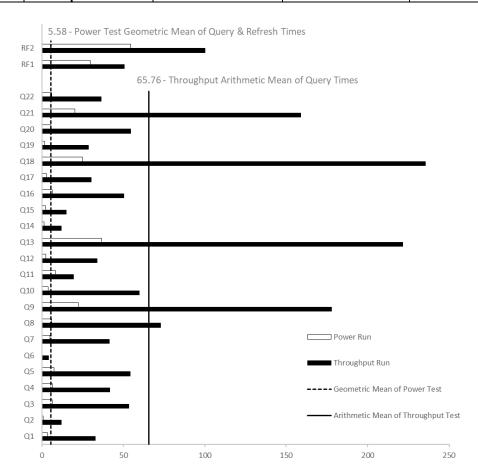| Hewlett Packard Enterprise	HPE ProLiant DL345 Gen11	TPC-H Rev. 3.0.1 TPC Pricing Rev. 2.9.0
		Report Date: November 25, 2024

Total System Cost	Composite Query per Hour Rating	Price/Performance
$354,088 USD	**1,573,589.2** QphH @ 3,000GB	**$225.02 USD** $ / kQphH @ 3,000GB

Database Size	Database Manager	Operating System	Other Software	Availability Date
3,000GB	**Microsoft® SQL Server 2022 Enterprise Edition**	**Microsoft Windows Server 2022**	**None**	**November 25,2024**

5.58 - Power Test Geometric Mean of Query & Refresh Times

65.76 - Throughput Arithmetic Mean of Query Times

Legend:
- Power Run
- Throughput Run
- Geometric Mean of Power Test
- Arithmetic Mean of Throughput Test

Database Load Time = 0d 2h 59m 10s	**Storage Redundancy Level**	
Load included backup: **Y**	Base Tables and Auxiliary Data Structures	**No RAID**
Total Data Storage / Database Size = **12.22**	DBMS Temporary Space and DBMS Software	**No RAID**
Memory/Database Size = 51.2**%**	OS, transaction logs	**Hardware RAID 1**

System Components   **System Total**

Nodes:	1
AMD® EPYC 9375F @ 3.85GHz:	1
Cores/Threads:	32/64
Memory:	1536 GiB
3.84TB NVMe Drives	10
RAID1 Boot Controller with 480GB M.2 NVMe	2

Total Storage: **36,656.86 GiB**

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HPE ProLiant DL345 Gen11		TPC-H Rev. 3.0.1 TPC Pricing Rev. 2.9.0				
		Report Date: November 25, 2024				

Description	PriceKey	Part Number	Unit Price	Qty	Extended Price	3 Yr Maint Price
Server Hardware						
HPE DL345 Gen11 8SFF CTO Server	1	P54207-B21	$4,200	1	$4,200	
AMD EPYC 9375F CPU for HPE	1	P72667-B21	$10,612	1	$10,612	
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	$11,676	12	$140,112	
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		$3,962
		Subtotal			**$164,334**	**$3,962**
Storage						
HPE 3.84TB NVMe RI E3S EC1 PM1743 SSD	1	P57799-B21	$7,050	10	$70,500	
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 DL345 Gen11 2SFF x4 TM BC Kit	1	P57110-B21	$756	1	$756	
HPE Gen 11 EI Rail Kit	1	P52351-B21	$141	1	$141	
HPE DL345G11 Standard Riser	1	standardDL345G11Riser		1		
		Subtotal			**$74,666**	**$0**
Other						
HP V22v G5 FHD Monitor	3	65P56AA	$130	3	$390	
		Subtotal			**$390**	**$0**
Software Components						
SQL Server 2022 Enterprise Edition (2 core license)	2	N/A	$15,123	16	$241,968	
Microsoft Problem Resolution Services	2	N/A	$259	1		$259
Windows Server 2022 Standard Edition (16 core license)	2	N/A	1,069	2	2,138	
			Subtotal		$244,106	$259
			Total Extended Price		$483,496	$4,221
			Total Discounts		$131,450	$2,179.00

Price Key: 1 - HPE , 2 – Microsoft, 3 – Hewlett Packard Inc.
Audited by Doug Johnson of InfoSizing (www.sizing.com)

Grand Total	**$352,045.97** **$2,042.00**

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.

3 year cost of ownership USD:	**$354,088.00**
QphH @ 3,000GB :	**1,573,589.2**
$ USD/QphH @ 3,000GB	**$225.02**

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	12.22
Percentage Memory / Database Size	51.2**%**
Start of Database Load	2024-11-07 07:35:27
End of Database Load	2024-11-07 10:34:37
Database Load Time	00d 02h 59m 10s
Query Streams for Throughput Test	**8**
TPC-H Power	1,936,576.2
TPC-H Throughput	1,278,639.6
TPC-H Composite Query-per-Hour (QphH@3,000GB)	1,573,589.2
Total System Price over 3 Years ($ USD)	**$354,088**
TPC-H Price/Performance Metric ($ USD / kQphH@3,000GB)	**$225.02**

