Performance Brief

Enterprise
Data Center

Microsoft SQL Server Performance on Intel® Xeon® 6 Processors

Executive Summary

This document provides an overview of a comprehensive performance analysis and system tuning carried out on the latest Intel® Xeon® 6 processors.

The higher performance of Intel Xeon 6 processors deliver significant TCO savings for database workloads such as Microsoft SQL Server. Enhanced processor capabilities result in higher scalability, faster query execution, and reduced latency for demanding business applications. Intel Xeon 6 processors deliver up to 92 percent performance upside for Online Transactional Processing (OLTP) workloads and 47 percent for Online Analytical Processing (OLAP) workloads running Microsoft SQL Server over 3rd Gen Intel® Xeon® processors at iso-core count. By refreshing and consolidating your infrastructure to the latest Intel Xeon 6 processors, your organization can achieve significant 1.74X-2.29X perf/dollar savings directly translating to up to around 20 percent TCO savings at iso-core count.

Intel Xeon 6 processors deliver up to

92%
performance gain

AND

2.29X
perf/dollar
(over 3rd Gen Intel Xeon processors)

Testing Objectives

Online Transaction Processing (OLTP)

We simulate an OLTP system by running the TPROC-C benchmark from the HammerDB benchmark, using New Orders Per Minute (NOPM) as the key performance metric. The setup used 150 virtual users, mimicking online transactions on 800 data warehouses.

Online Analytical Processing (OLAP)

We stimulate an OLAP decision support system by running the TPROC-H benchmark from the HammerDB benchmark, using Query per hour as the primary performance metric. The setup used 150 virtual users.

Results

TPROC-C Benchmark Performance

The chart below showcases the performance speedup of TPROC-C on Intel Xeon 6 processors over 3rd Gen Intel Xeon processors. With Intel Xeon 6 processors, 92 percent more NOPMs are delivered at iso-core count compared to 3rd Gen Intel Xeon processors. This significant increase in throughput at iso-core count directly translates to 2.29X perf/$ savings reducing an organization's TCO (see figure 1).

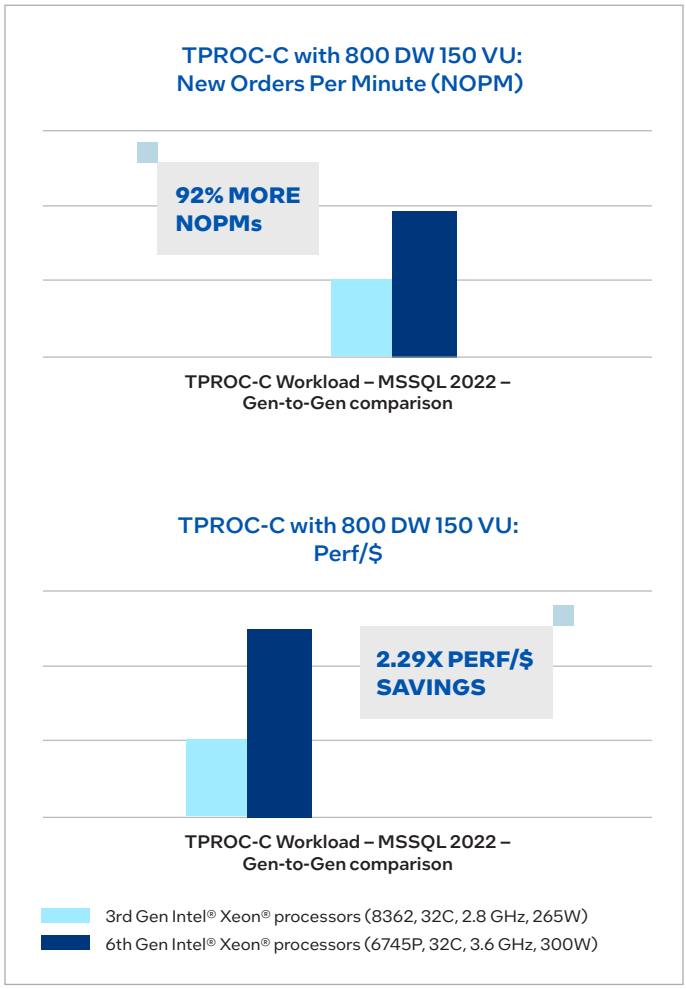

Figure 1. TPROC-C with 800 DQ 150 VC: New Orders per Minute (NOPM) and Perf/$.

TPROC-H Benchmark Performance

The chart below showcases the performance speedup of TPROC-H on Intel Xeon 6 processors over 3rd Gen Intel Xeon processors. With Intel Xeon 6 processors, 47 percent more queries per hour are delivered at iso-core count compared to 3rd Gen Intel Xeon processors. This significant increase in throughput at iso-core count directly translates to 1.74X perf/$ savings reducing an organization's TCO (see figure 2).

