White Paper

Managing SQL Server Databases with Nutanix Database Service (NDB)

NUTANIX

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Executive Summary

Microsoft SQL Server is one of the most widely deployed enterprise databases, consistently ranking among the top three relational database platforms globally according to DB-Engines, and used by over 30% of developers worldwide based on the 2025 Stack Overflow Developer Survey. This sustained adoption reflects the role of SQL Server in supporting mission-critical workloads across industries such as finance, healthcare, retail, and manufacturing.

As SQL Server estates have grown in size and complexity, Microsoft has actively evolved its platform strategy to reduce operational overhead through managed deployment models. Services such as Azure SQL Database and SQL Managed Instance abstract away provisioning, patching, backups, and high availability, while broader support for SQL Server on Linux and containerized deployments - via Kubernetes, Azure Kubernetes Service (AKS), and Azure Arc enabled hybrid environments - offers customers additional cloud-native and hybrid options. For organizations able to fully align with Azure centric or container-native operating models, these approaches significantly modernize database operations and reduce traditional administrative burden.

However, these models are not universally applicable across all enterprise environments. Regulatory and data-residency requirements, latency-sensitive workloads, existing investments in on-premises infrastructure, concerns around long-term vendor lock-in, and the complexity of refactoring legacy applications continue to limit the feasibility of adopting Azure managed or Kubernetes based deployment models for many customers. In addition, cost predictability and total cost of ownership remain important considerations. While managed cloud services reduce operational effort, some customers may experience higher ongoing infrastructure and licensing costs compared to optimized on-premises or hybrid deployments, particularly for steady-state, high-utilization workloads.

As a result, a substantial portion of SQL Server estates continues to operate in customer-managed environments — whether on-premises or in self-managed cloud VMs — even as the SQL Server platform itself continues to advance.

However, in these customer-managed environments, the operational model for running SQL Server at scale has not evolved at the same pace as the database engine. Industry research indicates that database teams still spend a disproportionate amount of time on reactive and repetitive operational tasks - such as manual provisioning, patch coordination, backup management, and incident response - rather than on higher-value activities like performance optimization or modernization. For example, SolarWinds' 2025 State of Database Management report found that DBAs spend nearly 27 hours per week on reactive work, and that fragmented tooling remains common across enterprises.

These operational inefficiencies also have downstream cost implications. Because SQL Server is licensed on a per-core basis, practices commonly used to manage operational risk - such as over-allocating CPU resources, deploying isolated virtual machines per workload, or maintaining duplicate environments for availability and testing - can materially increase licensing requirements under Microsoft's published guidance. As SQL Server estates scale to hundreds or thousands of instances, this combination of manual operations and core-based licensing amplifies cost, operational risk, and SLA pressure.

Nutanix Database Service (NDB) transforms SQL Server into a self-managed, automated database service by combining enterprise-grade Nutanix Cloud Infrastructure (NCI) or Nutanix Cloud Clusters (NC2) platforms with policy-driven database lifecycle automation. NDB enables customers to retain operational ownership while embedding infrastructure and SQL Server best practices into provisioning and operations, standardizing how SQL Server is deployed, protected, patched, cloned, and operated across standalone instances, Always On Availability Groups, and Failover Cluster Instances in on-premises and cloud environments.

