



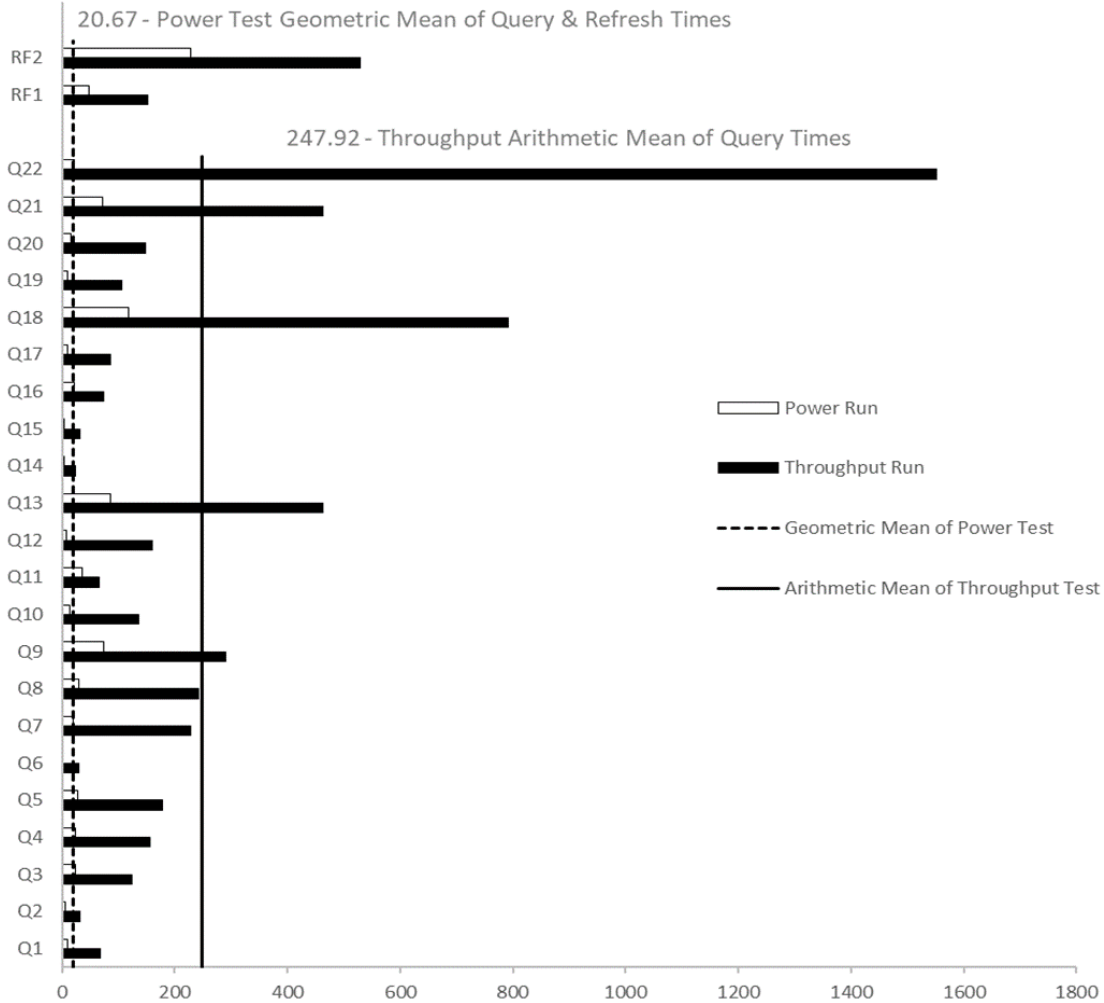
PowerEdge R940xa Server

TPC-H Rev. 2.18.0
 TPC Pricing Rev. 2.6.0

Report Date:
 Aug 20, 2020

Total System Cost	Composite Query per Hour Rating	Price/Performance
\$943,769 USD	1,420,550.7 QphH@10,000 GB	\$0.67 USD \$/QphH@10,000GB

Database Size	Database Manager	Operating System	Other Software	Availability Date
10,000 GB	Microsoft® SQL Server 2019 Enterprise Edition	Windows Server 2019 Standard Edition	N/A	Aug 26, 2020



