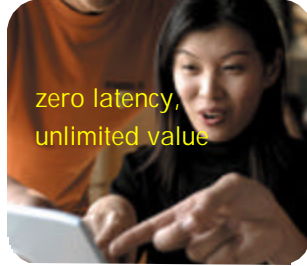




hp zero latency  
enterprise



a white paper from  
Hewlett-Packard  
Company

## the business case for a zero latency enterprise

What if the moment a business event takes place—on a website, in a call center, or anywhere along a supply chain—all pertinent systems and people in the enterprise are instantly aware of the occurrence and equipped to act appropriately? This, in a sentence, is the promise of zero latency enterprise, or ZLE, computing.

Gartner was among the first to define ZLE, stating that “in a real time, zero latency enterprise, information is delivered to the right place at the right time for maximum business value.” The HP NonStop Enterprise Division was the first to demonstrate the potential of a zero latency enterprise by developing a fully operational ZLE framework.

This white paper discusses what it means to become a zero latency enterprise, describes the challenges involved, examines the requisite architectural approach, and explains how the HP ZLE framework eliminates latency in the enterprise.

## becoming a zero latency enterprise

The idea behind ZLE is simple—increase business responsiveness and competitiveness by eliminating latency, or “information float,” from the IT systems supporting business functions. In a zero latency enterprise, whenever a business event occurs, it immediately triggers appropriate responses and actions across the entire enterprise and beyond.

The costs of enterprise latency are well known—frustrated customers, uninformed decisions, low productivity, electronic fraud, and missed opportunities. ZLE technology provides a way to avoid these and other business penalties by integrating, updating, and synchronizing data and applications in real time.

## value of real-time integration

Companies in numerous industries—including financial services, telecommunications, manufacturing, and retailing—are starting to apply ZLE technologies to business processes such as customer relationship management (CRM), supply chain management, business intelligence, and risk management. With real-time integration of information, they gain consolidated up-to-the-second views of customers, orders, and product movements. Business processes accelerate. Customers enjoy more responsive and more personalized service. Risk factors such as fraud and churn are exposed in real time. And disparate systems and platforms—inside and outside the enterprise—can share a common view.

The ZLE environment also makes it possible to implement entirely new kinds of applications that depend on real-time integration. Companies can create new ways to leverage enterprise information for increased efficiency and competitive advantage.

ZLE requires a high-level architecture for real-time, enterprisewide consolidation of data and integration of applications and processes.

## challenge of real-time integration

The challenge of ZLE lies in its implementation. ZLE requires a high-level architecture for real-time, enterprisewide consolidation of data and integration of applications and processes. The demands placed on this architecture and its components are substantial.

Enterprise latency results from stovepiped applications and islands of information, inside and outside an enterprise. To route and synchronize information across all of them, companies need an extensible architecture that simultaneously

- Integrates disparate data types into a consolidated real-time view
- Supports transactional access for applications that require real-time data
- Enhances business intelligence and analytic functions

## filling the functionality gaps

The ZLE architecture has to combine data and enterprise application integration (EAI), robust messaging, and a data warehouse or operational data store in a real time-enabled infrastructure. Moreover, this infrastructure has to perform tasks that go beyond the traditional definitions of those components.

EAI technologies have traditionally been limited in terms of scalability. Thus they have been unable to handle the large event volumes that characterize a ZLE environment. EAI toolsets have also typically lacked the robust transactional and message store capabilities required by a zero latency enterprise.

Traditional data warehousing is normally implemented using high-latency (batch) extraction, transformation, and load (ETL) technology. Furthermore, it is focused on summarizing historical data rather than providing real-time operational views. A data warehouse is not typically equipped to handle high-volume data access and the concurrent mixed workloads (simultaneous real-time updates, time-critical transactions, and complex querying) that characterize a ZLE environment.

The ZLE architecture has to fill those technology gaps by augmenting the application integration capabilities of EAI with high-volume event capture, message transformation and routing, and business rules functionality. And it must enhance the data integration strengths of traditional data warehousing with real-time data caching, message management, and concurrent mixed-workload capabilities.

providing a solid operational platform

Going beyond traditional EAI and database limitations is the functional challenge of developing a ZLE architecture. There is also the operational challenge of providing a massively scalable, 24 x 7 base for ZLE operations. ZLE is by nature operational. Once the architecture is implemented, with scores of systems depending on its operations, it is imperative that nothing halt or compromise the real-time flow of transactions and messages—not even for a second.