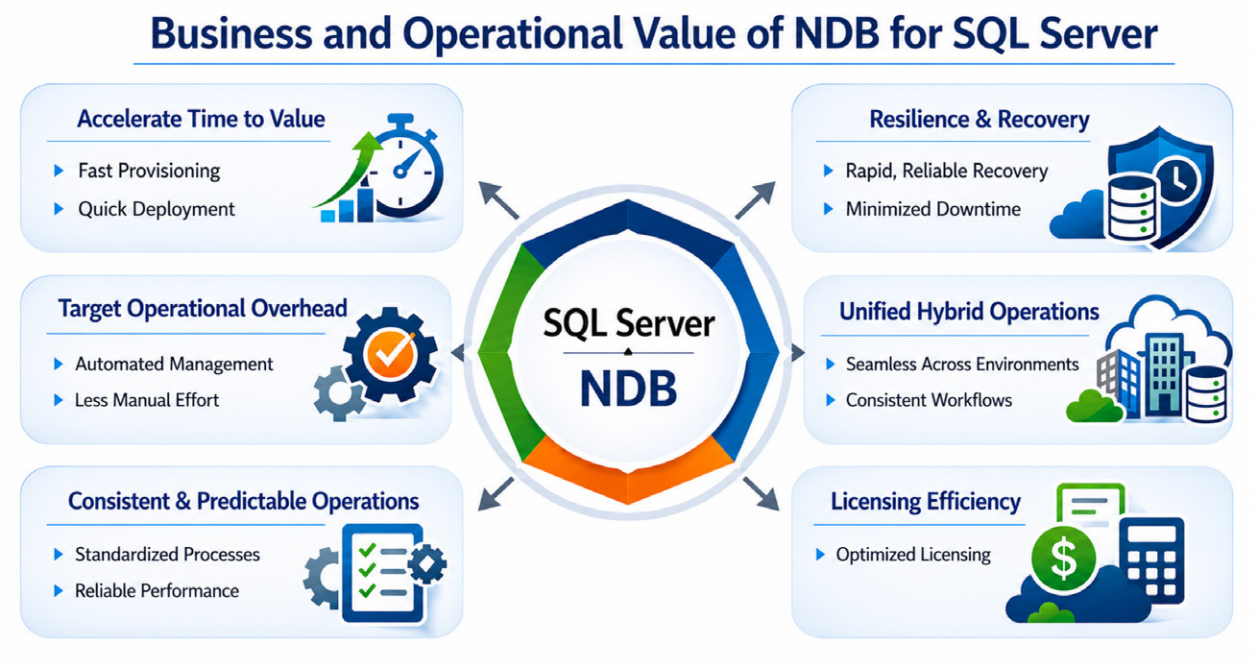
NDB automates and governs–through policy-based controls, role-based access, and operational guardrails–the infrastructure and operational lifecycle of SQL Server, while SQL Server software support and licensing remain directly between the customer and Microsoft. Public customer references highlight measurable operational benefits: Penn National Insurance was able to effectively reduce the time required to protect its SQL Server databases from approximately seven hours using native backups to four minutes using snapshot-based protection through Nutanix Database Service (NDB), representing a material improvement in operational efficiency and recovery responsiveness. BisB (Bahrain Islamic Bank) notes that NDB reduced database provisioning from days to under an hour, shortening time to support development and testing.

These customer outcomes are reinforced by independent analysis. The 2026 Forrester Total Economic Impact™ (TEI) study for Nutanix Database Service found that a composite organization of the customers in their study achieved a 136% return on investment over three years, $2.0 million in net present value, and payback within six months. The study also highlighted a 90% reduction in patching effort through a unified control plane and significant acceleration of provisioning timelines - from multi-day manual processes to automated delivery measured in minutes.

Collectively, these findings demonstrate how NDB's automated workflows and enforcement of validated designs enable enterprises to shift database teams from reactive maintenance to strategic innovation. By reducing operational overhead, improving governance, and increasing efficiency within Microsoft's licensing framework, NDB can deliver measurable financial and operational impact for organizations running mission-critical SQL Server workloads at scale.

Business and Operational Value

Running SQL Server at enterprise scale requires more than reliable infrastructure - it demands an operating model that can deliver speed, consistency, and resilience without increasing operational complexity. Nutanix Database Service (NDB) can deliver measurable business and operational value by transforming how SQL Server environments are provisioned, managed, and operated across their lifecycle.



Accelerate Time to Value

NDB provides an opportunity to significantly reduce the time required to deliver production-ready SQL Server environments. By automating provisioning and embedding proven infrastructure and database best practices, NDB removes many of the manual steps and cross-team dependencies traditionally associated with deploying SQL Server. This enables application and platform teams to move from request to availability in minutes rather than days or weeks, accelerating project timelines and improving overall business agility.

