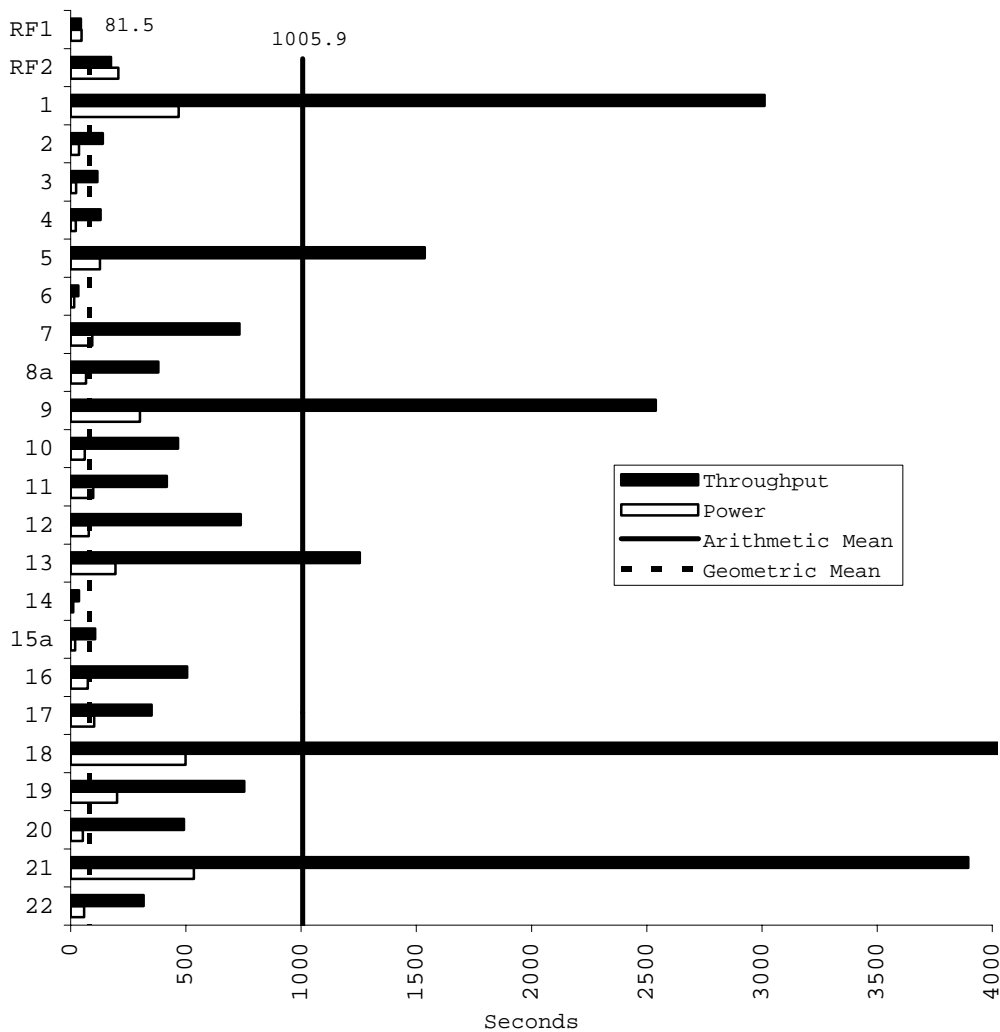
3000GB

Oracle Database 10g Enterprise
Edition, Release 2 with Partitioning

AIX 5L V5.3

None

March 1, 2006



Database Load Time: 4:06:30

Load included backup: N

Total Data Storage/Database Size: 12.861

RAID (base tables): Y

RAID (Base Tables and Auxiliary Data Structures): Y

RAID (All): Y

System Configurations

1 IBM @server p5 595 server with

- Processors** 64 x 1900MHz POWER5 processors on 32 chips, 64 cores, 128 threads, with 32 x 36MB L3 Cache
- Memory** 256GB
- Disk Controllers** 96 x 2Gigabit Fibre Channel PCI-X Adapter & 24 x IBM TotalStorage DS4500 dual controllers
- Disk Drives** 1,152 x 36.4GB 15K 2Gb FC drives ; 4 x 36.4GB 15K Ultra4 SCSI drives
- Network**
- Total Disk Storage** 38,583.5 GB (GB is defined as 1024 * 1024 * 1024 bytes)