Database load Time = 00D 08H 08M 03S	Storage Redundancy Level	
Load Includes Backup: Y	Base Tables and Auxiliary Data Structures	No RAID
Total Data Storage/Database Size = 3.87	DBMS Temporary Space	No RAID
Percentage Memory/ Database size = 61.4 %	OS and DBMS Software	RAID 1
	Log	RAID 10
System Configuration: Dell PowerEdge R940xaServer		
Processors/Model: 4x Intel Xeon Platinum 8280L 2.7G, 10.4GT/s, 38.5MCache, Turbo, HT, (205W)1.5TBDDR4-2933		
Cores/Threads: 112C/224T		
Memory: 6 TB (48x 128GB)		
Storage: 10x 1.6TB SSD SAS Mix Use 12Gbps512e 2.5in Hot-plug AG Drive,3 DWPD, 8760 TBW		
4x Dell 6.4TB, NVMe, Mixed Use Express Flash, 2.5 SFF Drive, U.2, PM1725a with Carrier		
Total Storage: 38745.32		



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Description	Part Number	Source	Unit Price	Qty	Ext. Price \$	3 Yr Maint. Price
PowerEdge R940xa Server	210-AOQP	1	7,892.00	1	7,892.00	
PowerEdge R840/R940xa MLK Motherboard	329-BEOT	1	0.00	1	0.00	
No Trusted Platform Module	461-AADZ	1	0.00	1	0.00	
32 x 2.5" Chassis, 28 SAS/SATA + 4 NVMe/SAS/SATA, Single-wide FPGA capable, 4 CPU Configuration	321-BDTC	1	2,999.00	1	2,999.00	
PowerEdge R940xa Shipping	340-CBCB	1	0.00	1	0.00	
PowerEdge R940xa Shipping Material, DAO	340-COPV	1	99.00	1	99.00	
Intel Xeon Platinum 8280L2.7G, 28C/56T, 10.4GT/s, 38.5M Cache, Turbo, HT (205W) DDR4-2933	338-BSHT	1	21,379.00	4	85,516.00	
4 CPU Heatsink	412-AANH	1	388.00	1	388.00	
2666MT/s LRDIMMs	370-ADNT	1	279.00	1	279.00	
Blank for 4CPU Configuration	370-AECN	1	0.00	1	0.00	
Performance Optimized	370-AAIP	1	0.00	1	0.00	
128GB LRDIMM, 2666MT/s, OctoRank	370-ADMX	1	4,749.00	48	227,952.00	
Unconfigured RAID	780-BCDS	1	0.00	1	0.00	
PERC H740P RAID Controller, 8GB NV Cache, Adapter, Full Height	405-AANR	1	999.00	1	999.00	
iDRAC9, Enterprise	385-BBKT	1	0.00	1	0.00	
iDRAC Group Manager, Disabled	379-BCQY	1	0.00	1	0.00	
iDRAC, Factory Generated Password	379-BCSF	1	0.00	1	0.00	
Riser Config4, 10 PCIe slots(10 x8 Full height slots), NVMe, 4 CPU	330-BBLB	1	569.00	1	569.00	
1.6TB SSD SAS Mix Use 12Gbps512e 2.5in Hot-plug AG Drive,3 DWPD, 8760 TBW	400-AZOY	1	2,199.00	10	21,990.00	
Dell 6.4TB, NVMe, Mixed Use Express Flash, 2.5 SFF Drive, U.2, P4610 with Carrier	400-BELR	1	7,918.00	4	31,672.00	
Broadcom 57412 Dual Port 10GbE SFP+ & 5720 Dual Port 1GbE BASE-T rNDC	540-BBUL	1	469.00	1	469.00	
Dell EMC PowerEdge SFP+ SR Optic 10GbE 850nm	407-BCBE	1	239.00	2	478.00	
No Internal Optical Drive	429-AAIQ	1	0.00	1	0.00	
1+1 Power Supply, Redundant Configuration, 2400W, 250 VoltPower Cord Required for Use	450-AHCJ	1	1,499.00	1	1,499.00	
No Power Cord	450-AAGG	1	0.00	1	0.00	
No Bezel	350-BBBW	1	0.00	1	0.00	
Dell EMC Luggage Tag	389-CHBB	1	0.00	1	0.00	
Quick Sync 2 (At-the-box mgmt)	350-BBOZ	1	149.00	1	149.00	
Performance BIOS Settings	384-BBBL	1	0.00	1	0.00	
UEFI BIOS Boot Mode with GPT Partition	800-BBDM	1	0.00	1	0.00	
No Rack Rails	770-BBBS	1	0.00	1	0.00	
No Systems Documentation, NoOpenManage DVD Kit	631-AAACK	1	0.00	1	0.00	
Dell Hardware Limited Warranty Plus On-Site Service	818-7292	1	249.00	1	0.00	249.00
ProSupport Mission Critical: 7x24 HW/SW Technical Support & Assistance, 3 years	818-7402	1	5,668.00	1	0.00	5,668.00
ProSupport Mission Critical: 4-Hour 7x24 On-Site Service with Emergency Dispatch, 3 Years	818-7394	1	3,031.00	1	0.00	3,031.00
Logitech MK120 Keyboard and Mouse	A6999510	1	15.99	1	15.99	
Dell Monitor	210-AIWG	1	169.99	1	169.99	
				Sub Total	383,135.98	8,948.00
Large Purchase Discount (58% for Hardware and 35% for Service)				Discounted Price	-222,218.87	-3,131.80
				Hardware Subtotal	160,917.11	5,816.20
SOFTWARE						
SQL SERVER 2019 Enterprise Edition for Windows (2 cores license, 28 Cores)	NA	2	13,748.00	56	769,888.00	
Windows Server 2019 Standard Edition(2core License)	NA	2	123.00	56	6,888.00	
Microsoft Problem Resolution Services	NA	2	259.00	1		259.00
				Software Subtotal	776,776.00	259.00
				Total	937,693.11	6,075.20
Source: 1: DELLEMC 2: MICROSOFT	Three Year cost Ownership				\$943,769.00	
Audited by Francois Raab of InfoSizing (www.sizing.com)	QphH @10000				1,420,550.70	
All discounts are based on US list prices and for similar quantities and configurations. The discounts was based on the overall specific components pricing from respective vendors in this single quotation. Discounts for similarly sized configurations will be similar to those quoted here, but may vary based on the components in the configuration.	\$/QphH @10000				\$0.67	
Dell EMC Sales Contact: Microsoft.Assist@dell.com						
Windows and SQL Server Sales Contact: Microsoft Corporation, One Microsoft Way, Redmond, WA 98052 6399 (425) 882 8080						
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 the stated prices are not available according to these terms please inform the TPC at pricing@tpc.org. Thank you.						



