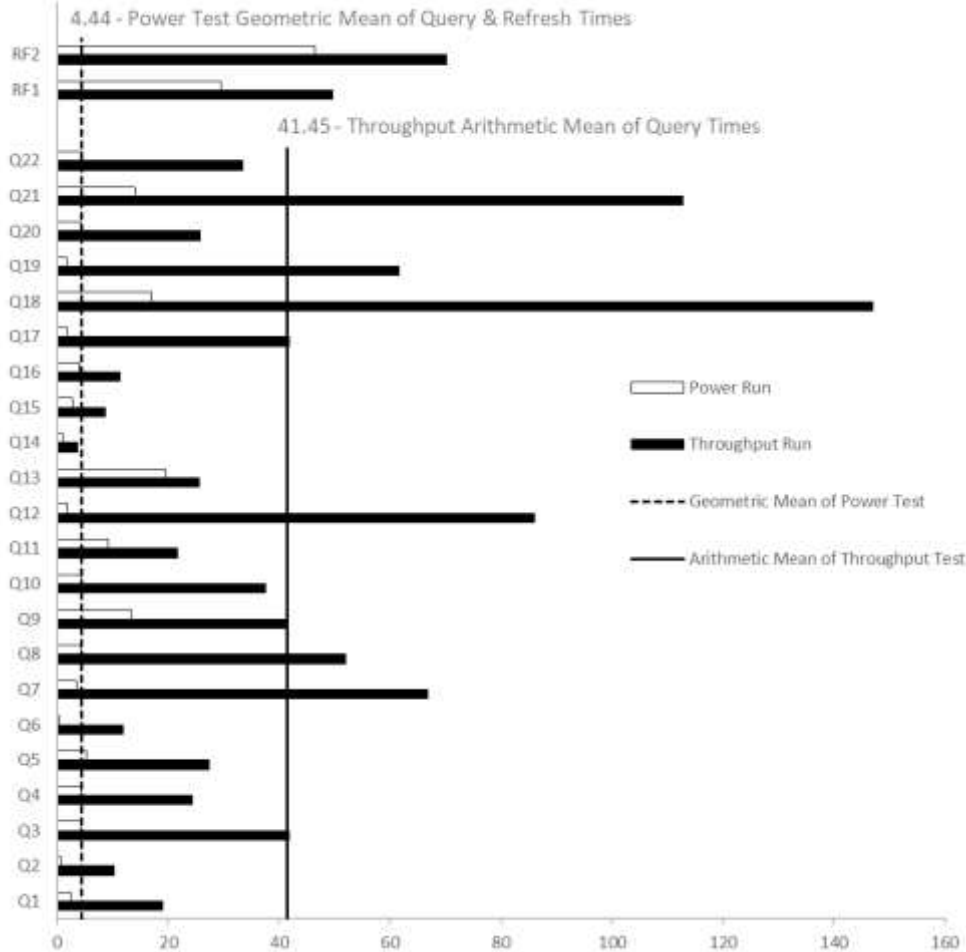



<b>Hewlett Packard Enterprise</b>	<b>HPE ProLiant DL345 Gen11</b> (with AMD EPYC 9654P Processor)	TPC-H Rev. 3.0.1 TPC Pricing Rev. 2.9.0		
		Report Date: August 22, 2024		
Total System Cost	Composite Query per Hour Rating	Price/Performance		
<b>\$847,260 USD</b>	<b>2,195,198.9</b> QphH @ 3,000GB	<b>\$385.97 USD</b> \$/kQphH @ 3,000GB		
Database Size	Database Manager	Operating System	Other Software	Availability Date
<b>3,000GB</b>	<b>Microsoft® SQL Server 2022 Enterprise Edition</b>	<b>Microsoft Windows Server 2022</b>	<b>None</b>	<b>August 22,2024</b>



Database Load Time = 0d 01h 30m 46s	<b>Storage Redundancy Level</b>	
Load included backup: <b>Y</b>	Base Tables and Auxiliary Data Structures	<b>No RAID</b>
Total Data Storage / Database Size = <b>12.22</b>	DBMS Temporary Space and DBMS Software	<b>No RAID</b>
Memory/Database Size = 51.2%	OS, transaction logs	<b>Software RAID 1</b>

System Components	System Total
Nodes:	1
AMD® EPYC 9654P @ 2.4GHz:	1
Cores/Threads:	96/192
Memory:	1536 GiB
3.84TB NVMe Drives	10
RAID1 Boot Controller with 480GB M.2 NVMe	2
<b>Total Storage:</b>	<b>36,656.86 GiB</b>