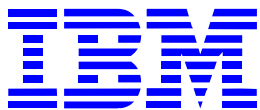


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Description	Part No.	Source	Unit Price	Qty	Ext Price	Maint Price
Server Hardware						
Server 1:- p5 595	9119-595	1	92,000	1	92,000	63,000
RIO-2 (Remote I/O-2) Cable, 3.5M	3147	1	660	8	5,280	
RIO-2(Remote I/O-2)Cbl, 8.0M	3170	1	800	24	19,200	
36.4 GB 15,000 RPM Ultra320 SCSI Disk Drive	3277	1	2,125	4	8,500	
IBM 10/100/1000 Base-TX Ethernet PCI-X Adapter	5701	1	1,280	1	1,280	
PCI-X Dual Ultra320 SCSI by Adaptec, Inc.	5710	1	790	1	790	
2 Gigabit Fibre Channel PCI-X Adapter	5716	1	2,720	96	261,120	
Expansion Rack, Powered	5792	1	60,000	1	60,000	3,960
I/O Drawer, 20 Slots, 8 Disk Bays	5794	1	30,000	8	240,000	32,640
I/O Drw.Cbl.Grp, Prim.Rck/5U	6122	1	400	1	400	
I/O Drw.Cbl.Grp, Prim.Rck/1U	6123	1	400	1	400	
Bulk Power Regulator	6186	1	4,000	10	40,000	
Slim Line Doors, System and #5792 Racks	6251	1	6,000	2	12,000	
Ethernet Cable, 15M, HMC to System Unit	7802	1	31	3	93	
Power Controller Assembly	7803	1	4,000	4	16,000	
Cooling Group, 2-4 Processor Books	7807	1	4,000	1	4,000	
DC Power Converter, Processor Book	7809	1	6,000	12	72,000	
Processor Clock Card, Programmable	7810	1	575	2	1,150	
System Service Processor	7811	1	3,500	2	7,000	
Multiplexer Card	7812	1	2,200	4	8,800	
16-Way POWER5 Turbo Processor, 0-Way Active	7813	1	127,000	4	508,000	68,640
Activation, #7813 Processor, One Processor	7815	1	32,000	64	2,048,000	506,880
Remote I/O-2 (RIO-2) Loop Adapter, Two Port	7818	1	3,400	16	54,400	
Pwr.Cbl.Grp, CEC Primary Fans	7821	1	650	1	650	
Pwr.Cbl.Grp, 1st CEC Book	7822	1	650	1	650	
Pwr.Cbl.Grp, 2nd CEC Book	7823	1	650	1	650	
Pwr.Cbl.Grp, 3rd CEC Book	7824	1	650	1	650	
Pwr.Cbl.Grp, 4th CEC Book	7825	1	650	1	650	
Pwr.Cbl.Grp, 7807 Cooling Grp.	7826	1	650	1	650	
Power Distribution Assembly	7837	1	2,500	6	15,000	
I/O Drw.Cbl.Grp, 5792 Rck/1U	7853	1	650	1	650	
I/O Drw.Cbl.Grp, 5792 Rck/5U	7854	1	650	1	650	
I/O Drw.Cbl.Grp, 5792 Rck/9U	7855	1	650	1	650	
I/O Drw.Cbl.Grp, Rck/19U	7857	1	400	1	400	
I/O Drw.Cbl.Grp, Rck/23U	7858	1	400	1	400	
I/O Drw.Cbl.Grp, Rck/23U	7859	1	400	1	400	
256GB DDR1 Memory (32 X 8GB Cards)	8195	1	786,432	1	786,432	
Line Cord, 6AWG, 14ft, IEC309 100A Plug	8686	1	2,000	4	8,000	
IBM DVD RAM Drive	7210-025	1	1,400	1	1,400	360
HMC 1:7310-C04 Desktop Hardw.Mgmt.Console	7310-C04	1	1,830	1	1,830	960
10/100 Mbps Ethernet PCI Adapter II	4962	1	412	1	412	
IBM ThinkVision C170 17-inch Color Monitor	3631	1	250	1	250	
Ethernet Cable,6M, HMC to System Unit	7801	1	12	1	12	
Keyboard	8800	1	83	1	83	
Mouse	8841	1	62	1	62	
Power Cable	6470	1	14	1	14	
Subtotal					4,280,958	676,440



