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Technical Brief

Modernize Enterprise Open-Source Databases with New Processors for Improved VM Density and Greater Performance

Testing by Prowess Consulting found that refreshing systems with older processors to servers powered by the latest Intel® Xeon® 6 processors can help organizations get ready for AI-infused workloads.

The Imperative to Modernize

Transaction volumes are increasing and concurrency is rising. Meanwhile, mixed workloads have become the norm. Older server platforms can struggle to deliver consistent performance at scale, which can leave organizations running near capacity with little headroom. At the same time, rack-level power and cooling limits constrain growth even as compute demand rises.

Open-source databases have their own infrastructure challenges associated with growth. As transaction volumes and concurrency increase, organizations must either add servers or extract more capacity from existing data-center resources. Older platforms can limit that capacity by requiring more infrastructure to support additional database instances and sustained demand. The rising prevalence of AI-infused applications adds urgency to modernization by placing further demands on database compute, memory bandwidth, and concurrency.

Despite these pressures, many enterprises delay refresh cycles due to perceived risks and rising costs. They often worry that platform changes can introduce downtime, retraining, and validation burdens. One approach to mitigate these risks is to prioritize modernization paths that deliver measurable performance, efficiency, and consolidation gains while avoiding disruptive architectural changes.

To evaluate the potential benefits of a generation-over-generation platform refresh, Prowess Consulting conducted testing using representative enterprise workloads. We focused on the benefits of a direct Intel-to-Intel refresh to reflect the fact that many enterprises already run earlier-generation Intel® Xeon® processors, making this a familiar architecture for their teams, and to help them overcome challenges that might bar organizations from taking advantage of newer technologies.

What We Tested and Why

For this testing, we selected the **HPE® ProLiant® Compute DL380 Gen12** platform because it represents a widely deployed enterprise server design used in many mainstream data center environments. Evaluating Intel Xeon 6 processors in this platform allowed us to examine the benefits of a generation-over-generation refresh in a system designed for operational consistency, lifecycle management, and broad enterprise applicability.

Our testing used a modern virtualized environment aligned with typical enterprise operations, for which we used Red Hat® OpenShift® to reflect current virtualization practices. We drove all workloads using the HammerDB online transaction processing (OLTP) benchmark, with supporting storage and network checks used to confirm compute-bound behavior. For all workloads, we evaluated two server generations: a prior-generation baseline built on 3rd Gen Intel Xeon Scalable processors and a newer evaluation platform powered by Intel Xeon 6 processors. We intentionally varied virtual machine (VM) sizing and density to evaluate right-sizing and consolidation behavior.

We selected a test suite that reflects current enterprise relevance, with MySQL® and PostgreSQL® representing a mix of commercial and open-source transactional workloads commonly deployed in production environments. Our measurements emphasized aggregate throughput, scaling characteristics, and consolidation efficiency rather than isolated peak performance. The results captured throughput across multiple load levels, observed VM density limits, and the implications for infrastructure footprint. This approach supports an evaluation of how newer platforms behave as utilization and consolidation increase.

Table 1 | Test overview

Category	Description
Workloads	• MySQL® • PostgreSQL®
Database Versions	Enterprise-relevant releases (current and near-term)
Benchmark	HammerDB (OLTP workloads)
Virtualization Platform	Red Hat® OpenShift® 4.20.10
Hardware Platforms	• Baseline: 3rd Gen Intel® Xeon® Scalable processors • Evaluation: Intel Xeon 6 processors
VM Configuration	Multiple vCPU sizes; varied VM density for right-sizing and consolidation analysis
Key Metrics Measured	• Aggregate throughput (transactions per minute [TPM] and new orders per minute [NOPM]) • Scaling behavior • VM density

Results and Analysis

Our analysis found that modernizing to systems powered by Intel Xeon 6 processors unlocks significant performance and efficiency gains, with differentiated benefits across database workloads.

