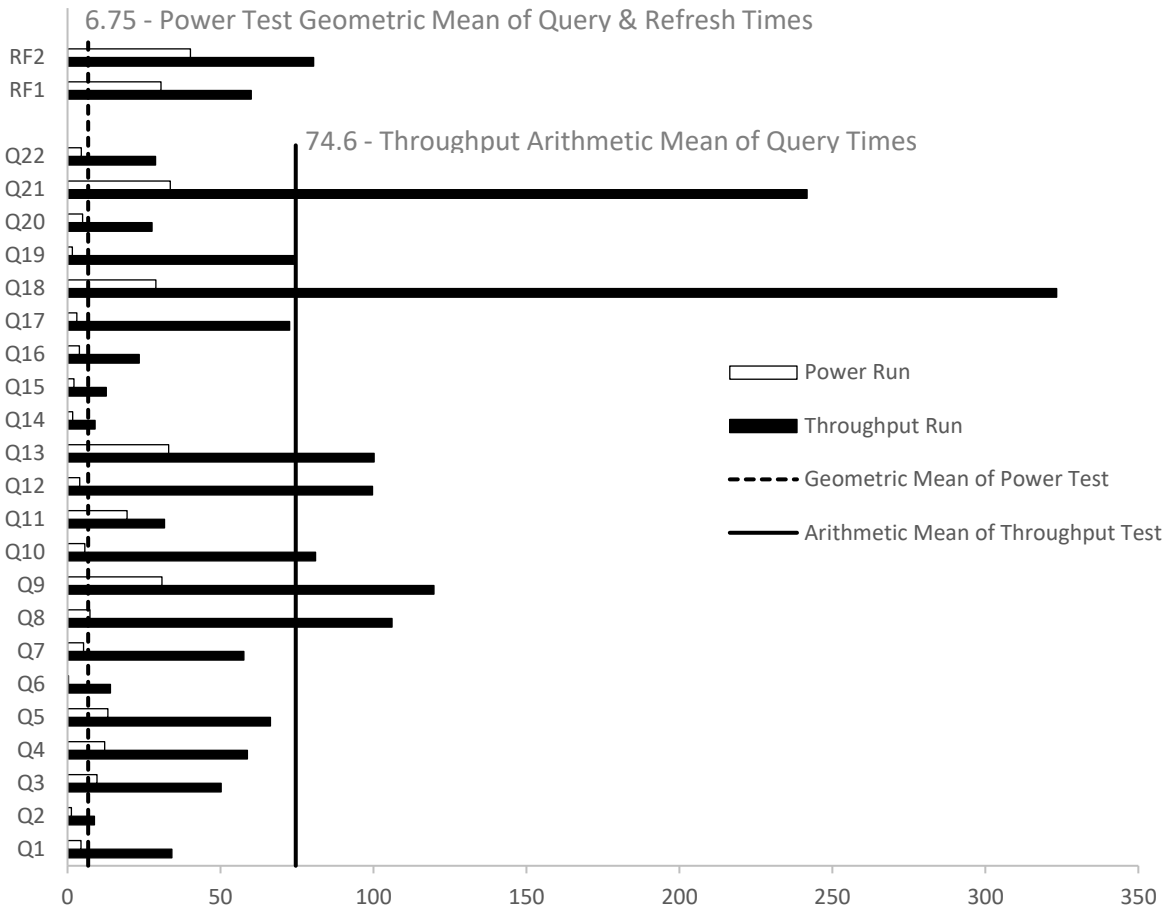
 Hewlett Packard Enterprise		HPE ProLiant DL345 Gen10 Plus		TPC-H Rev. 2.18.0 TPC Pricing Rev. 2.6.0
Total System Cost		Composite Query per Hour Rating		Report Date: March 15, 2021
\$533,622 USD		1,346,932.7 QphH @ 3,000GB		\$0.40 USD \$/ QphH @ 3,000GB
Database Size	Database Manager	Operating System	Other Software	Availability Date
3,000GB	Microsoft® SQL Server 2019 Enterprise Edition	Red Hat® Enterprise Linux® 8	None	April 19, 2021



