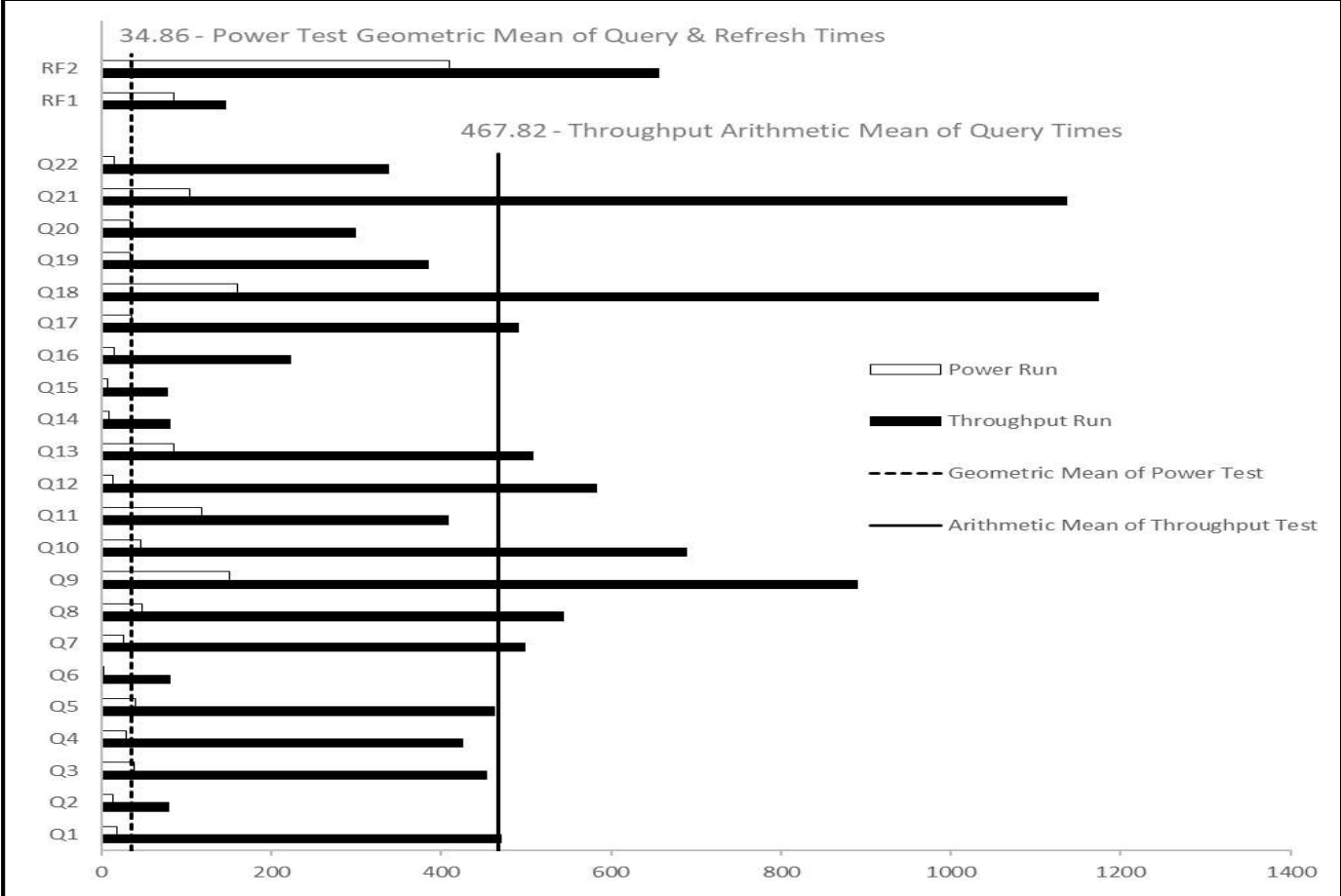
 Hewlett Packard Enterprise	HPE ProLiant DL560 Gen11	TPC-H Rev. 3.0.1 TPC Pricing Rev. 2.8.0		
		Report Date: Aug 03, 2023		
Total System Cost	Composite Query per Hour Rating	Price/Performance		
\$2,593,590 USD	2,604,288.3 QphH @ 30,000GB	\$995.90 USD \$ / kQphH @ 30,000GB		
Database Size	Database Manager	Operating System	Other Software	Availability Date
30,000GB	Microsoft® SQL Server 2022 Enterprise Edition	Windows Server 2022	None	May 01, 2023