MySQL®: Consistent Performance and Efficiency Gains

MySQL throughput on the platform based on Intel Xeon 6 processors improved consistently from a single virtual user through peak load, delivering approximately 2.5–3.5x higher aggregate TPM than the baseline powered by 3rd Gen Intel Xeon Scalable processors. Gains increased steadily through 8 virtual users, where throughput reached approximately 3.5x the baseline, then remained stable at that level, reducing to only 3.2x the baseline at 16 virtual users, which indicates that the platform sustains its performance advantage without degradation as concurrency increases. Unlike workloads where consolidation density is the primary driver of uplift, MySQL performance on the Intel Xeon 6 platform reflects architectural efficiency gains that are consistent regardless of load configuration.

Testing by Prowess Consulting found that, compared to running MySQL® on systems powered by 3rd Gen Intel® Xeon® Scalable processors, systems powered by Intel Xeon 6 processors provide up to:

3.5x higher

throughput

PostgreSQL®: Scalable Performance
PostgreSQL throughput on the platform based on Intel Xeon 6 processors scaled strongly with concurrency, delivering approximately 1.5–3.6x higher aggregate TPM than the baseline based on 3rd Gen Intel Xeon Scalable processors across tested virtual user counts. The lower end of that range reflects single-virtual-user conditions. As virtual user counts increased, throughput gains grew consistently, reaching approximately 3.6x at 8 virtual users and remaining in the 3.4–3.5x range through 14 virtual users. (Throughput spiked to 4.0x at 16 virtual users, but this outlying data point is the result of contention on the VM.) These gains indicate effective use of the platform's additional cores, cache, and memory bandwidth as load increased.

Testing by Prowess Consulting found that, compared to running PostgreSQL® on systems powered by 3rd Gen Intel® Xeon® Scalable processors, systems powered by Intel Xeon 6 processors provide up to:

3.6x higher
throughput

Tested on Red Hat® OpenShift®
The database workloads in this study ran on Red Hat OpenShift, Red Hat's enterprise Kubernetes® platform for deploying and managing containerized workloads at scale. OpenShift provided the virtualization layer for all tested configurations. This setup reflects how modern enterprises increasingly run database workloads: in orchestrated, containerized environments rather than on bare-metal or traditional hypervisors. Our testing demonstrates that Intel® Xeon® 6 processors deliver their performance and consolidation advantages within that operational reality, not in an idealized standalone configuration.

What Modernization Means for Enterprises

The performance and consolidation gains found in our testing reflect not just AI-readiness as a consequence of generational compute improvements, but also a broader set of platform advantages that Intel Xeon 6 processors bring to production database environments.

AI-Readiness Outcomes
The observed gains in throughput, scaling efficiency, and consolidation headroom indicate improved readiness for AI-infused database capabilities. Higher sustained compute capacity and memory efficiency create headroom for features such as intelligent query processing, vector search, and embedded analytics, enabling adoption without requiring disruptive infrastructure changes.

Additional Intel Xeon 6 Platform Modernization Advantages
Our testing shows that architectural improvements (such as higher core counts, increased memory bandwidth, and cache enhancements) in Intel Xeon 6 processors directly benefit database throughput and concurrency. We found that these newer processors' support for Intel® Advanced Vector Extensions 512 (Intel® AVX-512) accelerates compute-intensive database operations (including advanced AI features in database platforms) within existing power and space envelopes.

Newly supported in Intel Xeon 6 processors, Compute Express Link® (CXL®) expands memory capacity and flexibility by enabling coherent attachment of external memory devices, which helps reduce bottlenecks in data-intensive database workloads. Also new, support for Flat Memory Mode further simplifies memory management by presenting combined local and CXL-attached memory as a single, unified address space, allowing databases to scale larger in-memory datasets without application changes. And the built-in innovative reliability, availability, and serviceability (RAS) capabilities further strengthen the case for mission-critical deployments, with alignment to OEM-specific management and diagnostic tooling.

Intel's platform continuity also simplifies migration and ongoing operations. Long-standing ecosystem compatibility supports zero-downtime migrations (via tools such as the Red Hat® Migration Toolkit for Virtualization) that preserve consistency in virtualization performance and support. For database administrators (DBAs) and IT teams, that capability translates into modernization with minimal retraining, lower operational risk, and faster time to value.

