



NonStop solutions from HP: Powering the most demanding business-critical applications for the adaptive enterprise in real time

What is NonStop technology and why is it different?

Back to basics: NonStop system fundamentals

With the sale of the first NonStop server to run Citibank's ATM network in 1976, NonStop technology created the market for online transaction processing. Since then, HP NonStop servers have been the backbone for the businesses that run the world's most demanding computing environments "online all the time"—from stock exchanges, banks, electronic funds transfer networks, retail point-of-sale networks, telecommunications companies, and E911 systems, to today's online travel systems and the world's largest e-mail system.

Today, HP NonStop servers "own" the business-critical infrastructures fueling the vast majority of the world's electronic commerce. Just a few of the companies that rely on NonStop technology include the New York Stock Exchange, NASDAQ, Rabobank, Target Stores, Sabre Holdings, and Sprint Telecommunications.

Why do these and many other companies—which run the most business-critical applications in the world, and whose revenue, market capitalization, and worldwide reputation depend on the availability of their applications—entrust their IT infrastructures to NonStop servers? Because they know that no other platform can manage their complex computing environments better—environments that are transaction intensive, experience unpredictable growth, and demand the highest levels of availability. No other platform can be relied upon to keep their businesses running 24 x 7 with full data protection and 100 percent application availability.

*NonStop servers at **Visa DPS** handle approximately one billion debit card processing transactions every 70 days.*

*At **TeleDanmark**, the largest provider of Internet, mobile phone, and long-distance services in Denmark, NonStop systems provide 99.999 percent availability while handling up to 40 million call detail records each day.*

NonStop technology was there at the birthplace of the first real-time enterprise—on the electronic trading floor of financial markets, where information is money in real time.

Citicorp EFS, the leading vendor of electronic benefits transfer in the U.S., processes around 35 million authorization transactions a month through its NonStop systems.

*Three NonStop servers power **Bank One's** retail banking operations, processing more than 1.5 million customer transactions each day.*

The NonStop architectural advantages

The NonStop architecture delivers this high level of performance over other platforms because its underlying design—from the “ground up”—is based on an open, standards-based, tightly integrated hardware and software stack built for high-volume transaction processing, parallelism, and mixed workloads. The NonStop system delivers its benefits through the exploitation of virtualization throughout the architecture. Resources in the system are kept in virtual pools such that should a resource be lost its workload can be taken up by the remaining components. One of the major differentiators for NonStop is that the following advantages are delivered “out-of-the-box”, helping to reduce the complexity of the critical application environment.

Its advantages include

- An integrated architecture—hardware, interconnect architecture, operating system, system management, database, and middleware—that is built to manage high rates of data change
 - Entire stack integrated with third-party components and tested together for superior reliability and availability over competing platforms
- Powerful operating system designed for parallelism, software and hardware fault tolerance, and clustering
- Database and high-volume transaction processing capability designed to exploit clustering and suites of business applications
- Ability to handle mixed workloads concurrently
 - Simultaneous handling of complex, real-time transaction processing, standard queries, and large ad hoc queries against terabytes of storage without partitioning workloads
 - Prioritizes tasks—transactions, queries, and batch processing—so the most important tasks receive the shortest turnaround
- Linear scalability
 - To thousands of processors for unsurpassed application and database transaction throughput
 - Each additional processor executes more than 98 percent of the throughput of the first processor, with no throughput limitation in large-scale configurations
 - Consistent return on investment from each NonStop processor
- Continuous availability
 - Ability to tolerate multiple hardware failures with no application downtime

- Only platform in the industry focused on delivering 100 percent application—not just system—availability in the face of all software and hardware outages, both planned and unplanned
- Superior database technology
 - Parallelism for high performance over very large data sets
 - Online database maintenance with no application downtime
 - Scale as large as necessary, with tasks balanced evenly and automatically across every processor in the cluster
 - Single database image across all processors so that the database can be configured, monitored, and managed as a unified entity
 - Exceptional data mining capabilities
- Online manageability
 - Transparent application management, ensuring that every application component continues to run through any single point of failure, whether hardware or software
 - Exceptional very large database support with superior online manageability
- Iron-clad data integrity
 - Data integrity at every level of the system, memory, I/O subsystems, and data and transaction management systems
- Open architecture
 - “Open on the outside”—industry-standard application development and management environment allows new applications to easily and transparently inherit NonStop system fundamentals
 - “Open on the inside”—comprehensive roadmap for 64-bit Intel Itanium architecture will expand the number of applications available to the NonStop platform
 - Support for BEA WebLogic Server, uniting the leading application server with the industry’s most available, scalable platform
 - Support for HP StorageWorks XP software, allowing NonStop servers to participate in open Storage Area Network (SAN) solutions without compromising the NonStop fundamentals
- Lowest total cost of ownership for complex or most demanding applications over multiple years of any platform in the industry, including comparably configured clusters of Microsoft Windows NT system-based platforms

On average, **CRESTCo**—which settles U.K., Irish, and international securities and money market instruments—processes 350,000 transactions per day, with a total daily value of US\$740 billion.