Target Operational Overhead

As SQL Server estates grow, manual processes and instance-by-instance management create operational friction and consume a disproportionate amount of DBA and infrastructure team time. NDB replaces these manual workflows with centralized, policy-driven automation for common lifecycle

operations such as provisioning, patching, backup, recovery, and cloning. This reduces repetitive administrative work, lowers the risk of human error, and allows teams to focus on higher-value initiatives such as performance optimization, improving availability and resiliency, and strengthening operational best practices.

Consistent and Predictable Operations at Scale

Operational consistency is one of the most difficult challenges in large SQL Server environments. Variations in configuration, patch levels, and operational practices can lead to unpredictable behavior, longer troubleshooting cycles, and increased risk during maintenance and recovery events. NDB enforces consistency through standardized workflows and profiles that apply uniformly across deployment models and environments. This repeatability improves operational predictability, simplifies governance, and increases confidence as SQL Server environments scale.

Resilience and Recovery Opportunities

From a business perspective, resilience is measured by how quickly and reliably systems can recover when issues occur. NDB helps customers to improve recovery outcomes by integrating application-consistent, point-in-time recovery into the SQL Server lifecycle. Standardized high availability configurations and consistent recovery workflows reduce uncertainty during incidents and enable faster restoration of services, helping organizations meet recovery objectives and minimize business disruption.

Unified Operations Across Hybrid Environments

Modern SQL Server deployments increasingly span on-premises data centers, co-location facilities, and public cloud environments. Managing these environments with different tools and processes introduces operational fragmentation and inefficiency. NDB provides a unified operational model across hybrid environments, allowing organizations to apply the same provisioning, patching, protection, and recovery workflows regardless of where SQL Server runs. This consistency simplifies operations, reduces training overhead, and supports evolving infrastructure strategies without disrupting existing processes.

Operational Discipline That Can Support Licensing Efficiency

SQL Server licensing is closely tied to operational decisions such as VM sizing, consolidation, and environment sprawl. While NDB does not alter Microsoft's licensing model, it promotes more consistent operational practices by enabling right-sized deployments, reducing unnecessary duplication, and simplifying consolidation across environments. Over time, this disciplined approach helps organizations better understand and manage their SQL Server footprint, leading to more predictable infrastructure and licensing-related costs as SQL Server estates expand.