	<b>HPE ProLiant DL345 Gen11</b>		TPC-H Rev. 3.0.1 TPC Pricing Rev. 2.9.0				
			Report Date: August 22, 2024				
Description	Price Key	Part Number	Unit Price	Qty	Extended Price	3 Yr Maint Price	
<b>Server Hardware</b>							
HPE DL345 Gen11 8SFF CTO Server	1	P54207-B21	\$4,200	1	\$4,200		
AMD EPYC 9554 CPU for HPE	1	P53697-B21	\$19,401	1	\$19,401		
HPE DL3X5 Gen11 Max Perf 2U Heat Sink Kit	1	P58459-B21	\$256	1	\$256		
HPE DL3X5 2Y Perf FAN KIT	1	P58465-B21	\$160	1	\$160		
HPE 128GB 4Rx4 PC5-4800B-R 3DS Smart Kit	1	P50313-B21	\$10,999	12	\$131,988		
HPE 1600W FS Plat Ht Plug LH PS Kit	1	P38997-B21	\$751	2	\$1,502		
HPE USB US Keyboard/Mouse Kit	1	631341-B21	\$32	3	\$96		
MLX MCX6314 10/25GbE 2p QSFP56 Adptr	1	P25960-B21	\$4,373	1	\$4,373		
Add to Rack 48U 600mmx1075mm G2 Advanced Pallet	1	P9K19A	\$3,023	1	\$3,023		
HPE 3 Year Total Care Essential for DL345 Gen11	1	H78X5E	\$3,445	1		\$3,445	
					<b>Subtotal</b>	<b>\$164,999</b>	<b>\$3,445</b>
<b>Storage</b>							
HPE 3.2TB NVMe MU SFF BC U.3 PM1735a SSD	1	P50230-B21	\$8,180	10	\$81,860		
NS204i-u Gen11 OS Boot, RAID 1	1	P48183-B21	\$1,994	1	\$1,994		
HPE DL3X5 Gen11 Ht Pg Boot Opt Dev	1	P57013-B21	\$83	1	\$83		
HPE DL345 Gen11 20EDSFF x4 FIO Kit	1	P64383-B21	\$1,192	1	\$1,192		
HPE Gen 11 EI Rail Kit	1	P52351-B21	\$141	1	\$141		
HPE DL345G11 Standard Riser	1	standardDL325G11Riser		1			
					<b>Subtotal</b>	<b>\$85,270</b>	<b>\$0</b>
<b>Other</b>							
HP V22v G5 FHD Monitor	3	65P56AA	\$130	3	\$390		
					<b>Subtotal</b>	<b>\$390</b>	<b>\$0</b>
<b>Software Components</b>							
SQL Server 2022 Enterprise Edition (2 core license, 48 cores)	2	N/A	\$15,123	48	\$725,904		
Microsoft Problem Resolution Services	2	N/A	\$259	1		\$259	
Windows Server 2022 Standard Edition (16 processor license)	2	N/A	\$1089	6	\$6,534		
					<b>Subtotal</b>	<b>\$732,438</b>	<b>\$259</b>
Total Extended Price					\$983,097	\$3,704	
Total Discounts					\$137,647	\$1,894.00	
Price Key: 1 - HPE , 2 - Microsoft, 3 - Hewlett Packard Inc.					<b>Grand Total</b>	<b>\$845,449.97</b>	<b>\$1,810.00</b>
<b>Audited by Doug Johnson of InfoSizing (www.sizing.com)</b>					<b>3 year cost of ownership USD: \$847,260</b>		
All discounts are based on US list prices and for similar quantities and configurations. A 55% 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.					<b>QphH @ 3,000GB : 2,195,198.9</b>		
					<b>\$ USD/QphH @ 3,000GB \$385.97</b>		
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	<b>3,000</b>
Total Data Storage / Database Size	12.22
Percentage Memory / Database Size	51.2%
Start of Database Load	2024-08-07 07:20:09
End of Database Load	2024-08-07 08:50:55
Database Load Time	00d 01h 30m 46s
Query Streams for Throughput Test	<b>8</b>
TPC-H Power	<b>2,433,634.8</b>
TPC-H Throughput	<b>1,980,123.8</b>
TPC-H Composite Query-per-Hour (QphH@3,000GB)	<b>2,195,198.9</b>
Total System Price over 3 Years (\$ USD)	<b>\$847,260</b>
TPC-H Price/Performance Metric (\$ USD / kQphH@3,000GB)	<b>\$385.97</b>

