



IBM® @server™ x346
with IBM DB2® UDB 8.2

TPC-H Revision 2.1.0

Report Date:
May 18, 2005

Total System Cost

Composite Query-per-hour Metric

Price/Performance

\$1,761,686

54,465.9
 QphH@3000GB

\$ 32
 per QphH@3000GB

Database Size

Database Manager

Operating System

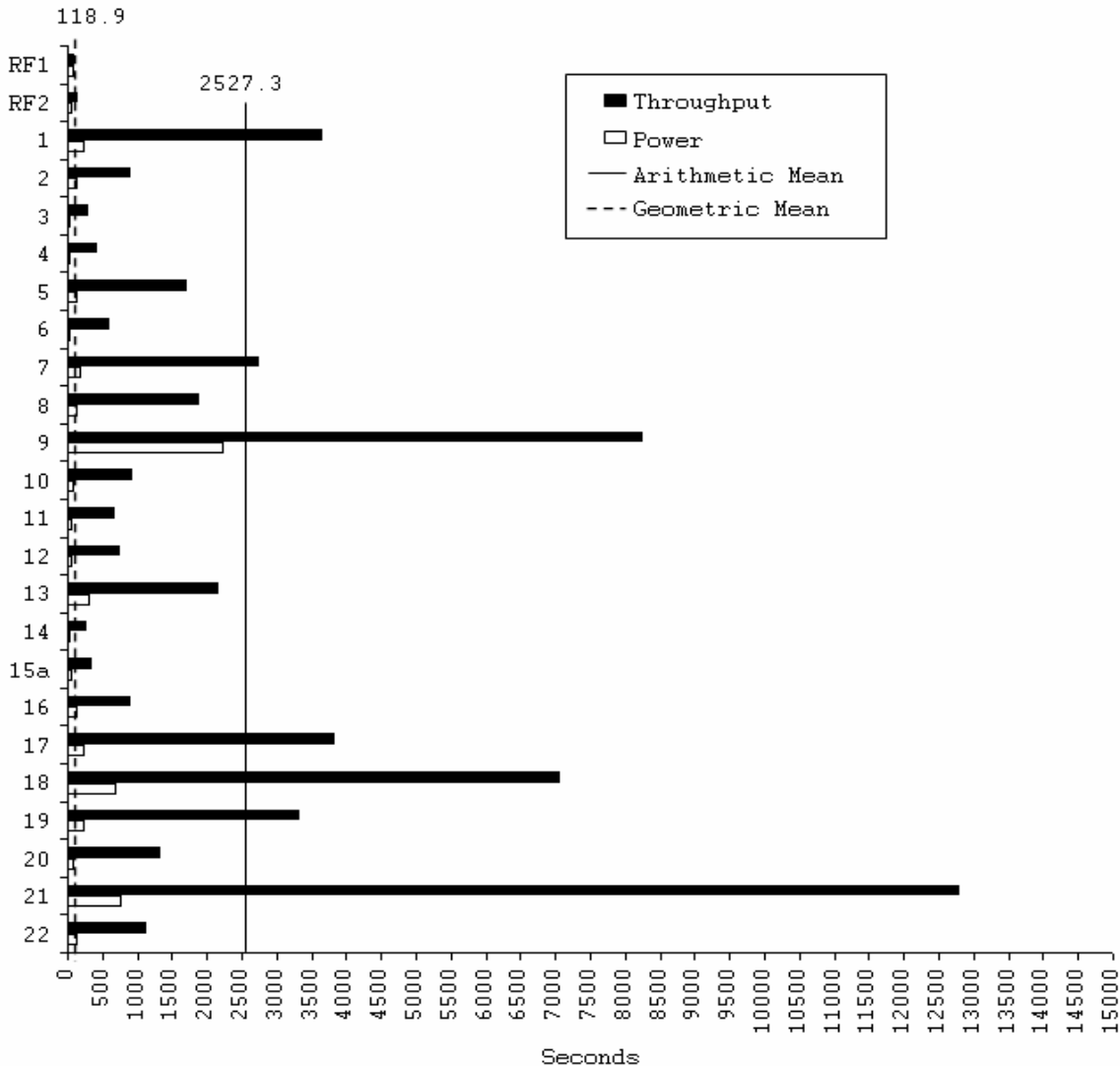
Availability Date

3000GB

IBM DB2 UDB 8.2

SuSE Linux
Enterprise Server 9

Aug 15, 2005



Database Load Time: 2:23:35

Load Included Backup: N

**Total Data Storage /
 Database Size: 8.75**

RAID (Base Table): Y

**RAID (Base Tables and
 Auxiliary Data Structures): Y**

RAID (ALL): Y

System Configuration:

64 IBM @server x346 servers, each server with:

Processor: 1 x 3.6GHz Intel Xeon with 2MB cache
 on 1 processor, 1 core, 2 threads

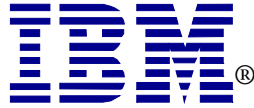
Memory: Eight (8) 512MB PC-3200 ECC SDRAM RDIMMs

Cluster Interconnect: One Voltaire HCA400 Dual-Port InfiniBand Host Channel Adapter

Disk Controllers: One ServeRAID-7k Ultra320 SCSI controller

Disk Drives: Six (6) 73.4GB 15K Ultra320 SCSI disk drives

Total Disk Storage: 26,249 GB



**IBM® @server™ x346
with IBM DB2® UDB 8.2**

TPC-H Revision 2.1.0

Report Date:
May 18, 2005

Description	Part Number	Third Party		Unit Price	Quantity	Extended Price	3-Yr. Maint. Price
		Brand	Pricing				
Server Hardware							
x346 3.6GHz/800MHz// 2 x 512MB DDR2, Open Bay	884041U	IBM xSeries	1	3,449	64	220,736	
1GB (2x512MB Kit) PC2-3200 CL3 ECC DDR2 SDRAM RDIMM (256Mb)	73P3522	IBM xSeries	1	399	192	76,608	
IBM ServeRAID 7k Controller	71P8642	IBM xSeries	1	449	64	28,736	
Epac 3 Year 24x7x4 Warranty Upgrade	21P2078	IBM xSeries	1	600	64		38,400
IBM 73.4 GB Hot-Swap U320 15 K SCSI SSL Drive	90P1319	IBM xSeries	1	499	384	191,616	
IBM S2 42U Standard Rack Cabinet	93074SX	IBM xSeries	1	1,489	4	5,956	
4.3m IEC Power Cable C13/ C14	94G7448	IBM xSeries	1	19	65	1,235	
IBM Preferred Pro Full-size Keyboard PS/2	31P7415	IBM xSeries	1	29	1	29	
IBM Sleek 2-Button Mouse	28L3673	IBM xSeries	1	15	1	15	
E54 15" Colour Monitor (Stealth Grey)	633147N	IBM xSeries	1	139	1	139	
Monitor Shelf	94G7444	IBM xSeries	1	169	1	169	
Keyboard Tray	28L4707	IBM xSeries	1	249	1	249	
RJ45 connectors	1735L04	IBM xSeries	1	759	1	759	
Cable Kit, KVM Conversion (KCO) Long 1.5m	32P1652	IBM xSeries	1	559	16	8,944	
Universal Jumper Cord - 1.5m	24P7469	IBM xSeries	1	20	4	80	
3U Quick Install Panel Set	25R5560	IBM xSeries	1	75	7	525	
Epac 3 Year 24x7x4 Warranty Upgrade for Racks	41L2760	IBM xSeries	1	300	4		1,200
Epac 3 Year 24x7x4 Warranty Upgrade for LCM	41I2752	IBM xSeries	1	60	1		60
Epac 3 Year 24x7x4 Warranty Upgrade for Monitor	30P9183	IBM xSeries	1	90	1		90
ISR9024M, IB switch router, internally managed	501S30021	Voltaire	3	5,721	5	28,605	
HCA 400 (PCI-X) w/ 2 4X IB ports, 128MB RAM & Linux open source MPI pkg with IpoIB & SDP support	501S12319	Voltaire	3	525	64	33,600	
4x InfiniBand Cable - 3m	199C10003	Voltaire	3	109	64	6,976	
4x InfiniBand Cable - 7m	199C10007	Voltaire	3	122	8	976	
				Subtotal		605,953	39,750
Server Software							
DB2 UDB Enterprise Server Edition ICE Edition MAINT 12 MO		IBM DB2	2	12,514	64	800,896	
DB2 UDB Database Partitioning Feature ICE Edition MAINT 12 MO		IBM DB2	2	3,759	64	240,576	
DB2 ICE SW maintenance renewal - 1 year		IBM DB2	2	596	128		76,288
DPF ICE SW maintenance renewal - 1 year		IBM DB2	2	179	128		22,912
SUSE Linux Enterprise Server 9 - incl. 3 yr upgrade	0662694556164	SUSE	3	870	64	55,680	
				Subtotal		1,097,152	99,200
xSeries volume discount 15%				Discount		80,369	
				Total		1,622,736	138,950
						Three-Year Cost of Ownership:	1,761,686