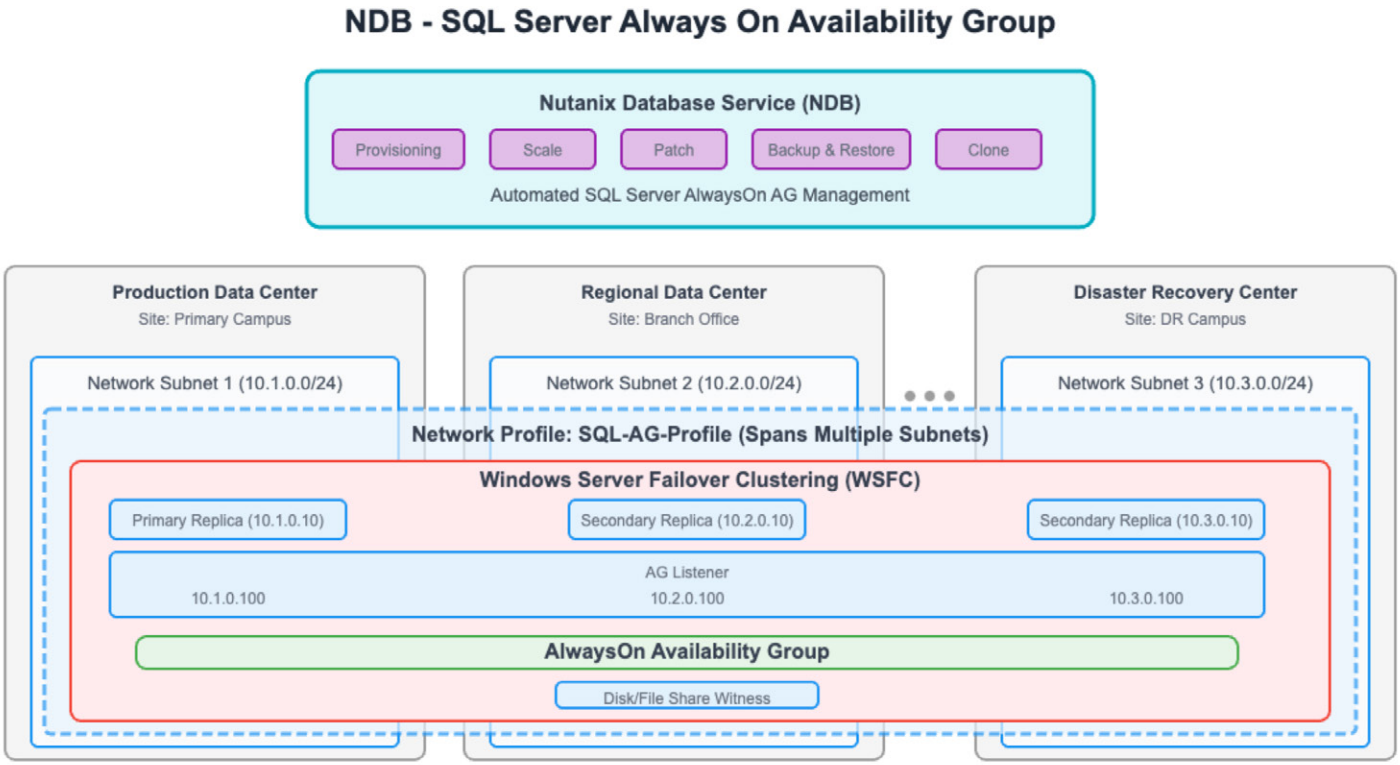
NDB Architecture

Nutanix Database Service (NDB) for SQL Server uses a clear separation between the control plane and the database data plane. The NDB control plane provides centralized, policy-driven automation for SQL Server lifecycle operations such as provisioning, profile-driven configuration, patching, cloning, backup, and point-in-time recovery.

Users interact with NDB through a self-service UI or APIs, as well as through external automation and service portals such as ServiceNow, infrastructure-as-code tools including Terraform and Ansible, and a Kubernetes operator. The Kubernetes operator enables cloud-native applications to request SQL Server databases declaratively from Kubernetes; however, the provisioned database runs as a full Microsoft SQL Server instance on a virtual machine. The operator acts as an integration and orchestration interface rather than a containerized database deployment model.

NDB orchestrates native SQL Server and Nutanix platform workflows while remaining outside the database I/O path, which is meant to avoid introducing runtime overhead or becoming a performance bottleneck for database workloads.

SQL Server databases run on Windows virtual machines deployed on Nutanix Cloud Infrastructure, supporting standalone instances, Always On Availability Groups, and Failover Cluster Instances. Database files reside on Nutanix's distributed storage fabric, which co-locates compute and storage to deliver low-latency, scalable performance. NDB coordinates application-consistent snapshots, log-based recovery, rolling patching, and instant cloning by integrating with SQL Server services and Nutanix APIs, while all query processing and data access remain native to SQL Server.



What Makes Running SQL Server on NDB Different?

