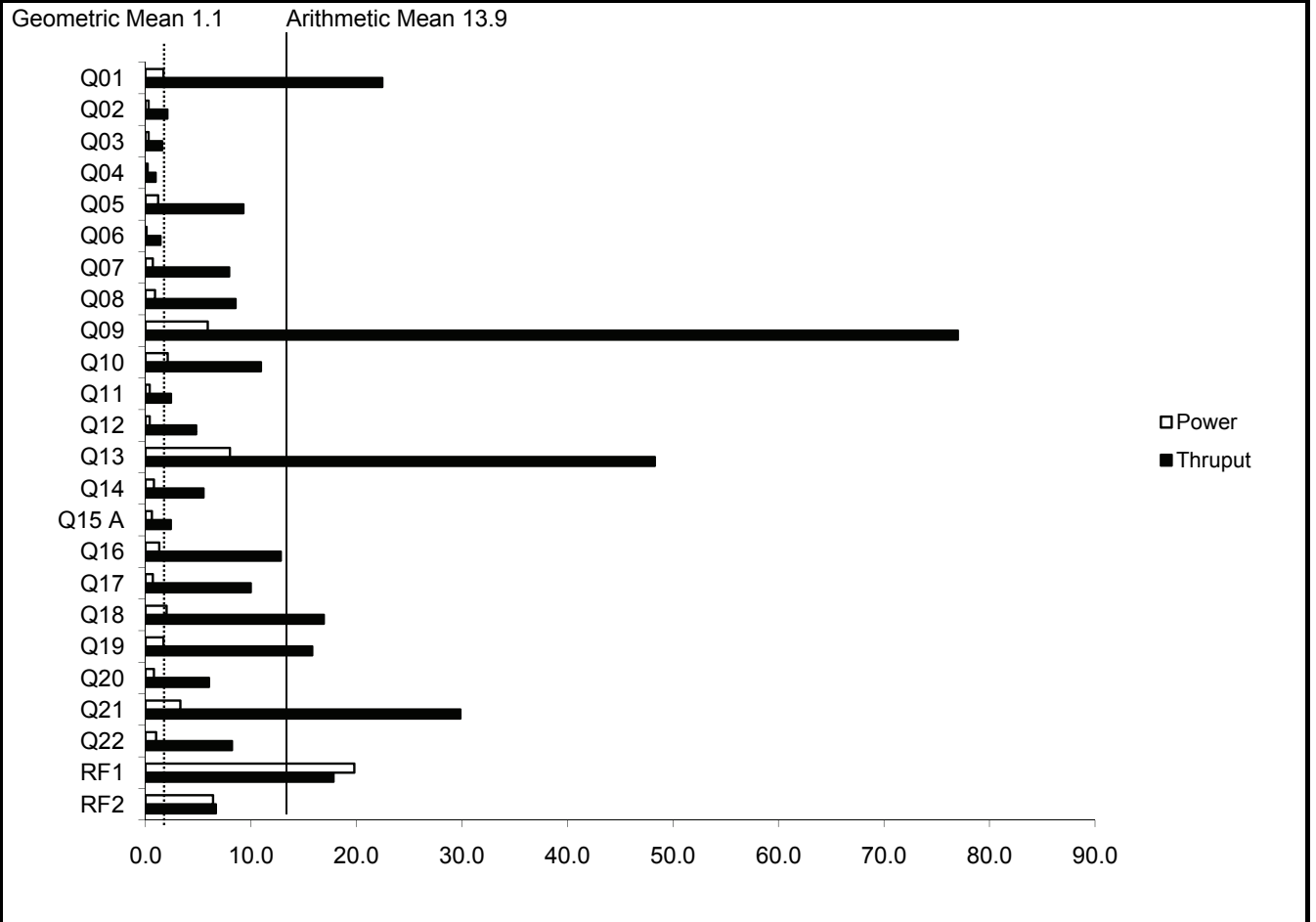


Dell PowerEdge R610 using VectorWise 1.6

TPC-H Rev 2.14.0
TPC Pricing Rev 1.6.0

Report Date:
May 20, 2011

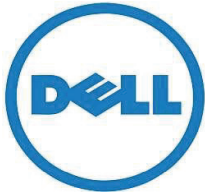
Total System Cost	Composite Query per Hour Metric	Price/Performance	TPC-Energy Metric	
\$48,328 USD	303,289.8 QphH@100GB	\$0.16 USD Price/QphH@100GB	1.28 Watts/KQphH@100GB	
Database Size	Database Manager	Operating System	Other Software	Availability Date
100 GB	VectorWise 1.6	RedHat Enterprise Linux 6.0	None	6/30/2011