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Numerical Quantities

Measurement Results

Database Scale Factor : 10,000
 Total Data Storage / Database Size : 3.87
 Percentage Memory / Database Size : 61.4%
 Start of Database Load : 8/8/2020 11:03:57 PM
 End of Database Load : 8/9/2020 7:11:59 AM
 Database Load Time h m s : 00D 08H 08M 03S
 Query Streams for Throughput Test : 9
 TPC-H Power : 1,741,966.2
 TPC-H Throughput : 1,158,440.5
 TPC-H Composite Query-per-Hour (QphH@10,000 GB) : 1,420,550.7
 Total System Price over 3 Years (\$ USD) : USD 943,769.00
 TPC-H Price/Performance Metric (\$ USD/QphH@10,000 GB) : USD 0.67

Measurement Interval

Measurement Interval in Throughput Test (Ts) : 6,153.1

Duration of Stream Execution

Power Run	Seed	Query Start Time	Total Time (hh:mm:ss)	RF1 Start Time	RF2 Start Time
		Query End Time		RF1 End Time	RF2 End Time
	809071159	2020-08-09 10:09:42	00:10:45	2020-08-09 10:08:52	2020-08-09 10:20:29
		2020-08-09 10:20:27		2020-08-09 10:09:40	2020-08-09 10:24:18
Throughput Stream	Seed	Query Start Time	Total Time (hh:mm:ss)	RF1 Start Time	RF2 Start Time
		Query End Time		RF1 End Time	RF2 End Time
1	809071160	2020-08-09 10:24:17	01:42:35	2020-08-09 10:24:17	2020-08-09 10:28:07
		2020-08-09 12:06:52		2020-08-09 10:28:07	2020-08-09 10:39:49
2	809071161	2020-08-09 10:24:17	01:19:21	2020-08-09 10:39:50	2020-08-09 10:42:33
		2020-08-09 11:43:38		2020-08-09 10:42:33	2020-08-09 10:51:40
3	809071162	2020-08-09 10:24:17	01:34:33	2020-08-09 10:51:40	2020-08-09 10:53:43
		2020-08-09 11:58:50		2020-08-09 10:53:43	2020-08-09 11:04:12
4	809071163	2020-08-09 10:24:18	01:39:02	2020-08-09 11:04:12	2020-08-09 11:08:39
		2020-08-09 12:03:20		2020-08-09 11:08:39	2020-08-09 11:17:30
5	809071164	2020-08-09 10:24:18	01:11:51	2020-08-09 11:17:30	2020-08-09 11:20:44
		2020-08-09 11:36:09		2020-08-09 11:20:44	2020-08-09 11:28:37
6	809071165	2020-08-09 10:24:18	01:39:10	2020-08-09 11:28:37	2020-08-09 11:30:26
		2020-08-09 12:03:28		2020-08-09 11:30:26	2020-08-09 11:37:54
7	809071166	2020-08-09 10:24:18	01:35:58	2020-08-09 11:37:54	2020-08-09 11:38:59
		2020-08-09 12:00:16		2020-08-09 11:38:59	2020-08-09 11:46:46
8	809071167	2020-08-09 10:24:18	01:13:31	2020-08-09 11:46:47	2020-08-09 11:48:39
		2020-08-09 11:37:49		2020-08-09 11:48:39	2020-08-09 11:56:06
9	809071168	2020-08-09 10:24:18	01:42:15	2020-08-09 11:56:06	2020-08-09 11:58:00
		2020-08-09 12:06:33		2020-08-09 11:58:00	2020-08-09 12:06:49