	Traditional SQL Server Management	SQL Server with Nutanix Database Service (NDB)
Operating Model	SQL Server is managed primarily at the individual VM or cluster level, with provisioning, configuration, and ongoing operations performed independently for each deployment. Operational standards are enforced through documentation, scripts, and manual processes, which vary across teams and environments.	SQL Server is still deployed on VMs and clusters, but lifecycle operations are centralized and governed through a control plane. Provisioning, protection, patching, and recovery follow standardized, policy-driven workflows applied consistently across the SQL Server estate.
Provisioning Approach	Environment build-out typically requires coordination across infrastructure, OS, and DBA teams, often involving tickets, manual configuration, and environment-specific customization.	SQL Server database server VMs and databases are provisioned using predefined profiles created using golden images that encapsulate infrastructure and SQL Server best practices, potentially reducing variability and shortening deployment cycles.
Configuration Consistency	SQL Server configurations, storage layouts, and HA settings often differ by environment or administrator, leading to configuration drift over time.	NDB enables customers to define reusable profiles based on customer-provided golden images and approved standards, and consistently apply those profiles during provisioning. This helps standardize configurations across deployments and reduce configuration drift as environments scale.
High Availability & Clustering	Always On Availability Groups and Failover Cluster Instances are supported but require careful manual setup and ongoing validation. Operational complexity increases as the number of clusters and replicas grows.	NDB orchestrates the deployment and lifecycle of AGs and FCIs using standardized workflows, including cluster registration, listener configuration, and integration with backup preferences defined in SQL Server.
Backup & Recovery Operations	Backup, log management, and restore processes are commonly implemented using native SQL Server jobs and custom scripts. Research consistently shows that backup windows and restore predictability remain major operational challenges for large databases.	NDB integrates application-consistent snapshots and transaction log capture into a unified recovery workflow, enabling consistent point-in-time recovery and faster restore and clone operations. NDB is also interoperable with third party backup tools.

	Traditional SQL Server Management	SQL Server with Nutanix Database Service (NDB)
Patching & Maintenance	SQL Server and OS patching is often executed on a per-server basis, with manual coordination across environments. This increases operational effort and the likelihood of version skew in large estates.	NDB uses software profiles to standardize SQL Server and OS versions and coordinates patching across multiple database server VMs and clusters using controlled workflows.
Operational Visibility	Visibility into the SQL Server estate is spread across monitoring tools, scripts, and spreadsheets, making it difficult to assess posture and consistency at scale.	NDB provides centralized visibility into SQL Server database server VMs, databases, protection status, and lifecycle operations across clusters and environments.
Scalability of Operations	As the number of SQL Server instances grows, operational effort scales linearly (or worse).	NDB is designed to scale operational control by applying the same workflows and policies across many databases and deployments without increasing per-instance management effort.
Licensing Control (Contextual)	Because SQL Server licensing is core-based, VM sprawl, over-allocation, and duplicated environments can unintentionally increase licensing exposure, particularly in manually managed estates.	NDB does not alter Microsoft licensing terms but enables disciplined SQL Server deployment and consolidation to help limit CPU over-allocation and improve licensing efficiency. When used with Nutanix Database-Optimized Solutions (ODBS), SQL Server workloads can be constrained to defined compute boundaries, helping customers better align core consumption with their Microsoft licensing entitlements, subject to applicable licensing terms and customer policies.

Performance Benefits of Running SQL Server on NDB

SQL Server workloads managed by Nutanix Database Service (NDB) inherently benefit from the performance characteristics of the underlying Nutanix Hyperconverged Infrastructure (HCI). In addition to running directly on Nutanix's distributed compute and storage layer, NDB promotes the deployment of SQL Server databases in alignment with validated SQL Server and infrastructure best practices. These include recommendations around CPU, memory configuration, storage layout, networking, and high availability design, which are critical for achieving predictable low latency and scalable throughput for OLTP and mixed database workloads. By embedding these best practices into profile-driven provisioning and lifecycle operations, NDB helps customers consistently achieve optimal performance without relying on manual, error-prone configuration steps.