Database Load Time = 00d 18h 09m 45s	Storage Redundancy Level	
Load included backup: Y	Base Tables and Auxiliary Data Structures	No RAID
Total Data Storage / Database Size = 7.15	DBMS Temporary Space	No RAID
Memory/Database Size = 68.3%	OS and DBMS Software	RAID 1

System Components	System Total
Nodes:	1
AMD® EPYC MILAN 7763 @ 2.45GHz:	1
Cores/Threads:	64/128
Memory:	2,048 GiB
1.6TB NVMe Drives	6
1.92TB NVMe Drives	6
Disk Drives (960GB 6G SATA SSD)	2
Total Storage:	21,457.67 GiB



HPE ProLiant DL345 Gen10 Plus

TPC-H Rev. 2.18.0
TPC Pricing Rev. 2.6.0

Report Date: March 15, 2021

Description	Price Key	Part Number	Unit Price	Qty	Extended Price	3 Yr Maint Price
Server Hardware						
HPE DL345 Gen10+ 8SFF CTO Svr	1	P38665-B21	\$1,135	1	\$1,135	
AMD EPYC 7763 CPU for HPE	1	P38696-B21	\$15,997	1	\$15,997	
HPE DL345 Gen10+ High Perf Heat Sink Kit	1	P38655-B21	\$69	1	\$69	
HPE DL38X Gen10+ Max Perf Fan Kit	1	P14608-B21	\$274	1	\$274	
HPE 128GB 4Rx4 PC4-3200AA-L Smart	1	P07652-B21	\$5,122	16	\$81,952	
HPE 800W FS Plat Ht Plg LH PS Kit	1	P38995-B21	\$379	2	\$758	
HPE USB US Keyboard/Mouse Kit	1	631341-B21	\$32	3	\$96	
MLX MCX562A 10/25GbE 2p SFP28 OCP3 Adptr	1	P10112-B21	\$725	1	\$725	
Add to Rack 48U 600mmx1075mm G2 Advanced Pallet	1	P9K19A	\$2,075	1	\$2,075	
HPE C13 - JIS C8303 JP 100V 12Amp 2.0m Power Cord	1	AF572A	\$54	1	\$54	
HPE 3 Year Total Care Essential for DL345 Gen10 Plus	1			1		\$2,205
		Subtotal			\$103,135	\$2,205
Storage						
HPE 1.92TB NVMe RI BC U.3 PM1733 SSD	1	P40565-B21	\$2,372	6	\$14,232	
HPE 1.6TB NVMe MU SFF BC U.3 PM1735 SSD	1	P40570-B21	\$2,474	6	\$14,844	
HPE 960GB SATA MU SFF BC MV SSD	1	P40503-B21	\$1,321	2	\$2,642	
HPE Smart Array E208i-p SR Gen10 Ctrlr	1	804394-B21	\$379	1	\$379	
HPE DL345 Gen10+ 8SFF SAS/SATA Box3 Kit (PCIe SAS/SATA Controller Cable)	1	P39722-B21	\$55	1	\$55	
HPE DL300 Gen10+ 2U 8SFF x4Tmode U.3 Kit (Drive Cage)	1	P26931-B21	\$499	2	\$998	
HPE DL345 Gen10+ 16NVMe U.3 Dir FIO Kit	1	P38649-B21	\$0	1	\$0	
HPE DL345 Gen10+ 16NVMe FIO Cbl Kit	1	P38660-B21	\$300	1	\$300	
HPE DL38X Gen10 Plus 2U Cable Management Arm for Rail Kit	1	P22020-B21	\$72	1	\$72	
HPE DL38X Gen10 Plus 2U SFF Easy Install Rail Kit	1	P22018-B21	\$110	1	\$110	
HPE DL345 G10+ Smart Array-NVMe Adp Kit	1	P39271-B21	\$139	1	\$139	
		Subtotal			\$33,771	\$0
Other						
Other HP 23 Inch Monitor 3 HP	3	HP 23f	\$199	3	\$597	
		Subtotal			\$597	\$0
Software Components						
SQL Server 2019 Enterprise Edition for Linux (2 core license, 64 cores)	2	N/A	\$13,748.00	32	\$439,936	
Microsoft Problem Resolution Services	2	N/A	\$259.00	1		\$259.00
RHEL Svr 2 Sckt/2 Gst 3yr 24x7 E-LTU	1	G3J30AAE	\$3,702.00	1	\$3,702	
		Subtotal			\$443,638	\$259
		Total Extended Price			\$581,141	\$2,464
		Total Discounts			\$49,212	\$771
Price Key: 1 - HPE , 2 - Microsoft, 3 - Hewlett Packard Inc.		Grand Total			\$531,929	\$1,693
Audited by Doug Johnson of InfoSizing (www.sizing.com)						
All discounts are based on US list prices and for similar quantities and configurations. A 35% discount was based on the overall specific components pricing from vendor 1 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.		3 year cost of ownership USD:				\$533,622
		QphH @ 3,000GB:				1346932.7
		\$ USD/QphH @ 3,000GB				\$0.40
Sales contact: HPE WW Headquarters, 3000 Hanover St., Palo Alto, CA 94304-1185 (855)472-5233 / (800)786-7967 / (888)269-4073 (US)						
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 at pricing@tpc.org. Thank you.						



