Brochure

HP NonStop SQL
The enterprise database for continuous business

In a world that never stops, many enterprises absolutely can’t afford to be unavailable. Downtime—whether planned or unplanned—can cause irreparable harm, such as loss of customer loyalty, damaged reputation, or even financial disaster. Being in the news is not good news when downtime is the topic.

Engineered for the highest availability level
HP NonStop is designed specifically for the very highest availability level. According to the IDC\(^1\) Level 4 definition, that means business processes continue as before.

“AL4 defines true fault tolerance, enabling continuous data processing, even in the event of the failure of one hardware or software component. The end user experiences no perceived interruption based on the use of fault-tolerant servers. In this level, the combination of multiple hardware and software components allow a near-instantaneous failover to alternate resources so that business processing continues as before without interruption.”\(^2\)

That means NO business interruption, NO transactions lost, and NO degradation in performance. For over 35 years, the HP NonStop architecture remains the ideal choice when there’s a need for the highest level of availability and reliability—in environments that require continuous business.

“Since deploying the HP Integrity NonStop BladeSystem a few years ago, we have had 100% availability to keep our applications running. The HP system consistently delivers the performance, scalability, and end-to-end transaction integrity that are essential in our industry.”

– Gregor Pirc, IT Manager, Bankart, d.o.o.

HP NonStop SQL
HP NonStop is the linearly-scalable, highly-reliable, and continuously-available platform of choice for mission-critical applications with extreme service-level agreement requirements. And HP NonStop SQL, tightly integrated with the HP NonStop platform and operating system, is the preferred clustered database engine for mission-critical, high-end OLTP database applications that require performance, efficiency, and availability. This combination supports the majority of the world’s stock exchanges and point-of-sale (POS) and automatic teller machine (ATM) networks.

HP NonStop SQL has been architected as a clustered database engine fully integrated with HP NonStop hardware and software. Even though database access takes place on separate processors in the server, NonStop SQL is managed as a single database on a single system. This concept extends to ServerNet clusters so that a database spread across a cluster is still managed as a single database. It is designed to leverage the HP NonStop shared-nothing, massively parallel processing (MPP) architecture.

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\(^1\)IDC, Worldwide and U.S. High-Availability Server 2012-2016 Forecast and Analysis, Doc #236946, September 2012
\(^2\)IDC, September 2012 (see footnote 1)
As the size of the database, data volume, number of concurrent users or sessions, query workloads, and complexity increases, HP NonStop SQL has proven to scale to petabytes of data and thousands of processors per system—while continuing to exceed performance SLAs. It is uniquely capable of thriving in a mixed-workload environment that includes simultaneous support for:

- Large-scale and real-time ETL requirements (extract, transform, and load)
- Large-scale online transaction processing (OLTP)
- Subscribers with need for instant access to data, such as real-time event analysis, real-time fraud detection, real-time reporting, real-time data mining, and real-time dashboards
- Batch subscribers, such as data mart extracts and enterprise application integration data feeds
- Complex query support, such as online analytical processing (OLAP) and complex reporting
- Database maintenance operations concurrent with transaction processing

**Designed for continuous database availability**

While most databases are deployed on highly-available systems, there is no other platform that comes close to providing the levels of continuous database and application availability that HP NonStop and NonStop SQL provide out-of-the-box. Because there is no need to create specialized scripts to handle failovers, there is no complex configuration required for true 24x7 availability. And most commonly used database administration (DBA) tasks can be done online without requiring the database and applications to be taken offline.

NonStop SQL provides several features that make it possible to keep the database continuously available to your application. Process pairs are especially valuable when applied to the data access manager. The data access manager can be configured to have a backup process on another processor—and if a failure should occur in the CPU where the primary data access manager resides, the alternate data access manager can immediately take over the job of retrieving data so that the in-process query can complete successfully. As a result of this instant takeover, I/Os in process are completed, open files remain open, and database queries complete without interruption.

This is a major architectural differentiation between failover architectures and NonStop takeover architecture built into the entire NonStop software stack. Instead of needing an idle machine to provide fault tolerance, each of the processors in the node shares in the database task. Should one processor fail, database requests and transactions are automatically and transparently moved to another processor in the node. Using a patented process-pair technology, the database remains available—even if a processor or disk fails or if there is a fault in the application software.

Because of the dynamic system configuration facility, new disk drives and communications equipment can be dynamically added without requiring downtime. Existing mirrored disks can be upgraded to larger capacity disks with no application downtime. HP NonStop SQL can migrate data to the newly-added or upgraded disks from existing databases while simultaneously supporting high-volume application transaction processing.