Validated SQL Server Performance on Nutanix HCI

Recent independent and vendor-validated analyses demonstrate that Nutanix HCI platforms support high-performance SQL Server workloads:

- **Cisco Validated Design (CVD) for SQL Server 2022 on Nutanix:** In HammerDB (TPC-C - like) testing of SQL Server 2022 VMs on a Nutanix cluster with all-NVMe storage, a single SQL Server VM sustained approximately 70,000 IOPS with write latency under 2 ms, while scaling to four SQL Server VMs resulted in approximately 235,000 IOPS with sub-2 ms latency across the cluster. Testing of Always On Availability Groups showed that synchronous commit replicas caused a modest performance overhead, while adding asynchronous disaster-recovery replicas did not materially impact primary workload throughput. These results reflect strong scalability and low-latency behavior in real SQL Server OLTP workloads on Nutanix HCI. https://www.cisco.com/c/en/us/td/docs/unified_computing/ucs/UCS_CVDs/cisco_nutanix_sql.html
- **Lenovo ThinkAgile HX with Nutanix - SQL Server 2022 Performance:** In a four-node Nutanix ThinkAgile HX reference architecture, a large SQL Server 2022 configuration using HammerDB demonstrated aggregate transactional throughput in the tens of millions of transactions per minute, illustrating linear scale-out behavior as the number of SQL Server VMs increased. This validates that Nutanix clusters can sustain heavy SQL Server workloads while maintaining predictable performance. https://lenovopress.lenovo.com/lp0665.pdf
- In the March 2025 Signal65 report, Improving Enterprise Application Performance with Nutanix and Intel, SQL Server workloads running on a modernized Nutanix platform achieved up to 2.65× higher throughput

even after reducing VM allocation from 10 vCPUs to 6 vCPUs. The study also reported an 18% performance improvement from upgrading Nutanix AOS software alone and up to 3.57× higher throughput following a full infrastructure modernization, highlighting the efficiency and scalability benefits of modern Nutanix environments for SQL Server workloads. https://signal65.com/wp-content/uploads/2025/04/Improving-Enterprise-Application-Performance-with-Nutanix-and-Intel.pdf

These results exemplify capabilities of Nutanix HCI - the platform for NDB - delivering **robust transactional performance, low latency, and effective scale-out capability** for SQL Server databases.

How This Compares with Traditional Architectures

In traditional three-tier architectures - where SQL Server compute is **decoupled from centralized SAN storage** - database performance can be constrained by shared storage I/O contention and the operational complexity of tuning multiple independent layers of infrastructure. As enterprise workloads grow and database I/O demands increase, these architectures often require extensive SAN tuning and optimization to meet performance SLAs.

A research study by IDC reports that participating organizations achieved measurable performance and operational benefits when consolidating compute and storage into the Nutanix Cloud Platform, a distributed, software-defined platform, in comparison to their prior legacy architectures.

Nutanix's storage architecture, on which Nutanix Database Service (NDB) is built, is designed to eliminate centralized storage bottlenecks by co-locating compute and storage and distributing I/O across cluster nodes. This architecture can reduce latency variability and enable more predictable performance as SQL Server workloads scale, without the tuning overhead typically associated with traditional SAN-based environments.

Why This Matters in Real Deployments

Running SQL Server on NDB can help customers achieve performance benefits that matter in production environments:

- **Consistent low latency** for OLTP workloads, even under scale-out scenarios
- **Predictable throughput scaling** as database workloads grow
- **Resilience and performance robustness** under availability group configurations
- **No SAN-level tuning burden**, as the platform's software-defined storage handles data distribution and I/O optimization.

Because NDB services are fully integrated with this performant infrastructure, customers are positioned to benefit from **both operational efficiency (provisioning, patching, recovery) and strong underlying database performance** without sacrificing one for the other.

Running SQL Server on NDB vs Public Cloud DBaaS

Public cloud DBaaS offerings typically prioritize provider-managed simplicity by abstracting significant portions of the SQL Server platform. This model works well when applications, operational practices, and business requirements align with service-defined constraints. Nutanix Database Service (NDB) - whether running on-prem in Nutanix Cloud Infrastructure or in the cloud on Nutanix Cloud Clusters - is designed to enable more flexible environments compared to cloud-based services, and to minimize service constraints that could introduce unnecessary costs, lower database performance, app re-architecture, complex migration projects or operational friction.