Database Load Time = 03d 02h 15m 51s	Storage Redundancy Level	
Load included backup: Y	Base Tables and Auxiliary Data Structures	No RAID
Total Data Storage / Database Size = 1.42	DBMS Temporary Space	No RAID
Memory/Database Size = 27.31%	OS, DBMS Software and Transaction Log	RAID 1

System Components	System Total
Nodes:	1
Intel Xeon-Platinum 8490H 1.9GHz:	4
Cores/Threads:	240/480
Memory:	8,192 GiB
6.4TB/3.2TB/1.6TB NVMe Drives	2/4/12 (18 in total)
HPE NS204i-u Gen11 Boot Controller w/ 2 x 480GB Drives	1
MR416i-p Tri-mode controller	1
MCX631102AS-ADAT Ethernet 10/25Gb 2-port SFP28 Adapter for HPE	1
Total Storage:	42,617.36 GiB



HPE ProLiant DL560 Gen11

TPC-H Rev. 3.0.1
 TPC Pricing Rev. 2.8.0
 Report Date: Aug 03, 2023

Description	Price Key	Part Number	Unit Price	Qty	Extended Price	3 Yr Maint Price
HPE ProLiant DL560 Gen11 Liquid Cooling Configure-to-order Server	1	P55182-B21	\$9,064.00	1	\$9,064.00	
Intel Xeon-Platinum 8490H 1.9GHz 60-core 350W Processor for HPE	1	P49630-B21	\$44,200.00	4	\$176,800.00	
HPE 128GB (1x128GB) Quad Rank x4 DDR5-4800 CAS-46-39-39 EC8 Registered	1	P63345-B21	\$13,497.00	64	\$863,808.00	
HPE DL560 Gen11 8SFF x1 TM Kit	1	P54798-B21	\$389.00	2	\$778.00	
HPE 1.6TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 PM1735a SSD	1	P50227-B21	\$4,025.00	12	\$48,300.00	
HPE 3.2TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 PM1735a SSD	1	P50230-B21	\$6,476.00	4	\$25,904.00	
HPE 6.4TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 PM1735a SSD	1	P50233-B21	\$12,250.00	2	\$24,500.00	
HPE DL560 Gen11 2SFF U.3 Kit	1	P54801-B21	\$485.00	1	\$485.00	
HPE DL560 Gen11 SFF Univ Media Bay Kit	1	P60500-B21	\$261.00	1	\$261.00	
HPE DL560 Gen11 x8/x16/x8 Riser Kit	1	P54779-B21	\$254.00	2	\$508.00	
HPE MR416i-p Gen11 x16 Lanes 8GB Cache PCI SPDM Plug-in Storage Controller	1	P47777-B21	\$3,955.00	1	\$3,955.00	
Mellanox MCX631102AS-ADAT Ethernet 10/25Gb 2-port SFP28 Adapter for HPE	1	P42044-B21	\$1,500.00	1	\$1,500.00	
HPE 96W Smart Storage Lithium-ion Battery with 260mm Cable Kit	1	P01367-B21	\$234.00	1	\$234.00	
HPE 1600W Flex Slot Platinum Hot Plug Low Halogen Power Supply Kit	1	P38997-B21	\$685.00	4	\$2,740.00	
HPE DL560 Gen11 TM Box 1/2 Cbl Kit	1	P55320-B21	\$117.00	1	\$117.00	
HPE DL560 Gen11 TM Box 3 Cbl Kit	1	P59144-B21	\$106.00	1	\$106.00	
HPE NS204i-u Gen11 NVMe Hot Plug Boot Optimized Storage Device	1	P48183-B21	\$1,994.00	1	\$1,994.00	
HPE DL560 Gen11 LC FIO Heat Sink Kit	1	P54791-B21	\$1,652.00	2	\$3,304.00	
HPE DL560 Gen11 4P CPU Mezzanine Kit	1	P54803-B21	\$3,736.00	1	\$3,736.00	
HPE DL560 Gen11 4xPS Enable Kit	1	P54812-B21	\$354.00	1	\$354.00	
HPE ProLiant DL380a/DL560 Gen11 NS204i-u Rear Enablement Kit	1	P55710-B21	\$108.00	1	\$108.00	
HPE Gen 11 DL560 BB Rail Kit 8	1	P61501-B21	\$546.00	1	\$546.00	
HPE 3Y TC Bas DL560 Gen11 HW SVC	1	H40HYE	\$5,206.00	1		\$5,206.00
Subtotal					\$1,169,102	\$5,206
Other						
HP M24fw Monitor + Wireless Mouse + Keyboard kit	3	2D9K1AA#ABA, 3ML04AA#ABL	\$169.99	3	\$509.97	
Subtotal					\$510	
Server Software						
SQL Server 2022 Enterprise Edition (2 core license)	2	NA	\$15,123.00	120	\$1,814,760.00	
Microsoft Problem Resolution Services	2	NA	\$259.00	1		\$259.00
Windows Server 2022 Standard Edition (16 Core License)	2	NA	\$984.00	15	\$14,760.00	
Subtotal					\$1,829,520	\$259
Total Extended Price					\$2,999,132	\$5,465
Total Discounts					\$409,185	\$1,822
Price Key: 1 - HPE, 2 - Microsoft, 3 - Hewlett Packard Inc. Audited by Doug Johnson of InfoSizing (www.sizing.com)					Grand Total	\$2,589,947
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: \$2,593,590	
					QpH @ 30000GB: 2,604,288.30	
					\$ USD/kQpH @ 30000GB \$995.90	