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Storage

DS4500 Disk System	1742-90U	1	49,900	24	1,197,600	
DS4500 AIX Host Kit	7111	1	4,000	1	4,000	
DS4000 EXP710 Storage Expansion	1740-710	1	6,000	96	576,000	
2Gb FC, 36.4GB/15K Drive	5212	1	1,115	1,152	1,284,480	
Short Wave SFP	2210	1	499	480	239,520	
Fiber Cable 25m	5625	1	189	96	18,144	
Fiber Cable 1m	5601	1	79	192	15,168	
2Gb Mini HUB	3507	1	899	96	86,304	
IBM S2 42U Standard Rack	93074SX	1	1,489	10	14,890	
3-Year 24x7x4 ServicePac for (Rack)	41L2760	1	300	10		3,000
1740-710 24x7x4 WSU	6942-25B	1	760	96		72,960
1742-90U 24x7x4 WSU	6942-25B	1	1,087	24		26,088

Subtotal 3,436,106 102,048

Server Software

AIX 5.3 (media only)	5692-A5L	1	50	1	50	
AIX Software per Processor	5765-G03	1	2,495	64	159,680	
Software Maintenance for AIX, 3 Year	5773-SM3	1	NC	1		
AIX Software Maintenance (3Y per CPU)	0474	1	2,836	64		181,504
AIX Software Maintenance 24x7 Upgrade (3Y Per CPU)	0476	1	732	64		46,848
Virtual I/O Server SW Maintenance: 3 Yr	5773-VI3	1	NC			
Per Processor H5 VIO 3 Yr Maintenance	0781	1	155	64		9,920
Per Processor H5 VIO 3 Yr Maint 24x7 Support	0782	1	64	64		4,096
PLM Per processor 3 Yr SW Maint 24x7 Support†	5773-PL3	1	NC			
5773-PL3 SW MAINT 3Y Reg H5	0779	1	35	64		2,240
Per processor 3 Yr SW Maint 24x7 Support H5	0780	1	14	64		896
HMC Initial Software Support 3 Year	5773-RS3	1	NC			
Per Processor Software Support 3 Year	0569	1	675	1		675
Per Processor 24x7 Software Support 3 Year	0570	1	236	1		236
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
Oracle Database 10g Enterprise Edition Release 2, Named User Plus for 3 years		2	10,000	48 ‡	480,000	
Oracle Partitioning, Named User Plus for 3 years		2	2,500	48 ‡	120,000	
Oracle Mandatory E-Business Discount		2			-121,200	
Oracle Database Server Support Package for 3 years		2	2,000	3		6,000

Subtotal 639,045 252,621

Total 8,356,109 1,031,109

IBM Total System Discounts† -4,028,344

Three-Year Cost of Ownership 5,358,874

QphH@3000 100,512.3

\$/QphH@3000 53

†Discounts are based on US list prices for similar quantities & configurations including pre-payment for maintenance

Pricing Sources:

1 IBM: Alysia E. Waller awaller@us.ibm.com (770-835-6612)

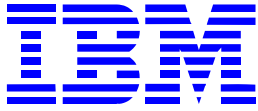
2 Oracle: MaryBeth Pierantoni, mary.beth.pierantoni@oracle.com (916-315-5081)

‡ 48 = 0.75 * 64. Explanation: For the purposes of counting the number of processors which require licensing, a multicore chip with "n" cores shall be determined by multiplying "n" cores by a factor of .75.

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

The system as configured for the test will be available March 1, 2006.

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 base 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)	=	3000
Total Data Storage/Database Size	=	12.861
Start of Database Load	=	9/6/2005 21:34:21
End of Database Load	=	9/7/2005 01:40:51
Database Load Time	=	4:06:30
Query Streams for Throughput Test	=	8
TPC-H Power Metric (QppH@3000GB)	=	132,598.2
TPC-H Throughput Metric (QthH@3000GB)	=	76,190.5
Composite Query-per-Hour Rating (QphH@3000GB)	=	100,512.3
Total System Price over 3 years	=	5,358,874 USD
TPC-H Price/Performance Metric (\$/QphH@3000GB)	=	53 USD