Pricing: 1 - IBM xSeries (pricing contact Alex Yost, ayost@us.ibm.com, 1-919-543-4505)
 2 - IBM DB2 (pricing contact Jonathan Prial, jonpriar@us.ibm.com, 1-914-766-1576)
 3 - Novell list price from http://www.novell.com/licensing/price.html#us
 Warranty and Maintenance: The standard warranty has been upgraded to 3 years of 24x7x4 coverage.
 Audited by Francois Raab, InfoSizing, Inc.

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 that stated prices are not available according to these terms, please inform the TPC at pricing@tpc.org. Thank you.

QphH@3000GB: 54,465.9

\$/QphH@3000GB: \$32



IBM® @server™ x346
with IBM DB2® UDB 8.2

TPC-H Revision 2.1.0

Report Date: May 18, 2005

Measurement Results:

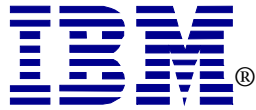
Database Scale Factor	3000
Total Data Storage/Database Size	8.75
Start of Database Load	15:05:38
End of Database Load	17:29:13
Database Load Time	2:23:35
Query Streams for Throughput Test	8
TPC-H Power	90,854.7
TPC-H Throughput	32,651.4
TPC-H Composite Query-per-Hour (QphH@3000GB)	54,465.9
Total System Price over 3 Years	\$1,761,686
TPC-H Price/Performance Metric (\$/QphH@3000GB)	\$32

Measurement Interval:

Measurement Interval in Throughput Test (Ts) = 58215 seconds

Duration of Stream Execution:

	Seed	Query Start Date/Time Query End Date/Time	RF1 Start Date/Time RF1 End Date/Time	RF2 Start Date/Time RF2 End Date/Time	Duration
Stream 00	507172913	05/07/05 19:03:58 05/07/05 20:41:57	05/07/05 19:02:40 05/07/05 19:03:58	05/07/05 20:41:57 05/07/05 20:42:38	1:40:04
Stream 01	507172914	05/07/05 20:42:43 05/08/05 12:11:25	05/07/05 20:43:10 05/08/05 12:25:17	05/08/05 12:25:17 05/08/05 12:26:54	15:28:42
Stream 02	507172915	05/07/05 20:42:41 05/08/05 12:16:04	05/08/05 12:26:54 05/08/05 12:28:44	05/08/05 12:28:44 05/08/05 12:31:19	15:33:23
Stream 03	507172916	05/07/05 20:42:41 05/08/05 12:23:27	05/08/05 12:31:19 05/08/05 12:32:34	05/08/05 12:32:34 05/08/05 12:35:05	15:40:46
Stream 04	507172917	05/07/05 20:42:43 05/08/05 11:49:43	05/08/05 12:35:05 05/08/05 12:36:26	05/08/05 12:36:26 05/08/05 12:38:45	15:07:00
Stream 05	507172918	05/07/05 20:42:45 05/08/05 11:59:30	05/08/05 12:38:45 05/08/05 12:40:22	05/08/05 12:40:22 05/08/05 12:42:19	15:16:45
Stream 06	507172919	05/07/05 20:42:43 05/08/05 12:14:59	05/08/05 12:42:19 05/08/05 12:43:54	05/08/05 12:43:54 05/08/05 12:45:58	15:32:16
Stream 07	507172920	05/07/05 20:42:43 05/08/05 11:59:55	05/08/05 12:45:58 05/08/05 12:46:59	05/08/05 12:46:59 05/08/05 12:48:57	15:17:12
Stream 08	507172921	05/07/05 20:42:44 05/08/05 12:20:06	05/08/05 12:48:57 05/08/05 12:50:14	05/08/05 12:50:14 05/08/05 12:52:58	15:37:22