**Mixed-workload handling**

The tight integration between the HP NonStop SQL database management system and the HP NonStop Operating System enables absolute control over a concurrent mixed-workload environment, making the NonStop SQL database unique in effectively handling all types of workloads executing concurrently across a potentially very large cluster. The HP NonStop OS plays a critical role in allocating processor, disk, and I/O resources where competing priorities have to be dynamically monitored and the highest-priority processes given precedence. Many key NonStop SQL database operations take place at the operating system level, which lead to performance efficiencies that have a positive impact on very large databases (VLDB) and real-time database performance.
Database scalability
HP NonStop SQL leverages the NonStop shared-nothing MPP server architecture, which enables it to scale linearly as more processing capacity is added. HP NonStop SQL software is optimized for clustered environments, delivering benefits from linear scalability across the CPUs in a single node, as well as across nodes in an HP ServerNet cluster. As processors are added to a node, or systems are added to a cluster, the database throughput scales linearly as well.

“The Integrity NonStop BladeSystem has many important features that support Tieto Sweden and our customers very well. The main thing is that we can deliver 24×7 availability to meet our customer’s requirements, while lowering our total cost of ownership. It comes down to economics and capacity, and the HP Integrity NonStop BladeSystem is a winner on both counts.”

– Bruno Lundell, NonStop Group Manager, Tieto Sweden

Optimized for performance
NonStop SQL is a massively-parallel, high-performance database engine that can service complex, mixed-workload environments. These range from instant dashboard updates or standard reports to ad hoc database queries—from single-record access to full-table scans, online inserts and updates, online backups, and routine database administration tasks.

The NonStop SQL optimizer selects the query plan that utilizes one of three levels of partitioning strategies for outstanding performance.
- Partition parallelism—runs the same SQL operation concurrently on each data partition
- Pipeline parallelism—overlaps successive operations on a stream of data
- Independent parallelism—concurrently executes different operations on separate streams of data

The optimizer is rules-driven and cost-based. Query plans are finalized based on computing costs and risk premiums associated with operators. It also takes into account differences between estimates used in costing plans and actual database statistics.

The design of the NonStop SQL executor is based on data-flow architecture that passes data directly from one operator to the next without requiring the data to land on a disk. For faster performance, SQL operators are pushed down to the earliest possible execution point—often at the point that data is flowing off the disk. The NonStop Disk Access Method can not only filter required rows and project the required columns, but can also do simple aggregations at hardware speeds.

Real-time data loading
Global organizations supporting thousands of users worldwide can no longer afford to have the database offline in order to load data. NonStop SQL enables real-time data loading, updating, and extraction. For scalability and flexibility, you can run multiple high-speed, parallel streams of transactional inserts and updates against the same or multiple tables simultaneously, while the database remains online. Data that is loaded is available immediately, unlike other database platforms that do not offer transactional integrity and often limit access to tables while data is being loaded.

Automatic load balancing
NonStop SQL offers query and data virtualization capabilities, enabling an environment that pools and optimizes all resources at the application level. With built-in clustering, automatic workload balancing, and online management, organizations using NonStop SQL can seamlessly accommodate rapid growth, without adding labor costs, compromising service levels, or causing user disruption.
Modern database connectivity

NonStop SQL supports industry standards (ANSI SQL, JDBC, ODBC) as well as numerous extensions to port database applications from other platforms.

The ANSI SQL-compliant NonStop SQL database can be accessed using Open Database Connectivity (ODBC) 3.x and Java Database Connectivity (JDBC) Type 4 interfaces from Microsoft® Windows®, Linux, HP-UX, IBM AIX, and Sun Solaris-based platforms. In addition, the Microsoft ODBC .NET data provider enables .NET applications to access the NonStop SQL database.

Managing transactions

To ensure transactional integrity, the HP NonStop Operating System integrates closely with HP NonStop Transaction Management Facility (NonStop TMF) software, which provides distributed two-phase commit protection for NonStop SQL database changes across all affected HP NonStop servers.

NonStop TMF software is designed to help protect a NonStop SQL database from intentional or accidental damage. With NonStop TMF software, a failure in an application, system, or network component does not result in a corrupted database because of a partially-completed database update. Before an update changes the database, an image of every affected record or row is captured in memory and written to an audit log. If any part of an update fails or is programmatically aborted, NonStop TMF software automatically backs out the change in its entirety, returning the NonStop SQL database to its state just prior to the start of that change.

NonStop TMF is the highest-performance distributed transaction manager in the industry—supporting distributed transaction processing environments that can scale to thousands of HP Integrity NonStop server processors and disks.

Disaster tolerance

HP NonStop Remote Database Facility (NonStop RDF) software extends the legendary NonStop fault tolerance to disaster tolerance. By geographically dispersing HP NonStop systems, NonStop RDF allows critical applications to survive a total site failure without specialized programming.

Using the transaction log generated by NonStop TMF, NonStop SQL database changes are instantaneously replicated to one or more target systems, no matter how many transactions per second your application generates. If a primary NonStop SQL database becomes inaccessible for any reason, processing can continue using the backup database with minimal service disruption or data loss.

Data security

In today’s interconnected world, companies across all industries need to demonstrate that they maintain confidentiality, integrity, and availability—for both their customers’ data and their own—as additional, overlapping standards and regulations continue to emerge all over the world.