Numerical Quantities

Measurement Results

Database Scale Factor	3,000
Total Data Storage / Database Size	7.15
Percentage Memory / Database Size	68.3%
Start of Database Load	2021-02-19 16:35:03
End of Database Load	2021-02-20 10:44:49
Database Load Time	00d 18h 09m 45s
Query Streams for Throughput Test	8
TPC-H Power	1,599,656.8
TPC-H Throughput	1,134,135.6
TPC-H Composite Query-per-Hour (QphH@3,000GB)	1,346,932.7
Total System Price over 3 Years (\$ USD)	\$533,622
TPC-H Price/Performance Metric (\$ USD / QphH@3,000GB)	\$0.40

Measurement Interval

Measurement Interval in Throughput Test **1,675.99 seconds**

Duration of Stream Execution

Power Run	Seed	Query Start Time	Total Time	RF1 Start Time	RF2 Start Time
		Query End Time	(hh:mm:ss)	RF1 End Time	RF2 End Time
	220104449	2021-02-20 11:21:41	00:03:51	2021-02-20 11:21:10	2021-02-20 11:25:32
		2021-02-20 11:25:32		2021-02-20 11:21:41	2021-02-20 11:26:13
Throughput Stream	Seed	Query Start Time	Total Time	RF1 Start Time	RF2 Start Time
		Query End Time	(hh:mm:ss)	RF1 End Time	RF2 End Time
1	220104450	2021-02-20 11:26:12	00:26:47	2021-02-20 11:26:12	2021-02-20 11:27:09
		2021-02-20 11:52:59		2021-02-20 11:27:09	2021-02-20 11:28:20
2	220104451	2021-02-20 11:26:12	00:27:13	2021-02-20 11:28:20	2021-02-20 11:29:21
		2021-02-20 11:53:25		2021-02-20 11:29:21	2021-02-20 11:30:51
3	220104452	2021-02-20 11:26:12	00:27:50	2021-02-20 11:30:51	2021-02-20 11:31:50
		2021-02-20 11:54:02		2021-02-20 11:31:50	2021-02-20 11:33:04
4	220104453	2021-02-20 11:26:12	00:27:57	2021-02-20 11:33:04	2021-02-20 11:33:56
		2021-02-20 11:54:09		2021-02-20 11:33:56	2021-02-20 11:35:15
5	220104454	2021-02-20 11:26:12	00:27:45	2021-02-20 11:35:15	2021-02-20 11:36:12
		2021-02-20 11:53:57		2021-02-20 11:36:12	2021-02-20 11:37:28
6	220104455	2021-02-20 11:26:12	00:27:53	2021-02-20 11:37:28	2021-02-20 11:38:28
		2021-02-20 11:54:05		2021-02-20 11:38:28	2021-02-20 11:39:55
7	220104456	2021-02-20 11:26:12	00:27:32	2021-02-20 11:39:55	2021-02-20 11:41:11
		2021-02-20 11:53:44		2021-02-20 11:41:11	2021-02-20 11:42:30
8	220104457	2021-02-20 11:26:12	00:26:02	2021-02-20 11:42:30	2021-02-20 11:43:30
		2021-02-20 11:52:14		2021-02-20 11:43:30	2021-02-20 11:44:59