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TPC-H Timing Intervals (Seconds)

Stream ID	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
0	10.88	5.68	24.08	24.74	28.55	1.39	19.64	30.03	74.33	13.80	36.62	8.88
1	43.56	32.08	177.40	57.14	348.51	56.31	180.27	202.93	219.94	157.67	114.40	220.95
2	36.14	38.03	28.99	63.68	214.80	29.41	314.59	309.35	457.91	176.47	40.85	239.00
3	133.81	15.49	58.47	201.08	218.62	23.47	191.13	252.57	84.36	25.91	39.96	80.83
4	78.66	36.64	69.94	134.02	219.40	33.26	121.30	264.80	616.45	142.71	73.47	176.88
5	78.44	35.11	270.62	188.17	174.54	36.44	223.70	226.21	239.99	109.51	74.34	103.99
6	61.77	14.16	111.34	224.87	76.67	42.95	395.05	188.51	403.51	156.89	81.06	205.91
7	50.00	37.84	59.48	133.53	67.90	2.50	54.33	253.53	131.52	26.85	55.08	18.57
8	122.11	31.00	166.81	244.13	245.79	22.69	493.16	261.16	374.10	282.88	42.28	338.67
9	16.66	45.88	176.82	160.40	44.39	27.65	74.96	221.67	92.27	150.39	70.29	54.52
QI Min	10.88	5.68	24.08	24.74	28.55	1.39	19.64	30.03	74.33	13.80	36.62	8.88
QI Avg	63.20	29.19	114.40	143.18	163.92	27.61	206.81	221.08	269.44	124.31	62.84	144.82
QI Max	133.81	45.88	270.62	244.13	348.51	56.31	493.16	309.35	616.45	282.88	114.40	338.67
Stream ID	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	RF1	RF2
0	85.16	4.53	4.78	22.50	9.57	118.36	9.71	16.33	72.81	21.81	47.27	229.13
1	520.85	12.94	24.40	61.43	73.30	877.41	131.78	153.85	702.69	1,783.31	228.26	702.39
2	508.79	45.10	40.86	126.37	126.85	1,070.14	105.74	555.32	138.31	93.02	163.80	546.50
3	190.96	15.09	5.99	60.21	117.44	772.40	15.70	59.60	305.44	2,803.20	122.84	628.39
4	463.60	50.59	38.77	111.46	134.26	352.76	129.32	47.93	605.57	2,039.90	266.68	530.89
5	380.25	32.55	46.81	49.77	119.93	749.13	250.69	102.11	699.67	118.00	194.18	472.49
6	725.46	11.13	47.92	58.58	18.29	388.64	17.27	29.67	184.77	2,505.16	108.64	448.17
7	197.75	9.35	12.09	32.03	34.02	1,274.31	77.09	123.11	833.35	2,272.97	65.00	466.91
8	471.45	28.75	30.77	122.61	65.04	458.56	93.05	146.71	213.20	155.44	111.98	446.84
9	711.22	5.27	31.69	43.44	93.95	1,187.57	130.13	112.59	479.68	2,202.79	113.77	528.90
QI Min	85.16	4.53	4.78	22.50	9.57	118.36	9.71	16.33	72.81	21.81	47.27	229.13
QI Avg	425.55	21.53	28.41	68.84	79.27	724.93	96.05	134.72	423.55	1,399.56	142.24	500.06
QI Max	725.46	50.59	47.92	126.37	134.26	1,274.31	250.69	555.32	833.35	2,803.20	266.68	702.39