**Hewlett Packard
Enterprise**

HPE ProLiant DL560 Gen11

TPC-H Rev. 3.0.1
TPC Pricing Rev. 2.8.0

Report Date:
Aug 03, 2023

Numerical Quantities

Measurement Results

Database Scale Factor	30,000
Total Data Storage / Database Size	1.42
Percentage Memory / Database Size	27.31%
Start of Database Load	2023-07-23 23:18:59
End of Database Load	2023-07-27 07:24:20
Database Load Time	03d 02h 15m 51s
Query Streams for Throughput Test	10
TPC-H Power	3,097,946.2
TPC-H Throughput	2,189,294.8
TPC-H Composite Query-per-Hour (QpH@30,000GB)	2,604,288.3
Total System Price over 3 Years (\$ USD)	\$2,593,590
TPC-H Price/Performance Metric (\$ USD / kQpH@30,000GB)	\$995.90

Measurement Interval

Measurement Interval in Throughput Test **10852.8 seconds**

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
	727072420	2023-07-27 11:17:01	00:17:29	2023-07-27 11:15:35	2023-07-27 11:34:30
		2023-07-27 11:34:30		2023-07-27 11:17:01	2023-07-27 11:41:19
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	727072421	2023-07-27 11:41:18	02:44:32	2023-07-27 11:41:18	2023-07-27 11:43:37
		2023-07-27 14:25:50		2023-07-27 11:43:37	2023-07-27 11:52:36
2	727072422	2023-07-27 11:41:18	02:41:45	2023-07-27 11:52:36	2023-07-27 11:54:33
		2023-07-27 14:23:03		2023-07-27 11:54:33	2023-07-27 12:02:58
3	727072423	2023-07-27 11:41:18	02:59:36	2023-07-27 12:02:58	2023-07-27 12:04:58
		2023-07-27 14:40:54		2023-07-27 12:04:58	2023-07-27 12:13:08
4	727072424	2023-07-27 11:41:18	03:00:27	2023-07-27 12:13:08	2023-07-27 12:16:46
		2023-07-27 14:41:45		2023-07-27 12:16:46	2023-07-27 12:26:30
5	727072425	2023-07-27 11:41:18	02:57:25	2023-07-27 12:26:30	2023-07-27 12:28:38
		2023-07-27 14:38:43		2023-07-27 12:28:38	2023-07-27 12:38:42
6	727072426	2023-07-27 11:41:19	02:37:21	2023-07-27 12:38:42	2023-07-27 12:40:46
		2023-07-27 14:18:40		2023-07-27 12:40:46	2023-07-27 12:51:04
7	727072427	2023-07-27 11:41:19	02:39:22	2023-07-27 12:51:04	2023-07-27 12:53:21
		2023-07-27 14:20:41		2023-07-27 12:53:21	2023-07-27 13:05:46
8	727072428	2023-07-27 11:41:19	03:00:53	2023-07-27 13:05:47	2023-07-27 13:07:49
		2023-07-27 14:42:12		2023-07-27 13:07:49	2023-07-27 13:23:58
9	727072429	2023-07-27 11:41:19	02:59:06	2023-07-27 13:23:58	2023-07-27 13:26:42
		2023-07-27 14:40:25		2023-07-27 13:26:42	2023-07-27 13:38:19
10	727072430	2023-07-27 11:41:19	02:55:05	2023-07-27 13:38:19	2023-07-27 13:41:31
		2023-07-27 14:36:24		2023-07-27 13:41:31	2023-07-27 13:54:57