Twenty-four NonStop S86000 servers and 10 NonStop S74000 servers are at the core of **NASDAQ’s** next-generation trading engine and messaging infrastructure, SuperMontage.

From “online all the time” to the real-time enterprise

Applying the unique NonStop strengths to the dominant IT issue of the next decade—real-time data and application integration

Today, the commercialization of the Internet has increased the demand for “online all the time” computing in nearly every industry. It has raised expectations for higher levels of service among consumers, whose behavior is driven not only by price, but also by time savings, efficiency, and convenience.

Coupled with higher customer expectations is an increased speed of change, which is forcing businesses to rapidly adopt new business models, improve their return on investment while reducing costs, and shorten time to market. They must do all of this while minimizing the risks associated with change, managing more and more

transactions through multiple customer touchpoints, and coping with an increasing flood of data.

Unfortunately, the evolution of most IT infrastructures has left businesses unprepared to meet these challenges. Over the years, most companies, in response to competitive threats and in an effort to provide new services, have deployed discrete applications for each operational function across the enterprise. While this strategy has optimized individual operations and created stable environments, it has burdened companies with hundreds of applications on multiple platforms; an excess of inconsistent, replicated data; and massive data exchange requirements, usually performed inefficiently by batch processing. Further complicating these IT environments in many cases has been an overlay of mergers and acquisitions, creating even more complexity, as companies struggle to adapt and integrate their infrastructures.

The NonStop architecture is ideally suited to reduce this complexity. As the foundation for the HP Zero Latency Enterprise (ZLE) architecture, it is already proven as the perfect infrastructure to integrate data and applications easily and simply across an enterprise with 100 percent application availability—in real time.

In 1998, Gartner first defined a zero latency enterprise as the “instantaneous awareness and appropriate response to events across an entire enterprise.” By this definition, as one system in the enterprise tracks a business event, other systems are alerted in real time that the event has occurred so that appropriate and timely actions can take place. More recently, Gartner stated that “The sooner an enterprise embraces and implements the concept of zero latency, the stronger its competitive position is likely to be.”

NASDAQ trades over 1 billion shares each day, takes in data from more than 350,000 terminals, provides its real-time market data to over 1,000,000 terminals around the world, and processes more than 5,000 transactions per second.

Real-time data and application integration will be the foundation for the successful companies of the future.

The HP ZLE architecture—real-time data and application integration with unrivaled availability

ZLE is a natural extension and the next logical application of the time-tested NonStop architectural fundamentals. It's a unique, adaptive framework that leverages and extends the strengths of the NonStop architecture by providing NonStop availability and scalability to existing, heterogeneous application environments. Using a phased, nonintrusive, flexible approach, a ZLE implementation combines enterprise application integration and an operational data store to allow a business to gather, process, and distribute information across the enterprise instantaneously to provide what the real-time enterprise needs:

- Integration of data and applications across business functions within the enterprise

The Standish Group ranks the HP NonStop server the leading system for application availability: “The HP NonStop [server] has the highest peak-time availability both on the system and the application level of all the systems we’ve researched.”

- Faster transaction processing rates to handle ever-increasing amounts of shared data while delivering 24 x 7 availability
- Significantly increased scale to cope with unpredictable spikes in transaction volume
- Access to the IT infrastructure for external suppliers to create a seamless supply chain
- Connection of all customer touchpoints to ensure comprehensive and up-to-the-second customer data
- Collection of data in real time to enable real-time decision making and flexibility

The foundation of the HP ZLE real-time enterprise—The robust NonStop database management system

A real-time infrastructure requires a database geared to maintaining a detailed and current view that enables real-time operational decision making on a transactional basis (that is, applying business rules in real time to determine appropriate actions). At the same time, the database should be able to handle end-user queries and analytical requirements. In short, it has to be adept at many tasks, all of which are happening at the same time.