IBM® @server™ x346
with IBM DB2® UDB 8.2

TPC-H Revision 2.1.0

Report Date:
May 18, 2005

TPC-H Timing Intervals (in seconds):

Stream ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Stream 0	229.7	122.8	29.0	30.4	134.8	31.4	184.1	119.0	2225.4	73.4	56.3	46.7
Stream 01	2288.1	852.5	401.1	135.9	1184.2	654.1	3119.8	1599.8	9157.5	707.9	434.1	1004.1
Stream 02	2987.2	1031.0	200.2	293.4	1405.8	535.8	2578.4	1452.7	8228.6	1177.8	460.9	1298.4
Stream 03	4238.7	802.4	33.4	386.0	1886.1	544.0	2637.0	1656.6	8432.8	874.7	588.7	52.1
Stream 04	3317.0	686.7	271.7	420.0	1323.0	363.5	2889.1	2405.6	9623.8	693.2	809.4	595.9
Stream 05	4295.7	869.0	455.9	599.4	1726.2	583.2	2679.3	1617.0	8630.9	1400.2	783.7	545.6
Stream 06	4376.5	1013.4	271.9	528.6	1598.7	835.9	2535.1	1732.1	7660.9	846.6	1106.4	1262.0
Stream 07	4408.2	853.8	315.4	283.8	2695.9	537.1	2622.2	1687.3	7368.4	706.9	761.6	580.5
Stream 08	3149.1	874.1	366.9	583.7	1751.6	629.7	2853.5	2788.2	6774.2	796.7	154.9	553.8
Minimum	2288.1	686.7	33.4	135.9	1184.2	363.5	2535.1	1452.7	6774.2	693.2	154.9	52.1
Average	3632.6	872.9	289.6	403.9	1696.4	585.4	2739.3	1867.4	8234.6	900.5	637.5	736.6
Maximum	4408.2	1031.0	455.9	599.4	2695.9	835.9	3119.8	2788.2	9623.8	1400.2	1106.4	1298.4
Stream ID	Q13	Q14	Q15a	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
Stream 0	301.4	36.7	57.9	130.1	222.9	669.8	221.9	78.4	755.2	121.8	78.2	41.1
Stream 01	1443.4	158.5	271.7	1189.2	4516.6	9303.7	3002.9	1443.4	11828.6	1024.7	109.0	96.7
Stream 02	2726.2	231.8	619.9	781.9	3325.2	8204.4	3656.2	1311.3	12718.3	776.9	110.7	155.2
Stream 03	436.3	181.7	246.7	142.8	3506.9	11333.3	1996.4	1257.3	14002.8	1209.2	74.5	150.7
Stream 04	3441.9	423.3	409.9	755.9	2926.8	3648.6	4363.8	1286.0	12575.3	1189.5	81.4	138.5
Stream 05	2129.0	281.8	326.6	906.7	3731.6	5958.5	3501.6	1136.6	11765.0	1081.8	97.5	117.0
Stream 06	1096.7	390.6	270.2	926.1	3131.4	6805.8	3918.9	1155.5	12896.6	1576.7	94.7	124.7
Stream 07	3312.5	184.1	220.9	613.3	4920.6	4402.0	2995.8	1430.2	13356.2	773.8	60.1	118.6
Stream 08	2642.3	114.3	283.4	1853.3	4506.3	6728.2	3062.5	1457.0	13158.1	1160.1	77.1	163.6
Minimum	436.3	114.3	220.9	142.8	2926.8	3648.6	1996.4	1136.6	11765.0	773.8	60.1	96.7
Average	2153.5	245.8	331.2	896.2	3820.7	7048.1	3312.3	1309.7	12787.6	1099.1	88.1	133.1
Maximum	3441.9	423.3	619.9	1853.3	4920.6	11333.3	4363.8	1457.0	14002.8	1576.7	110.7	163.6