The defining difference is **degree of control**. NDB deliberately sits between IaaS and DBaaS: delivering a managed database experience while preserving the traditional SQL Server surface. SQL Server remains a full instance under customer control, including operating system access, configuration choices, installed agents, and version selection. Public cloud DBaaS platforms reduce this surface area (as well as SQL surface area!) in exchange for simplicity, which is acceptable for some workloads and a blocker for others - particularly legacy, regulated, or ISV-dependent systems.

From a **compatibility and migration risk** perspective, this distinction matters. Enterprise SQL Server environments are shaped by accumulated assumptions: supported versions, native backup and restore practices, ISV certification, and established operational behaviors. NDB maintains these expectations by keeping SQL Server in a conventional deployment model, reducing the likelihood that migration triggers application re-factoring, re-certification efforts, or forced modernization.

NDB also provides **deployment and cost flexibility** that is difficult to achieve with fixed DBaaS service tiers. Availability, protection, and resource allocation can be aligned to workload criticality rather than applied uniformly. This is particularly relevant for development, testing, and lower-tier production workloads, where paying for premium availability by default is often unnecessary.

Finally, NDB supports **hybrid consistency and long-term optionality**. The same SQL Server operating model can be used across on-premises and cloud environments where Nutanix is deployed, preserving skills, tooling, and processes, while enjoying built-in resilience and high-availability (see the blog on how NDB enables Hybrid Resilience). Public cloud DBaaS services are highly effective within a single cloud ecosystem but often introduce service-specific dependencies that can increase friction when requirements change.

SQL Server Licensing and Potential for Savings

Microsoft SQL Server Enterprise Edition is licensed under a core-based model. Licenses are sold in two-core packs, and every physical or virtual core running SQL Server must be licensed.
For SQL Server 2022 (U.S. list pricing):

- Enterprise Edition: ~$15,123 per two-core pack
- Standard Edition: ~$3,945 per two-core pack

Because licensing scales linearly with core count, infrastructure design directly influences total licensing exposure.

Potential Cost Savings Levers

Infrastructure Consolidation and Licensed Core Reduction

Reducing the number of physical cores running SQL workloads can reduce licensing exposure in host-based licensing models.

In traditional three-tier architectures, consolidation is often constrained by storage controller throughput ceilings and fragmented silos. Even with low aggregate CPU utilization, these constraints can require SQL workloads to remain distributed across more hosts than necessary.

Nutanix hyperconverged infrastructure distributes storage services across all nodes, mitigating centralized storage bottlenecks and enabling higher sustained host utilization. Nutanix Database Service (NDB) adds centralized visibility and controlled placement of SQL instances, preserving consolidation boundaries over time, which may lead to cost savings.

Illustration

6 hosts × 24 cores = 144 cores

144 ÷ 2 = 72 two-core packs

72 × $15,123 ≈ $1,088,856

If consolidation reduces the footprint to 4 hosts:

4 × 24 cores = 96 cores

96 ÷ 2 = 48 two-core packs

48 × $15,123 ≈ $725,904

Licensed core reduction: 48 cores

Difference at U.S. list pricing: ≈ $362,952

DB-Optimized Architectures (Compute-Only + Storage-Only)

Nutanix DB-Optimized (DBSO) architectures - enabled and operationalized through Nutanix Database Service (NDB) - separate infrastructure into **Compute-Only (CO) nodes**, which run SQL Server workloads, and **Storage-Only (SO) nodes**, which provide scalable capacity. While SQL Server licensing

allows flexibility at the host level, NDB simplifies this model by enabling **centralized database placement, lifecycle management, and policy-driven provisioning**, to help customers ensure that database workloads are consistently deployed only on licensed CO nodes.

This becomes particularly valuable as storage requirements grow. In traditional HCI setups, scaling storage often requires adding nodes that also increase total cluster cores, potentially expanding the SQL Server licensing footprint. With DBSO, **storage can scale independently of compute**, allowing customers to constrain licensed cores to only CO nodes while expanding capacity via SO nodes.