Database Load Time = 02:04:23	Load Includes Backup: N
Total Data Storage/Database Size = 8.76	Memory/Database Size Percentage = 192.%
Storage Redundancy Level 1 for Base Tables, Auxiliary Data Structures, DBMS temporary space, and OS and DBMS Software	

System Configuration

Number of Nodes: 1
 Processors/Cores/Threads/Type: 2/12/12/Intel Xeon X5690 3.46 Ghz, 12MB L3 cache
 Memory: 192 GB
 Disk Controller: Dell PERC H700 RAID Controller with 1GB NVRAM Cache on-board
 Disk Drives: 6 x 146GB 2.5in SAS 6Gb/s 15k rpm
 Total Disk Storage: 876 GB
 LAN Controllers: 2 x 1Gb Ethernet on-board



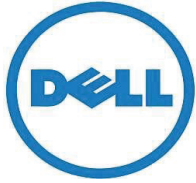
Dell PowerEdge R610 using VectorWise 1.6

TPC-H Rev 2.14.0
TPC Pricing Rev 1.6.0

Report Date:
May 20, 2011

Description	Part Number	Source	Reference Price	Qty	Extended Price	3 yr Maint Price
Server Hardware						
PER610 CHASSIS, UP TO 6 2.5IN HDD	224-8479	1	\$891.00	1	\$891.00	included
192GB,12x16GB,800,4R,RDIMMs,2P,OP	317-2196	1	\$9,865.00	1	\$9,865.00	
HIGH OUTPUT PWRSPPLY,NRDNT,717W	330-3519	1	\$30.00	1	\$30.00	
DVD+/-RW, SATA	313-9090	1	\$99.00	1	\$99.00	
PSMC 4H7X24 OS,PER610,UNY,2YR EXT	992-9972	1	\$231.00	1	\$231.00	
PSMC TECH SPT,PER610,3 YR	993-0162	1	\$599.00	1	\$599.00	
PSMC 4H7X24 OS,PER610,UNY,INIT	993-3670	1	\$269.00	1	\$269.00	
PSMC MISSION CRIT SVC,PER610,3YR	993-9408	1	\$500.00	1	\$500.00	
HW WRTY + SVC,PER610,UNY,INIT	993-9457	1	\$183.00	1	\$183.00	
HW WRTY + SVC,PER610,UNY,EXT	993-9458	1	\$175.00	1	\$175.00	
X5690,3.46GHz,12M,XN,6.4GT/s,6C	317-6160	1	\$2,159.00	1	\$2,159.00	
X5690,3.46GHz,12M,XN,6.4GT/s,6C	317-6167	1	\$2,159.00	1	\$2,159.00	
PERC H700 CTL 1GB NV Cache	342-1619	1	\$799.00	1	\$799.00	
146GB 15K SAS,6G,2.5,HP	342-0427	1	\$359.00	6	\$2,154.00	
RHEL6.0,Flx64,No Lic or Media	421-5717	1	\$0.00	1	\$0.00	
RHEL,1-2 SKT,3yr Sub and Lic,1VT Guest	421-5721	1	\$2,349.00	1	\$2,349.00	
RHEL6 Media Only X86_64, No Sub,FI	421-5737	1	\$0.00	1	\$0.00	
Slide Ready Rail,No Cb Mng Arm	330-3521	1	\$149.00	1	\$149.00	
<i>Dell Discount (30%)</i>		1			-\$6,783.30	
Subtotal					\$15,827.70	\$0.00
No External Storage						
Software						
VectorWise 1.6 3-year license Dell server**	ING-VW-3Y-GB-DELL	2	\$250.00	100	\$25,000.00	
VectorWise 1-year maintenance bug fixes**	ING-VW-3Y-GB-DELL-MNT	2	\$25.00	300		\$7,500.00
Subtotal					\$25,000.00	\$7,500.00
Total					\$40,827.70	\$7,500.00
Price Key: 1-Dell: Pricing may be verified by calling 1-800-BUY-DELL contact: Gregory Olsen, Greg_Olsen@dell.com and referencing quote # 583854113. 2-Ingres Pricing may be verified by calling 1-650-587-5538 contact: Mark Van de Wiel, mark.vandewiel@ingres.com All discounts are based on list prices and for similar quantities and configurations.			3-yr Cost of Ownership in USD: \$48,327.70 QphH@100GB: 303,289.8 \$/QphH@100Gb in USD: \$0.16			
Audited by: Steve Barrish for Performance Metrics, Inc.						

Prices used in TPC benchmarks reflect 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 inform the TPC at pricing@tpc.org. Thank you.