Measurement Interval

Measurement Interval in Throughput Test	**1,486.58 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
	1107103437	2024-11-07 11:06:17	00:03:01	2024-11-07 11:05:45	2024-11-07 11:09:20
		2024-11-07 11:09:18		2024-11-07 11:06:15	2024-11-07 11:10:15
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	1107103438	2024-11-07 11:10:14	00:24:17	2024-11-07 11:10:14	2024-11-07 11:11:06
		2024-11-07 11:34:31		2024-11-07 11:11:06	2024-11-07 11:12:41
2	1107103439	2024-11-07 11:10:14	00:22:48	2024-11-07 11:12:41	2024-11-07 11:13:32
		2024-11-07 11:33:02		2024-11-07 11:13:31	2024-11-07 11:15:11
3	1107103440	2024-11-07 11:10:14	00:24:18	2024-11-07 11:15:12	2024-11-07 11:16:03
		2024-11-07 11:34:32		2024-11-07 11:16:03	2024-11-07 11:17:43
4	1107103441	2024-11-07 11:10:14	00:24:32	2024-11-07 11:17:43	2024-11-07 11:18:35
		2024-11-07 11:34:46		2024-11-07 11:18:35	2024-11-07 11:20:11
5	1107103442	2024-11-07 11:10:14	00:24:23	2024-11-07 11:20:11	2024-11-07 11:21:02
		2024-11-07 11:34:37		2024-11-07 11:21:02	2024-11-07 11:22:35
6	1107103443	2024-11-07 11:10:14	00:24:47	2024-11-07 11:22:35	2024-11-07 11:23:25
		2024-11-07 11:35:01		2024-11-07 11:23:25	2024-11-07 11:25:10
7	1107103444	2024-11-07 11:10:14	00:23:47	2024-11-07 11:25:10	2024-11-07 11:26:00
		2024-11-07 11:34:01		2024-11-07 11:26:00	2024-11-07 11:27:50
8	1107103445	2024-11-07 11:10:14	00:24:10	2024-11-07 11:27:50	2024-11-07 11:28:42
		2024-11-07 11:34:24		2024-11-07 11:28:42	2024-11-07 11:30:23

TPC-H Timing Intervals (in seconds):

Stream ID	0	1	2	3	4	5	6	7	8	QI Min	QI Avg	QI Max
Q1	3.36	20.36	42.50	36.41	36.24	29.91	31.28	36.48	28.55	3.36	29.45	42.50
Q2	0.81	11.34	10.02	16.94	11.19	12.58	8.89	12.24	12.18	0.81	10.69	16.94
Q3	6.36	66.20	37.29	35.99	34.92	55.67	57.72	99.16	40.27	6.36	48.18	99.16
Q4	6.49	34.63	38.33	38.99	44.57	60.35	41.41	46.75	29.19	6.49	37.86	60.35
Q5	7.55	36.44	31.41	53.75	56.27	77.90	68.17	53.44	55.73	7.55	48.96	77.90
Q6	0.20	7.11	0.42	8.11	1.78	2.36	9.66	1.73	2.14	0.20	3.72	9.66
Q7	5.05	63.47	36.39	45.05	27.56	44.02	38.67	39.80	37.28	5.05	37.48	63.47
Q8	6.02	51.47	55.77	63.91	84.03	51.25	150.39	88.58	36.70	6.02	65.35	150.39
Q9	22.55	180.11	148.49	180.43	249.56	189.53	163.54	128.34	182.28	22.55	160.54	249.56
Q10	3.91	95.97	70.87	55.03	49.84	48.30	50.48	57.78	50.48	3.91	53.63	95.97
Q11	8.25	22.55	17.55	16.20	21.25	18.66	20.63	20.81	16.61	8.25	18.06	22.55
Q12	2.33	53.14	37.74	23.45	25.05	22.33	59.85	26.48	23.61	2.33	30.44	59.85
Q13	36.61	186.19	259.57	275.67	205.02	265.92	260.55	120.63	198.45	36.61	200.96	275.67
Q14	1.44	17.52	11.15	12.97	16.28	8.97	7.89	9.16	11.92	1.44	10.81	17.52
Q15	2.25	15.92	20.58	14.99	20.00	12.68	14.20	9.56	12.70	2.25	13.65	20.58
Q16	6.19	41.95	30.63	60.19	42.48	38.30	57.57	62.93	69.53	6.19	45.53	69.53
Q17	2.70	23.77	24.16	46.20	28.75	32.24	14.55	30.99	42.44	2.70	27.31	46.20
Q18	24.89	197.94	223.83	188.64	299.59	203.15	288.43	221.26	261.94	24.89	212.19	299.59
Q19	1.70	45.41	22.41	16.13	34.13	22.28	23.11	48.20	18.24	1.70	25.73	48.20
Q20	5.63	71.39	86.77	55.23	15.61	73.51	37.02	54.57	40.99	5.63	48.97	86.77
Q21	20.27	163.68	143.11	181.96	146.35	164.26	29.06	221.20	222.08	20.27	143.55	222.08
Q22	6.03	49.39	18.02	31.13	20.22	28.02	53.39	35.86	55.67	6.03	33.08	55.67
RF1	29.85	50.67	50.44	51.36	51.50	50.31	49.41	50.41	51.30	29.85	48.36	51.50
RF2	54.39	95.33	99.91	99.77	96.48	93.61	104.81	109.60	101.23	54.39	95.01	109.60