For example, a workload starting at 8 vCPUs with 10 TB storage may require only 8 SQL Server core licenses. As storage grows to 30 TB, traditional scaling could increase cluster cores significantly, driving higher licensing costs. With CO+SO, the workload remains on the same compute footprint, avoiding unnecessary license expansion driven purely by storage growth.

Advanced SQL Server Licensing Optimization

In addition to consolidation, three practical levers can influence SQL Server licensing exposure by aligning deployment patterns with Microsoft's licensing rules.

Unlimited Virtualization with Enterprise + Software Assurance

When all physical cores on a host are licensed with SQL Server Enterprise Edition and active Software Assurance (SA), Microsoft grants Unlimited Virtualization rights on that host. Any number of SQL Server VMs may be deployed without separately licensing vCPUs.

Example:

4 hosts × 24 cores = 96 cores

96 ÷ 2 = 48 two-core packs

48 × $15,123 ≈ $725,904

Once fully licensed, additional SQL VMs on those hosts do not require incremental core licenses. This model can be effective for consolidating numerous small or fragmented SQL workloads into a defined licensed cluster.

Edition Realignment: Enterprise to Standard

Standard Edition per-core licensing is approximately 4× lower than Enterprise at U.S. list pricing (~$3,945 vs ~$15,123 per two-core pack).

Where workloads do not require Enterprise-specific database engine features, Standard Edition may provide sufficient capability at materially lower per-core cost.

NDB provides operational lifecycle capabilities (policy-driven backup, cloning, provisioning) independent of SQL edition, enabling evaluation of Standard Edition for eligible workloads while maintaining governance.

Non-Production Optimization with Developer Edition

SQL Server Developer Edition is free and offers similar features to Enterprise but is restricted to non-production use. (See the applicable Microsoft license to confirm that your use is in compliance with the license.)

Illustration:

10 non-production VMs × 8 vCPUs = 80 cores

80 ÷ 2 = 40 two-core packs

40 × $15,123 ≈ $604,920

Migrating these environments to Developer Edition may eliminate this Enterprise licensing exposure (provided you remain in compliance with the applicable license).

NDB automates provisioning and cloning of non-production environments, which could help customers avoid unnecessary consumption of paid production licenses for development or testing.

Independent Validation by Forrester

According to the 2026 Forrester Total Economic Impact™ (TEI) of Nutanix Database Service, a composite of the organizations that participated in the study achieved significant reductions in database licensing costs—totaling **$1.1 million** over three years for the composite organization.

These estimated savings were driven by two primary architectural advantages:

- **Physical Core Reduction:** By creating smaller, dedicated clusters for licensed databases and decoupling storage processing, participating organizations reduced the number of physical cores that needed to be licensed. One hospitality customer reported saving $380,000 annually simply by optimizing their core-to-storage ratio during migration.
- **Zero-Cost Test Environments:** NDB's zero-byte cloning technology allows teams to spin up high-fidelity test environments without duplicating the full storage or licensing footprint. As one database engineering manager noted, "We don't need to license additional environments for testing anymore; we just clone what we need."

Overall, the study found that the composite organization, using NDB, attained a **136% ROI** and a net present value (NPV) of **$2.0 million**, with payback achieved in **less than six months**.

Conclusion

Managing SQL Server at enterprise scale no longer needs to mean manual processes, long backup windows, and operational risk. Nutanix Database Service combines the performance and resilience of Nutanix HCI with a DBaaS control plane purpose-built for SQL Server.

By automating provisioning, availability, protection, patching, and cloning, NDB enables organizations to operate SQL Server as a modern platform - delivering fast deployments, strong SLAs, optimized licensing, and efficient operational cost.

Next Steps

Learn more about Nutanix Database Service (NDB) for SQL Server at https://www.nutanix.com/products/database-service/sqlserver. You can also sign-up for a free test drive online to experience how easy it is to provision, take snapshots and restore your databases within minutes. No software to download or install. Click here to schedule a demo