Dell PowerEdge R610 using VectorWise 1.6

TPC-H Rev 2.14.0
TPC Pricing Rev 1.6.0

Report Date:
May 20, 2011

Measurement Results

Database Scaling (SF/size)	100
Total Data Storage/Database Size	8.76
Memory/Database Size Percentage	192.00%
Start of Database Load Time	04/30/11 18:13:49
End of Database Load Time	04/30/11 20:18:12
Database Load Time	2:04:23
Query Streams for Throughput Test (S)	11
TPC-H Power	333,328.3
TPC-H Throughput	275,958.2
TPC-H Composite Query-per-Hour Metric (QphH@100GB)	303,289.8
Total System Price Over 3 Years	\$48,327.70 USD
TPC-H Price/Performance Metric (\$/QphH@100GB)	\$0.16 USD

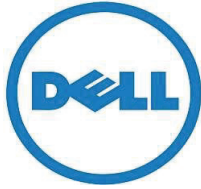
Measurement Intervals

Measurement Interval in Throughput Test (Ts) 316

Duration of Stream Execution:

Power Run	Seed	Query Start Time Query End Time	Duration (sec)	RF1 Start Time RF1 End Time	RF2 Start Time RF2 End Time
	430201812	04/30/11 20:43:09 04/30/11 20:43:44	50	04/30/11 20:42:57 04/30/11 20:43:09	04/30/11 20:43:44 04/30/11 20:43:47

Thruput Stream	Seed	Query Start Time Query End Time	Duration (sec)	RF1 Start Time RF1 End Time	RF2 Start Time RF2 End Time
1	430201813	04/30/11 20:43:49 04/30/11 20:48:59	310	04/30/11 20:43:49 04/30/11 20:44:08	04/30/11 20:44:08 04/30/11 20:44:15
2	430201814	04/30/11 20:43:49 04/30/11 20:48:52	303	04/30/11 20:44:15 04/30/11 20:44:31	04/30/11 20:44:31 04/30/11 20:44:37
3	430201815	04/30/11 20:43:49 04/30/11 20:48:51	303	04/30/11 20:44:37 04/30/11 20:44:54	04/30/11 20:44:54 04/30/11 20:45:01
4	430201816	04/30/11 20:43:49 04/30/11 20:48:57	308	04/30/11 20:45:01 04/30/11 20:45:19	04/30/11 20:45:19 04/30/11 20:45:26
5	430201817	04/30/11 20:43:49 04/30/11 20:48:50	301	04/30/11 20:45:26 04/30/11 20:45:44	04/30/11 20:45:44 04/30/11 20:45:51
6	430201818	04/30/11 20:43:49 04/30/11 20:49:04	316	04/30/11 20:45:51 04/30/11 20:46:11	04/30/11 20:46:11 04/30/11 20:46:17
7	430201819	04/30/11 20:43:49 04/30/11 20:48:45	297	04/30/11 20:46:17 04/30/11 20:46:35	04/30/11 20:46:35 04/30/11 20:46:41
8	430201820	04/30/11 20:43:49 04/30/11 20:48:50	301	04/30/11 20:46:41 04/30/11 20:46:59	04/30/11 20:46:59 04/30/11 20:47:05
9	430201821	04/30/11 20:43:49 04/30/11 20:48:54	305	04/30/11 20:47:05 04/30/11 20:47:23	04/30/11 20:47:23 04/30/11 20:47:30
10	430201822	04/30/11 20:43:49 04/30/11 20:48:56	308	04/30/11 20:47:30 04/30/11 20:47:48	04/30/11 20:47:48 04/30/11 20:47:55
11	430201823	04/30/11 20:43:49 04/30/11 20:48:54	306	04/30/11 20:47:55 04/30/11 20:48:13	04/30/11 20:48:13 04/30/11 20:48:20



Dell PowerEdge R610 using VectorWise 1.6

TPC-H Rev 2.14.0
TPC Pricing Rev 1.6.0

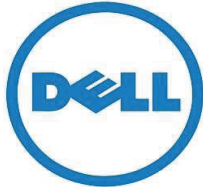
Report Date:
May 20, 2011

TPC-H Timing Intervals (in seconds)

Duration of stream execution:

Stream ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Stream 00	1.7	0.3	0.3	0.2	1.2	0.1	0.7	0.9	5.9	2.1	0.4	0.4
Stream 01	19.2	2.3	2.2	0.2	9.3	1.1	8.4	7.9	72.1	12.0	2.4	5.2
Stream 02	24.1	2.1	1.5	1.0	9.8	0.4	7.7	8.0	71.2	9.9	2.0	6.2
Stream 03	22.0	1.5	1.1	1.1	10.1	1.8	8.5	10.5	83.5	12.0	3.5	4.0
Stream 04	24.8	2.8	0.4	1.2	11.3	1.3	6.1	7.7	82.9	10.3	2.1	4.3
Stream 05	22.7	2.0	1.6	1.2	8.3	1.8	7.2	12.1	77.9	9.9	2.1	4.2
Stream 06	23.7	2.0	2.0	1.0	12.6	3.0	11.6	8.6	81.6	11.3	2.7	4.2
Stream 07	23.4	2.8	1.6	1.1	11.0	1.3	11.5	7.8	73.5	10.4	2.6	4.0
Stream 08	22.7	2.1	2.4	1.3	9.6	1.9	8.0	8.0	81.7	11.2	1.5	4.5
Stream 09	21.6	1.9	1.4	0.4	6.3	1.4	8.7	9.7	73.8	10.8	3.5	7.3
Stream 10	21.4	1.8	1.5	0.9	1.5	0.3	7.4	5.6	78.4	12.8	1.6	4.7
Stream 11	21.3	1.5	1.7	1.2	12.3	1.3	2.1	8.0	70.5	9.7	2.5	4.3
Minimum	1.7	0.3	0.3	0.2	1.2	0.1	0.7	0.9	5.9	2.1	0.4	0.4
Maximum	24.8	2.8	2.4	1.3	12.6	3.0	11.6	12.1	83.5	12.8	3.5	7.3
Average	20.7	1.9	1.5	0.9	8.6	1.3	7.3	7.9	71.1	10.2	2.2	4.4

Stream ID	Q13	Q14	Q15a	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
Stream 00	8.0	0.8	0.6	1.3	0.7	2.0	1.7	0.8	3.3	1.0	12.6	3.5
Stream 01	50.8	3.9	1.9	16.5	8.7	18.3	20.0	8.0	34.1	5.8	19.8	6.4
Stream 02	47.9	6.5	2.8	11.8	11.9	18.0	16.8	8.4	26.7	8.3	15.9	6.3
Stream 03	47.2	4.8	2.5	10.4	9.8	7.5	16.3	5.3	32.2	7.1	16.5	7.8
Stream 04	46.8	4.5	2.0	16.1	9.9	18.4	17.5	1.5	30.5	5.5	17.8	6.4
Stream 05	50.9	4.5	1.7	12.2	12.8	17.4	16.3	7.0	18.7	8.5	18.2	7.4
Stream 06	45.6	9.2	2.0	13.7	8.0	19.6	16.9	5.6	21.6	9.3	19.4	6.6
Stream 07	44.8	4.2	2.1	11.1	9.1	11.1	16.6	7.1	30.2	9.1	18.0	5.9
Stream 08	48.2	3.7	2.0	15.2	9.2	16.1	7.8	5.3	30.9	7.4	17.6	5.8
Stream 09	46.1	4.3	5.6	7.4	9.9	18.6	17.3	6.2	33.4	9.7	18.3	7.1
Stream 10	54.8	6.7	2.6	13.5	9.0	20.6	14.1	5.4	34.5	8.7	18.2	6.7
Stream 11	48.0	8.2	1.2	13.1	11.4	20.4	14.2	6.4	35.6	10.8	18.3	6.7
Minimum	8.0	0.8	0.6	1.3	0.7	2.0	1.7	0.8	3.3	1.0	12.6	3.5
Maximum	54.8	9.2	5.6	16.5	12.8	20.6	20.0	8.4	35.6	10.8	19.8	7.8
Average	44.9	5.1	2.3	11.9	9.2	15.7	14.6	5.6	27.6	7.6	17.6	6.4



Energy Summary

TPC-H Rev 2.14.0
TPC Pricing Rev 1.6.0
TPC Energy Rev 1.2.0

Report Date
May 20, 2011

Total System Cost	Composite Query per Hour Metric	Price/Performance	TPC-Energy Metric
\$48,328 USD	303,289.80 QphH@100GB	\$0.16 USD \$/QphH@100GB	1.28 Watts/KQphH@100GB
Database Size	Database Manager	Operating System	Other Software
100 GB	VectorWise 1.6	RedHat Enterprise Linux 6.0	None
			Availability Date
			June 30, 2011

Numerical Quantities for Reported Energy Configuration:

REC Idle Power	178.9
Average Power of REC	386.8

Subsystem Reporting:

Secondary (subsystem) Metrics are not reported.
Comparisons to other TPC-Energy Results must not reference subsystem energy information.

Lowest ambient temperature at air inlet: 25.88 Degrees Celsius

Items in Priced Configuration not in the Reported Energy Configuration: None.

Items in Reported Energy Configuration not in the Measured Energy Configuration:
Dell E170S Monitor