Measurement Intervals

Measurement Interval in Throughput Test (Ts) = 24,948 seconds

Duration of Stream Execution

Stream Id	Seed Used	Start Date & Time	End Date & Time	Duration
Stream 00	0907014051	9/7/2005 1:57:09	9/7/2005 2:53:36	0:56:27
Stream 01	0907014052	9/7/2005 2:53:50	9/7/2005 9:13:28	6:19:38
Stream 02	0907014053	9/7/2005 2:53:50	9/7/2005 9:04:16	6:10:26
Stream 03	0907014054	9/7/2005 2:53:50	9/7/2005 9:03:36	6:09:46
Stream 04	0907014055	9/7/2005 2:53:50	9/7/2005 8:39:02	5:45:12
Stream 05	0907014056	9/7/2005 2:53:50	9/7/2005 9:10:44	6:16:54
Stream 06	0907014057	9/7/2005 2:53:50	9/7/2005 9:00:45	6:06:55
Stream 07	0907014058	9/7/2005 2:53:50	9/7/2005 8:48:56	5:55:06
Stream 08	0907014059	9/7/2005 2:53:50	9/7/2005 9:20:30	6:26:40
Refresh		9/7/2005 9:20:30	9/7/2005 9:49:38	0:29:08
Throughput		9/7/2005 2:53:50	9/7/2005 9:49:38	6:55:48



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Timing Interval (in seconds)

Stream ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8a	Q9	Q10	Q11	Q12
Stream 0	467.9	36.0	23.7	22.1	126.3	15.0	93.8	66.4	299.9	60.1	97.1	78.5
Stream 01	1762.5	146.3	147.3	24.4	1483.6	44.4	563.5	385.1	2692.9	524.4	305.2	795.0
Stream 02	3385.9	122.6	175.8	158.5	1964.8	23.4	546.4	392.0	2608.9	479.4	595.3	774.4
Stream 03	3133.3	167.4	38.8	142.8	1862.6	25.6	675.7	405.3	2003.0	421.6	827.8	543.3
Stream 04	3316.8	102.0	130.2	167.2	614.2	69.0	698.7	339.7	2263.6	437.9	450.3	899.7
Stream 05	3388.9	138.4	84.1	123.6	1589.9	22.2	760.8	530.2	1555.3	543.0	302.7	778.6
Stream 06	2994.9	175.5	149.3	155.4	1585.5	24.4	744.6	367.2	2718.9	317.1	465.7	670.7
Stream 07	2318.8	102.2	101.4	126.3	1577.3	28.9	1269.6	340.0	3493.0	589.0	295.3	554.4
Stream 08	3789.8	158.4	103.1	134.0	1615.7	24.8	601.9	283.4	2976.2	409.8	94.8	892.5
Minimum	1762.5	102.0	38.8	24.4	614.2	22.2	546.4	283.4	1555.3	317.1	94.8	543.3
Average	3011.4	139.1	116.3	129.0	1536.7	32.8	732.6	380.4	2539.0	465.3	417.1	738.6
Maximum	3789.8	175.5	175.8	167.2	1964.8	69.0	1269.6	530.2	3493.0	589.0	827.8	899.7
Stream ID	Q13	Q14	Q15a	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
Stream 0	193.9	11.0	19.5	74.7	102.1	498.0	201.4	52.9	534.3	58.1	47.0	206.0
Stream 01	1545.9	29.7	139.7	518.4	426.4	4411.5	454.5	261.8	5684.6	430.9	43.0	88.6
Stream 02	904.1	30.4	95.2	553.2	730.0	3639.9	514.9	1011.5	3197.0	322.1	44.0	185.0
Stream 03	1072.8	21.4	91.5	441.2	269.3	4537.5	1080.6	529.2	3643.7	251.4	44.0	186.0
Stream 04	1563.2	25.7	98.8	456.1	224.0	4229.9	603.6	340.0	3310.3	371.4	44.0	188.0
Stream 05	1006.5	22.0	97.0	481.3	587.2	4371.2	455.0	325.4	5181.9	268.8	44.0	175.0
Stream 06	1409.8	49.1	109.1	568.9	172.6	5087.6	646.9	328.2	2960.5	313.6	43.0	143.0
Stream 07	1239.2	66.1	116.5	538.1	151.2	3033.2	635.7	915.9	3537.3	276.4	42.0	138.0
Stream 08	1289.3	41.7	102.5	487.3	250.9	4130.4	1635.4	223.7	3652.6	301.5	44.0	188.0
Minimum	904.1	21.4	91.5	441.2	151.2	3033.2	454.5	223.7	2960.5	251.4	42.0	88.6
Average	1253.8	35.8	106.3	505.5	351.4	4180.1	753.3	492.0	3896.0	317.0	43.5	161.5
Maximum	1563.2	66.1	139.7	568.9	730.0	5087.6	1635.4	1011.5	5684.6	430.9	44.0	188.0