TPC-H Timing Intervals (in seconds):

Query	Stream 0	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5	Stream 6	Stream 7	Stream 8	Min Qi	Max Qi	Avg. Qi
Q1	4.44	19.88	50.92	40.67	6.32	18.85	43.86	51.75	40.47	4.44	30.80	51.75
Q2	1.31	10.22	5.37	7.47	10.59	6.35	9.91	13.82	6.51	1.31	7.95	13.82
Q3	9.63	58.64	24.76	57.60	55.43	64.14	22.73	55.92	62.60	9.63	45.72	64.14
Q4	12.17	57.92	72.85	59.31	61.67	58.41	44.47	75.51	40.35	12.17	53.63	75.51
Q5	13.14	70.08	51.25	68.83	39.14	93.01	65.94	50.98	91.25	13.14	60.40	93.01
Q6	0.31	14.24	9.20	22.43	17.73	15.53	8.12	10.76	14.61	0.31	12.55	22.43
Q7	5.26	97.19	52.72	55.72	69.44	76.13	46.65	15.69	47.48	5.26	51.81	97.19
Q8	7.30	87.85	112.87	94.98	73.65	82.29	104.20	151.81	140.78	7.30	95.08	151.81
Q9	30.82	95.00	162.36	106.75	154.85	133.45	110.62	76.50	118.28	30.82	109.85	162.36
Q10	5.67	94.49	99.84	63.39	96.86	54.44	86.42	97.67	55.32	5.67	72.68	99.84
Q11	19.48	44.33	23.75	35.29	28.57	32.49	28.84	31.17	29.02	19.48	30.33	44.33
Q12	3.96	89.05	54.09	90.35	125.19	140.48	120.04	126.38	51.85	3.96	89.04	140.48
Q13	33.06	70.31	143.45	105.80	101.04	108.92	138.02	79.89	54.01	33.06	92.72	143.45
Q14	1.68	9.42	9.06	6.16	14.27	8.93	10.70	2.85	10.40	1.68	8.16	14.27
Q15	2.10	8.08	6.54	15.60	9.56	16.19	23.15	3.44	18.82	2.10	11.50	23.15
Q16	3.83	23.81	10.69	8.04	11.82	56.10	21.66	20.69	34.44	3.83	21.23	56.10
Q17	3.03	70.94	40.66	51.67	84.85	90.23	66.76	87.58	87.71	3.03	64.83	90.23
Q18	28.92	342.10	362.06	360.11	306.19	229.71	362.14	336.61	287.42	28.92	290.58	362.14
Q19	1.57	67.39	43.33	61.49	89.22	73.12	93.45	75.47	88.00	1.57	65.89	93.45
Q20	4.93	35.84	27.65	25.17	5.22	30.62	24.35	29.45	42.76	4.93	25.11	42.76
Q21	33.54	221.14	232.22	301.95	265.63	246.53	231.01	227.27	208.30	33.54	218.62	301.95
Q22	4.48	18.48	36.14	30.04	48.63	28.51	8.98	29.33	30.27	4.48	26.10	48.63
RF1	30.60	56.41	60.98	59.21	51.62	56.42	59.65	76.53	59.81	30.60	56.80	76.53
RF2	40.18	70.82	89.52	73.41	79.21	76.36	86.53	78.38	89.04	40.18	75.94	89.52