The database management system underpinning the ZLE framework is the HP NonStop SQL database. While competitive database systems are now attempting to add various degrees of real-time capability, the NonStop SQL database was designed since its inception in the mid-1980s as an online, real-time, all-the-time relational database solution. This is why NonStop SQL software currently underpins most of the world's stock exchanges, the majority of POS and ATM networks, and other large-scale business-critical applications that cannot afford even a second of downtime. It is also the only database management system capable of handling complex mixed workloads concurrently, and the only continuous availability database solution on the market.

Of course, a database is only as strong as the platform on which it resides. An integral part of the uniquely integrated NonStop server platform, the NonStop SQL database inherits the platform's real-time transactional responsiveness, massive scalability, continuous availability, online manageability, and industry-beating low total cost of ownership.

The NonStop platform provides all of these underlying technical advantages, which are essential to the deployment of real-time applications, for example:

- Real-time payments for finance
- Real-time customer relationship management (CRM)
- Real-time billing
- Real-time mobile commerce
- Real-time supply chain management
- Real-time data mining
- Real-time fraud management
- Legacy database integration

Deploying these applications in a real-time enterprise will allow companies to perform these and other business-critical operations at any time of day or night:

J.P. Morgan Invest, LLC, estimates the cost savings from upgrading its NonStop infrastructure at roughly US\$150,000 per month. "The NonStop platform is, without a doubt, the most cost-effective platform we're running. You don't need as many people to support the environment, so you get efficiencies relative to the personnel costs of running the system. And that is a significant factor in return on investment."

Sabre estimates that migrating from IBM mainframes to NonStop servers will cut the cost of running its airfare-pricing application by up to 40 percent.

*In the past four years that its ZLE infrastructure has been in production, **Sprint** has experienced no unplanned outages. And losses due to fraud have been reduced by several million dollars per year.*

- *For financial institutions*, provide real-time payment infrastructures and straight-through processing to avoid penalties, interest costs, or regulatory sanctions, and meet government requirements for money movement
- *In retail*, integrate data from multiple customer touchpoints and use online fraud scoring engines to approve or decline a transaction
- *In health care*, integrate hospital systems to deliver subsecond response times while eliminating risk of treatment error
- *In wireless communications*, increase prepaid renewal rates and improve cash flow by billing millions of short-message service messages in real time
- *In wireless communications*, let consumers recharge their prepaid phone accounts at their ATM, or other points of contact, to increase prepaid renewal rates
- *In telecommunications*, handle millions of call detail records a day to monitor churn rates in real time and reduce fraud
- *In travel*, evaluate billions of travel fare combinations to provide customized itineraries and real-time seat availability
- *In manufacturing*, integrate multiple supply chain applications to decrease order cycle time by optimizing inventories and increasing fill rates and capacity, thereby improving customer satisfaction
- *In any industry*, authorize transactions from phones, PCs, ATMs, POS terminals, and kiosks—any delivery channel—and provide a “dial-tone” experience to customers with 24 x 7, 100 percent application availability

***Sprint's** ZLE implementation requires 70 percent fewer database analysts and 50 percent fewer system administration personnel.*

HP has a proven track record of helping customers transform finance, telecom, and retail businesses into real-time enterprises based on the ZLE architecture. We've achieved this not only through the NonStop technical advantages, but also from the experience gained from nearly three decades of working with business-critical environments, partners, and solutions. Today, we understand the needs of the business-critical customer better than any other vendor. And we partner with solution providers that understand these needs as well as we do and are leaders in business-critical solutions and application integration.

Partnerships with leaders for total solutions

HP provides not only an advanced database platform for ZLE and other high-value applications, it also provides an architectural blueprint for end-to-end ZLE solutions that leverage added-value application components from HP partners that deliver such capabilities as

- Integration within and across the enterprise of applications, business processes, enterprise and legacy applications, and databases residing on any platform
- Data integration and database management services
- Business rules software for simplified, real-time control over business processes
- Business intelligence
- Collection and analysis of historical information to be used for data mining
- ZLE Services expertise to reduce complexity, cost, and risk

*NonStop servers at **Nakakita Yakuhin Co. Ltd.** handle daily output of as many as 20,000 delivery slips that track sales transactions, as well as manage inventory, and analyze sales information in real time.*

The HP NonStop/ZLE Support team provides complete life-cycle services to help organizations rapidly implement HP ZLE solutions with minimal risk and operate them continuously. The ZLE team utilizes its expertise as a full-service solutions

provider to integrate the NonStop platform, middleware, existing systems, applications, and processes into a complete business solution.