TPC-H Timing Intervals (in seconds):

Stream ID	0	1	2	3	4	5	6	7	8	9	10	QI Min	QI Avg	QI Max
Q1	18.31	393.47	258.81	437.72	751.00	329.09	526.61	471.36	359.78	664.32	519	18.31	429.95	751.00
Q2	14.33	121.03	121.64	47.16	97.31	55.97	65.24	63.92	48.24	74.81	90.31	14.33	72.72	121.64
Q3	39.04	456.79	252.35	60.69	447.81	766.88	694.68	261.30	842.44	580.75	167.68	39.04	415.49	842.44
Q4	29.13	737.79	585.00	327.43	313.62	447.61	193.40	385.49	227	512.93	527.05	29.13	389.68	737.79
Q5	39.63	463.24	208.81	903.46	305.48	691.07	314.47	639.44	276.89	450.91	372.16	39.63	424.14	903.46
Q6	2.03	88.32	5.38	72.27	112.99	83.08	52.26	116.06	71.28	123.18	79.54	2.03	73.31	123.18
Q7	26.48	328.08	508.25	755.97	569.63	1,027.96	217.73	616.81	317.11	495.65	152.74	26.48	456.04	1,027.96
Q8	48.10	837.63	387.19	426.76	654.13	876.46	628.88	440.05	370.47	469.1	341.72	48.10	498.23	876.46
Q9	151.08	533.72	790.80	1,299.75	404.21	648.96	732.06	933.07	1348.99	1180.75	1031.27	151.08	823.15	1,348.99
Q10	47.02	899.05	563.05	921.60	524.02	973.37	569.70	315.27	1270.1	468.88	391.09	47.02	631.20	1,270.10
Q11	118.83	178.64	639.00	436.97	498.67	440.35	173.14	376.33	234.9	737.03	359.94	118.83	381.25	737.03
Q12	13.51	762.49	565.50	483.38	307.67	431.39	519.52	698.04	426.88	369.04	1261.98	13.51	530.85	1,261.98
Q13	85.41	342.19	677.72	499.27	668.47	655.00	233.75	571.26	193.38	648.77	587.09	85.41	469.30	677.72
Q14	8.78	41.92	86.90	145.32	125.55	14.61	101.61	102.25	61.23	35.79	93.27	8.78	74.29	145.32
Q15	7.26	126.84	104.91	129.80	56.94	62.63	60.03	22.65	70.14	46.78	87.16	7.26	70.47	129.80
Q16	14.60	359.23	329.15	124.38	154.80	177.35	354.66	357.34	222.68	49.66	90.54	14.60	203.13	359.23
Q17	34.74	379.03	458.20	517.54	466.73	598.96	716.96	131.25	768.4	363.72	506.67	34.74	449.29	768.40
Q18	160.70	1,336.83	876.65	1,349.44	1,733.87	485.12	562.82	833.78	1752.74	1223.2	1585.93	160.70	1,081.92	1,752.74
Q19	34.09	189.12	397.88	575.93	475.75	596.91	395.47	577.87	125.29	419.94	89.51	34.09	352.52	596.91
Q20	34.14	264.13	266.88	119.86	136.04	320.52	378.00	158.29	546.83	218.52	574.36	34.14	274.32	574.36
Q21	104.69	951.93	813.82	881.87	1,952.71	865.91	1,256.87	1,441.41	737.74	1148.6	1307.93	104.69	1,042.13	1,952.71
Q22	15.75	79.00	805.50	257.68	67.93	94.62	692.22	48.51	580.01	462.65	287.52	15.75	308.31	805.50
RF1	85.40	137.69	116.51	120.14	218.19	127.60	124.28	137.23	122.68	164.17	192.08	85.40	140.54	218.19
RF2	409.53	538.83	505.02	489.67	584.30	603.68	617.22	745.37	968.51	696.73	805.24	409.53	633.10	968.51