This change in the business environment has made HP NonStop customers even more aware of security needs for their businesses and more demanding of sophisticated protection for their resources and data. NonStop SQL supports Secure Sockets Layer (SSL) for transactions being submitted from off-platform using standard connectivity interfaces. Customers can also encrypt data in their database using encryption solutions from NonStop partners.
Lower DBA costs mean lower TCO

The NonStop SQL database is distributed among multiple nodes of a cluster, and is presented to the database administrators and users as a single, clustered database image, thus keeping operational costs low. The DBA’s tasks are not daunting or time consuming and don’t require highly-specialized skills. Therefore, managing a clustered database is no different than managing a non-clustered environment. All DBA productivity tools—as well as diagnostic, tuning, and management packs—are included with the base NonStop SQL license at no additional cost.

NonStop SQL also allows the physical components of the database to be managed and reconfigured online—that is, users can continue full read and write access to the database while these management operations take place. For example, users can continue to access the database while the DBA performs backup and restore operations, loads data, and reorganizes files to maintain efficient access.

Because NonStop SQL has the industry’s most elegant mixed-workload handling capability, there is no add-on licensing or configuration required. No additional partitioning software licenses are required. And no need to replicate data to reporting servers.

This means that the HP NonStop integrated stack—including the NonStop SQL database—offers the lowest TCO in its class for complex, mission-critical application environments, based on initial capital expense and ongoing operational costs, including the cost of downtime.

“In solving the difficult problem of fault tolerance to the degree it has today with modern, open NonStop servers, HP’s engineers provided us with a server that is not only highly available, but can scale well past any other architecture. The loosely-coupled, shared nothing, MPP capabilities of the HP NonStop server remain unique to this day. It’s not that anything has changed. This is what it has always done. When a product benefits from good design fundamentals, as has always been the case with NonStop, then its relevance for users transcends time—it’s never old. It’s timeless.”

— Richard Buckle, CEO, Pyalla Technologies

Partner solutions

Many industries, such as financial services, telecommunications, manufacturing, and healthcare, are leading the way in delivering a continuous business environment—and HP NonStop and HP NonStop SQL are there at the heart of their business...

• Processing over 68 million credit card accounts and 10 billion transactions annually
• Servicing over 375M subscribers in advanced Telco network applications such as Home Location Register (HLR), Home Subscriber Server (HSS), and other network applications
• Powering mission-critical applications at 100% of the top 10 global manufacturers
• Supporting several of the world’s leading medical institutions

HP continues to work with the industry’s leading software and independent solution vendors. Our partnerships help make sure that customers have access to state-of-the-art technologies, while helping to preserve existing and planned investments in these solutions. These partners provide software for data integration, application and database migration from competing platforms, data analytics and mining, report writers, database manageability, and database column encryption.
**HP Technology Services**

HP Technology Services help build an infrastructure that is reliable, highly available, and rooted in best practices. HP recommends the following services:

• **HP Critical Service** (Optimized Care)
  High performance reactive and proactive support designed to minimize downtime. It offers an assigned support team which includes an Account Support Manager (ASM). This service offers access to HP’s Global Mission Critical Solution Center, 24x7 HW and SW support, 6-hour Call-to-Repair commitment, enhanced parts inventory, and accelerated escalation management.

• **HP Proactive 24** (Standard Care)
  Provides proactive and reactive support delivered under the direction of an ASM. It offers 24x7 HW support with 4-hour onsite response, 24x7 SW support with 2 hour response, and flexible call submittal.

• **HP Support Plus 24** (Basic Care)
  Provides reactive HW and SW support with remote problem diagnosis, 4-hour onsite response, replacement parts. The SW support includes installation advisory support, software updates for HP and selected third party software products.

• **HP Installation and Start-up Services**
  This service provides efficient and effective deployment of HP hardware components.

For more information, visit hp.com/services/nonstop

“Since the migration, we’ve been available 100% of the time. That’s HP technology at work, on the one hand, and there’s also a service envelope around the hardware and software.”

– Tony Zeis, Senior VP of Technology, PULSE
The platform for continuous business

If you require support for high volumes of online transactions, continuous access to information, and rational infrastructure and operational costs, HP NonStop can help you address these critical enterprise business issues.

• The confidence that your business will be continuously on
• The agility to quickly respond to ever-changing market and IT demands
• The ability to implement new business processes and keep pace with new initiatives
• The elimination of complexity and cost
• The protection of data and resources

The HP NonStop SQL database offers so much that is new, and continues to provide the highest levels of availability and near-linear scalability of any server in today’s marketplace.

By design, the NonStop SQL database is easy to manage, handles workloads simultaneously without degrading response time, and delivers significant ROI benefits. For real-time processing of ATM or payment transactions, telecommunications service, follow-the-sun access to operational data, or on-demand health information... HP NonStop SQL is the answer.

“When you put all this together as one stack, you have tremendous advantages in terms of operability, total cost of ownership, ease of use, manageability, redundancy, data recovery, and more.”

– Jalil Falsafi, Director of IT Computing Services and Operations, Future Electronics

To understand how HP NonStop enables you to conduct business that never stops, visit hp.com/go/nonstop.