The NonStop/ZLE Support team and HP partners work together to provide all that is required—technical presales support, services, delivery resources, and implementation skills—to transform companies into zero latency enterprises with comprehensive planning, design, implementation, and management services.

Where do we go from here?

HP continues to focus on the two markets in which the NonStop system advantages are needed most—the business-critical market and the real-time enterprise market.

For the business-critical market, the NonStop platform provides continuously available, scalable solutions—built on nearly 30 years of experience in online transaction processing—to help businesses run the most demanding, complex environments with the lowest total cost of ownership in the industry.

For the real-time enterprise computing market, the HP ZLE architecture integrates data and applications in real time to deliver instant access to information across the enterprise for faster decision making and solution deployment as business needs change.

Going forward, HP is focused on

- Maintaining its leadership in highly available, scalable computing technologies through focused R&D programs that continuously enhance the NonStop architectural fundamentals for the competitive advantage and support of our business-critical customers.
- Extending the NonStop architectural strengths, business-critical knowledge, and real-time computing expertise to help customers transform their IT environments into real-time enterprises in the least intrusive manner to provide an integrated view of the business with 100 percent application uptime.

Raising the bar in availability—The next-generation NonStop Advanced Architecture

In June 2001, it was announced that NonStop servers would standardize on the Intel Itanium microprocessor, the next-generation processor targeted at the enterprise computing market. This strategy incorporates the world's leading high-performance, volume-based microprocessor engine into the NonStop architecture to yield a server platform offering the highest levels of reliability, availability, scalability, and performance in the industry.

In April 2003, a major enhancement to this strategy was announced. To improve hardware fault tolerance in future NonStop systems, NonStop servers will leverage an Intel Itanium processor board, originally built for the HP Integrity rx servers, as a logical migration to combining the highest performance commodity processors with advanced design concepts to provide customers with industry-leading “real time, all the time” business systems. This enhanced architecture, the HP NonStop Advanced Architecture, will drastically reduce the risk of failures resulting from hardware faults and establish a new standard for availability in commercial computing.

Elder Beerman's senior vice president of information systems, James Lance: “Over 15 years, we’ve accumulated less than three hours of total downtime. In the last 4 years, we’ve had zero minutes of downtime. Because of this, we remain a very loyal [NonStop] customer.”

BP Cardex—one of the largest petroleum and energy companies in the world—depends on HP NonStop technology to run its online fuel-card processing system for 17 European and African countries. The application processed in excess of 60 million transactions in 2002.

The NonStop Advanced Architecture will provide the same level of data integrity as current NonStop servers and will not change the current plan for NonStop software compatibility with the Intel Itanium microprocessor. Application compatibility will be maintained across the entire NonStop server product family.

This plan will focus NonStop hardware and software development in the areas of unique added value and on issues that customers care about most—enhancing the NonStop core competencies to drive toward higher levels of availability, scalability, and data integrity.

The advancement in hardware availability will be the first major achievement of the NonStop Advanced Architecture. While competitors' architectures generally limit their focus to system availability, a unique feature of the NonStop platform has always been its tight linkage of hardware and software fault tolerance to provide end-to-end application availability. This means that from the NonStop systems perspective, raising the bar in availability requires enhancements not only in hardware fault tolerance, but also in software fault tolerance. The next level of innovation of the NonStop Advanced Architecture will incorporate significant software enhancements to further reduce planned outage duration and increase overall availability to new, unprecedented levels.

AdvancePCS processes approximately 2.5 million claims per day, with a peak of 70 transactions per second on its NonStop server.

In summary

Nearly 30 years ago, NonStop computing created and helped build the market for online transaction processing. New customers are still discovering the unrivaled scalability and availability of the NonStop platform. Combining the unique NonStop architecture with the proven capabilities of the ZLE framework is the next logical step in its evolution. The HP NonStop ZLE architecture is the ideal solution to help customers capitalize on the promise of the real-time enterprise, the next trend in enterprise computing and a key component of HP's strategy for the adaptive infrastructure.

Powered by HP NonStop servers, the more than 8,000 lottery point-of-sale terminals operated by **Loto-Québec** typically handle volumes of 50 transactions per second. In a Super Lotto, volume can jump to 120 transactions per second.

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