### Measurement Interval

Measurement Interval in Throughput Test **959.94 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
	807085055	2024-08-07 09:14:28	00:02:07	2024-08-07 09:13:57	2024-08-07 09:16:37
		2024-08-07 09:16:35		2024-08-07 09:14:26	2024-08-07 09:17:23
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	807085056	2024-08-07 09:17:22	00:14:33	2024-08-07 09:17:22	2024-08-07 09:18:10
		2024-08-07 09:31:55		2024-08-07 09:18:10	2024-08-07 09:19:20
2	807085057	2024-08-07 09:17:22	00:15:10	2024-08-07 09:19:20	2024-08-07 09:20:09
		2024-08-07 09:32:32		2024-08-07 09:20:09	2024-08-07 09:21:17
3	807085058	2024-08-07 09:17:22	00:15:34	2024-08-07 09:21:17	2024-08-07 09:22:06
		2024-08-07 09:32:56		2024-08-07 09:22:06	2024-08-07 09:23:14
4	807085059	2024-08-07 09:17:22	00:15:38	2024-08-07 09:23:14	2024-08-07 09:23:59
		2024-08-07 09:33:00		2024-08-07 09:23:59	2024-08-07 09:25:04
5	807085060	2024-08-07 09:17:22	00:15:49	2024-08-07 09:25:04	2024-08-07 09:25:59
		2024-08-07 09:33:11		2024-08-07 09:25:59	2024-08-07 09:27:13
6	807085061	2024-08-07 09:17:23	00:15:10	2024-08-07 09:27:13	2024-08-07 09:28:10
		2024-08-07 09:32:33		2024-08-07 09:28:10	2024-08-07 09:29:21
7	807085062	2024-08-07 09:17:23	00:15:48	2024-08-07 09:29:21	2024-08-07 09:30:12
		2024-08-07 09:33:11		2024-08-07 09:30:12	2024-08-07 09:31:28
8	807085063	2024-08-07 09:17:23	00:14:03	2024-08-07 09:31:28	2024-08-07 09:32:14
		2024-08-07 09:31:26		2024-08-07 09:32:14	2024-08-07 09:33:23

**TPC-H Timing Intervals (in seconds):**

Stream ID	Stream 0	Stream 1	Stream 2	Stream 3	Stream 4	Stream 5	Stream 6	Stream 7	Stream 8	QI Min	QI Avg	QI Max
Q1	2.49	3.53	14.66	21.64	13.84	59.30	13.72	22.13	3.55	2.49	17.21	59.30
Q2	0.72	9.73	6.52	13.38	11.14	12.92	2.08	15.01	11.50	0.72	9.22	15.01
Q3	4.28	51.95	58.14	16.49	29.71	53.24	13.77	82.98	28.75	4.28	37.70	82.98
Q4	4.43	5.71	43.43	16.99	29.97	14.73	16.38	37.92	30.00	4.43	22.17	43.43
Q5	5.33	14.91	21.24	22.27	28.10	21.89	22.02	42.67	45.56	5.33	24.89	45.56
Q6	0.22	7.44	9.83	13.84	15.25	18.60	11.45	11.52	6.71	0.22	10.54	18.60
Q7	3.56	48.83	83.51	76.46	86.33	69.49	65.86	45.53	58.98	3.56	59.84	86.33
Q8	4.49	86.35	39.21	31.50	34.10	71.48	39.83	69.85	43.07	4.49	46.65	86.35
Q9	13.30	28.74	24.33	25.13	73.48	27.16	36.21	81.69	33.13	13.30	38.13	81.69
Q10	4.49	26.32	61.10	66.97	59.41	8.17	49.96	4.66	23.14	4.49	33.80	66.97
Q11	9.13	17.52	22.50	18.91	25.06	23.90	15.55	32.94	17.64	9.13	20.35	32.94
Q12	1.95	117.25	92.48	82.99	70.74	133.67	104.17	42.05	44.52	1.95	76.65	133.67
Q13	19.50	31.42	27.11	26.74	24.01	23.86	23.88	22.70	25.49	19.50	24.97	31.42
Q14	0.95	2.87	11.28	1.44	3.33	3.13	3.31	2.16	2.67	0.95	3.46	11.28
Q15	2.83	14.11	7.41	17.52	6.05	4.47	8.47	6.75	5.11	2.83	8.08	17.52
Q16	4.11	16.33	5.78	8.89	6.23	9.99	7.41	5.38	30.20	4.11	10.48	30.20
Q17	1.98	23.80	45.43	74.14	22.25	36.66	58.45	48.74	25.42	1.98	37.43	74.14
Q18	17.03	82.29	113.24	98.80	165.82	118.00	221.25	169.87	207.22	17.03	132.61	221.25
Q19	1.80	95.88	82.30	73.70	66.01	38.77	45.42	53.00	38.10	1.80	55.00	95.88
Q20	4.31	43.98	19.97	39.17	19.17	13.22	17.80	22.96	30.54	4.31	23.46	43.98
Q21	13.99	136.21	88.47	110.52	108.04	136.01	112.38	92.68	117.17	13.99	101.72	136.21
Q22	4.66	6.44	30.97	75.40	38.63	48.47	20.41	33.88	13.47	4.66	30.26	75.40
RF1	29.47	46.96	49.04	48.93	45.13	54.64	56.23	50.44	45.60	29.47	47.38	56.23
RF2	46.41	69.38	68.28	67.71	64.61	74.20	71.50	75.92	69.71	46.41	67.52	75.92