Modernization That Pays Off

Generation-over-generation testing from Prowess Consulting shows that refreshing to servers powered by Intel Xeon 6 processors can deliver meaningful gains in performance, efficiency, and consolidation for open-source databases. MySQL and PostgreSQL workloads see substantial throughput and performance-per-watt improvements. Together, these gains reduce infrastructure strain, improve cost efficiency, and create headroom for AI-enabled database capabilities. For enterprises looking to modernize without disruption, an Intel-to-Intel refresh offers a practical, low-risk path to near-term value and long-term readiness.

Explore the latest research from Prowess Consulting at **prowessconsulting.com**.

Appendix: Methodology and Configurations

Hardware Configurations

Category	Previous-Generation Intel Server	HPE® ProLiant® Compute DL380 Gen12
Node Count	4	4
CPU	2 x Intel® Xeon® Silver 4314	2 x Intel Xeon 6737P
Memory	512 GB	1 TB
Disk	• 2 x 480 GB Intel® solid-state drive (SSD) • 2 x 2 TB Intel SSD	• 2 x 960 GB HPE® SSD • 4 x 1.6 TB HPE SSD
Operating System	Red Hat® Enterprise Linux® CoreOS® 9.6.20251219-0 (Plow)	Red Hat Enterprise Linux CoreOS 9.6.20260217-1 (Plow)

Cluster Configuration

Category	Intel® Xeon® Silver 4314 Processors with Red Hat® OpenShift® VMs	Intel Xeon 6737P Processors with Red Hat OpenShift VMs
Topology	1 control plane + 4 worker nodes	1 control plane + 4 worker nodes
Worker Memory	512 GB	1 TB
HugePages on Workload Node	448 GB	956 GB
Operating System	Red Hat Enterprise Linux® CoreOS® 4.20 (based on Red Hat Enterprise Linux 9.6)	Red Hat Enterprise Linux CoreOS 4.20 (based on Red Hat Enterprise Linux 9.6)
VM Instance Types	8 vCPUs with 56 GB memory	8 vCPUs with 56 GB memory, 6 vCPUs with 32 GB memory

Ubuntu® with MySQL VM Configuration

Category	Intel® Xeon® Silver 4314 Processors with Red Hat® OpenShift® VMs	Intel Xeon 6737P Processors with Red Hat OpenShift VMs
VM Count	8	16
vCPU	8	8
Memory	56	56
Storage	• 1 x 50 GB (boot drive) • 3 x 100 GB (data drives) • XFS filesystem	• 1 x 50 GB (boot drive) • 3 x 100 GB (data drives) • XFS filesystem
Operating System	Ubuntu® Server 22.04.5	Ubuntu Server 24.04.4
MySQL® Version	MySQL 8.0.45	MySQL 9.5.0
Benchmark	HammerDB 5.0	HammerDB 5.0
Warehouse Count	54	54
Virtual User Test	1, 2, 4, 6, 8, 10, 12, and 16	1, 2, 4, 6, 8, 10, 12, and 16

Ubuntu with PostgreSQL VM Configuration

Category	Intel® Xeon® Silver 4314 Processors with Red Hat® OpenShift® VMs	Intel Xeon 6737P Processors with Red Hat OpenShift VMs
VM Count	8	16
vCPU	8	8
Memory	56	56
Storage	• 1 x 50 GB (boot drive) • 3 x 100 GB (data drives) • XFS filesystem	• 1 x 50 GB (boot drive) • 3 x 100 GB (data drives) • XFS filesystem
Operating System	Ubuntu® Server 22.04.5	Ubuntu Server 24.04.4
PostgreSQL® Version	PostgreSQL 13	PostgreSQL 17
Benchmark	HammerDB 5.0	HammerDB 5.0
Warehouse Count	54	54
Virtual User Test	1, 2, 4, 6, 8, 10, 12, and 16	1, 2, 4, 6, 8, 10, 12, and 16

The analysis in this document was done by Prowess Consulting and commissioned by Intel.
Results have been simulated and are provided for informational purposes only.
Any difference in system hardware or software design or configuration may affect actual performance.

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