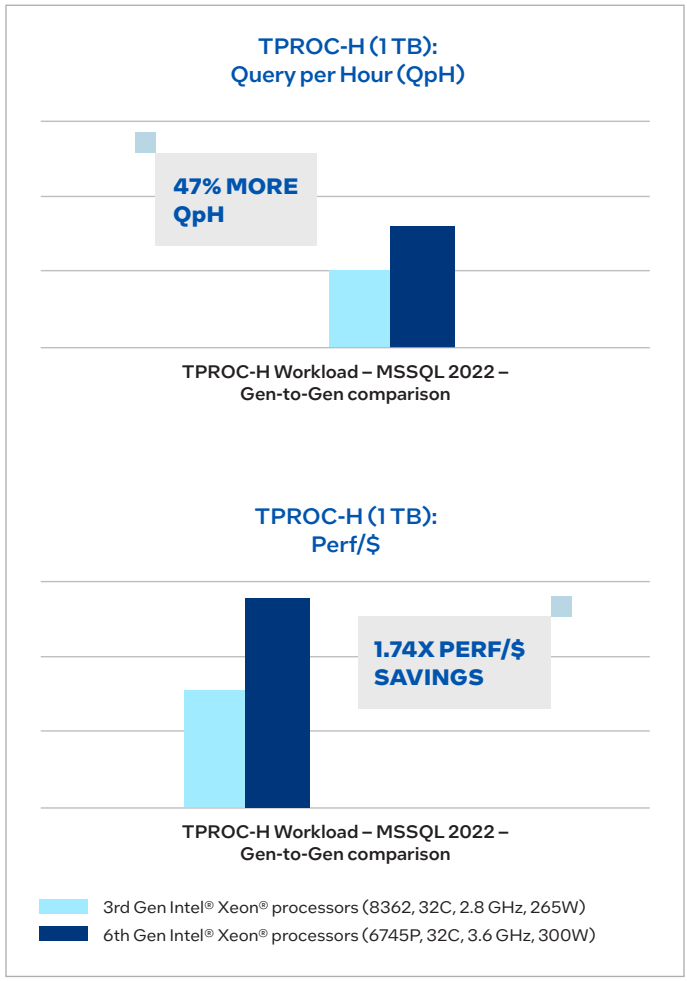

Figure 2. TPROC-H (1 TB): Query per Hour (QpH) and Perf/$.

Test Configuration Details

Hardware Setup

System	3rd Gen Intel® Xeon® processor-based System	Intel® Xeon® 6 processor-based System
Baseboard	Dell Inc. 0PYXKY	Quanta Cloud Technology Inc. S7Q-MB-MPS-MDP
CPU Model	Intel® Xeon® Gold 8362	Intel® Xeon® 6745P processor
Architecture	x86_64	x86_64
Microarchitecture	ICX	GNR_X2
L3 Cache	48 MiB	336 MiB
Cores per Socket	32	32
Sockets	2	2
Hyperthreading	Enabled	Enabled
CPUs	128	128
Intel® Turbo Boost	Enabled	Enabled
Base Frequency	2.8 Ghz	3.6 GHz
All-Core Maximum Frequency	3.5 Ghz	4.1 GHz
Maximum Frequency	3.6 Ghz	3.6 Ghz
NUMA Nodes	2	8
Installed Memory	1024GB (16x64GB DDR4 2933MT/s [2933MT/s])	1024GB (16x64GB DDR5 6400MT/s [6400MT/s])
Hugepagesize	2048 kB	2048 kB
Transparent Huge Pages	Madvise	Madvise
Automatic NUMA Balancing	Enabled	Enabled
NIC	2x Ethernet Controller E810-C for QSFP, 4x Ethernet Controller E810-XXV for SFP, 2x NetXtreme BCM5720 Gigabit Ethernet PCIe	1x Broadcom NetXtreme E-series Quad port 10Gb Base-T OCP 3.0 Adapter
Disk	1x 447.1G DELLBOSS VD, 1x 2.8G Virtual CD/DVD, 8x 3.5T INTEL SSDPF2KX038TZ, 2x 2.9T Dell Ent NVMe P5600 MU U.2 3.2TB	1x 4.4G Virtual Media Slot, 3x 1.5T Dell Ent NVMe P5600 MU U.2 1.6TB, 5x 2.9T Dell Ent NVMe P5600 MU U.2 3.2TB, 1x 1.7T Micron_7450_ MTFDKCC1T9TFR
BIOS	1.12.1	3A16.QCT001
Microcode	0xd0003e7	0x1000380
OS	Microsoft Windows Server 2025	Microsoft Windows Server 2025
Kernel		5.14.0-427.66.1.el9_4.x86_64
TDP	265W	300W
Power & Perf Policy	Performance	Performance
Frequency Governor	schedutil	Schedutil
Frequency Driver	Intel_cpufreq	acpi-cpufreq
Vulnerability	19 OK, 0 Vulnerable	19 OK, 0 Vulnerable

Table 1. Hardware Configuration.

Software Setup

System	Microsoft SQL Server 2022 version 16.0.4195.1
Test application	Test application HammerDB 4.11 TPROC-C benchmark for Online Transaction Processing (OLTP) TPROC-H benchmark for decision support system Both benchmark executed through HammerDB tool from client, connected over 25Gpbs switch

Table 2. Software Configuration.

Conclusion

Intel Xeon 6 processors built on the latest Intel technology and optimized for higher performance, deliver up to a 92 percent performance gain and 2.29X perf/dollar over the 3rd Gen Intel Xeon processors at iso-core count for Microsoft SQL Server.

The substantial gains in performance directly translate to up to around 20 percent TCO savings at iso-core count.

Authors

Smita Kamat

Senior Performance Engineer, Intel

Dhruv Desai

Senior Performance Engineer, Intel

Mishali Naik

Senior Principal Engineer, Intel