## meeting the challenge: the hp ZLE framework

The HP ZLE framework (see figure 1) provides a unifying architecture for integrating, synchronizing, routing, caching, and performing transactions in real time. It eliminates enterprise latency and, at any given moment, provides a single, consolidated, and up-to-the-second view of all pertinent data from all the disparate applications it integrates.

The HP ZLE framework provides a high-level architecture for existing system environments and integrates with them seamlessly and noninvasively. Enterprise applications such as CRM and enterprise resource planning (ERP) are attached to the ZLE framework with industry-standard EAI technologies, including application and technology adapters. Third-party EAI solutions from vendors such as SeeBeyond, TIBCO, and webMethods can also integrate with the ZLE framework. Information from these applications and independent solutions is consolidated and cached at the logical center of the framework—a virtual hub called the *ZLE core*.

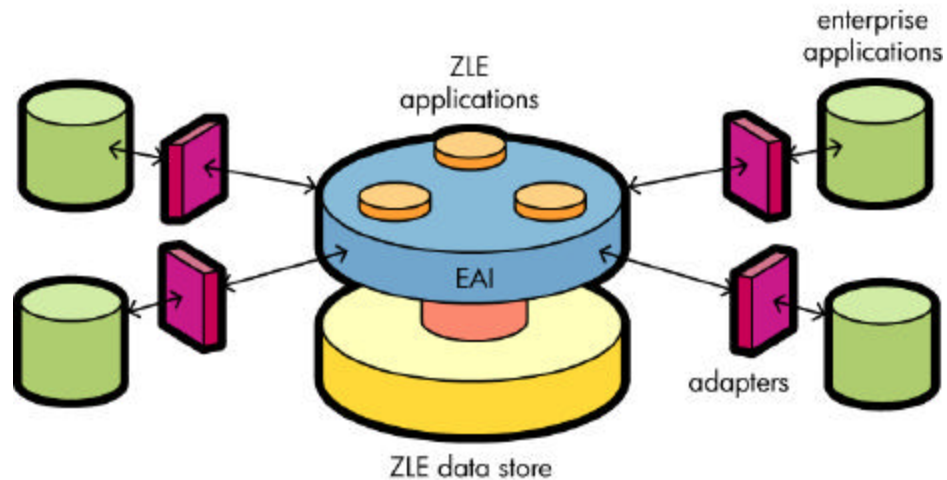


Figure 1. The ZLE framework.

The ZLE core is a two-level construct that combines EAI and database technologies. The core's services run on HP NonStop™ servers, which enable the ZLE framework's requisite parallel performance, massive scalability, and continuous availability.

Enterprise applications, however, are not the only applications that integrate with the ZLE core. Analytic applications can also integrate with the core and leverage the current-state data stored there for operational analysis, business intelligence, and data mining purposes. Business rules generated using data mining tools can then be loaded back into the ZLE core to be leveraged against new transactions or business events.

Similarly, specialized ZLE applications can reside logically on top of the core and use its real-time services and data for such purposes as real-time personalization or fraud detection.

Real-time information from enterprise applications is cached in the ZLE data store for immediate access by other applications and their users.

### ZLE data store: added-value database functionality

The foundation of the ZLE core is a new database construct called the *ZLE data store* (see figure 2). Real-time information from enterprise applications is cached in the ZLE data store for immediate access by other applications and their users. The information is maintained and stored relationally. Accordingly, the ZLE data store functions as a

- Hot enterprise cache—acts as a common database for enterprise applications attached to the ZLE core. Rather than integrating with one another, applications integrate directly with the ZLE data store, enabling them to receive constantly refreshed information in real time.
- State engine—expresses the current business state of the enterprise, moment to moment. Applications can draw on this current state information to get consolidated real-time views of customers, processes, and so on.
- Real-time data warehouse—supports end-user querying and provides a downstream enterprise data warehouse or data marts with real-time information.
- Relational message store—acts as a relational repository from which information can be reliably routed to subscriber systems via publish/subscribe messaging.

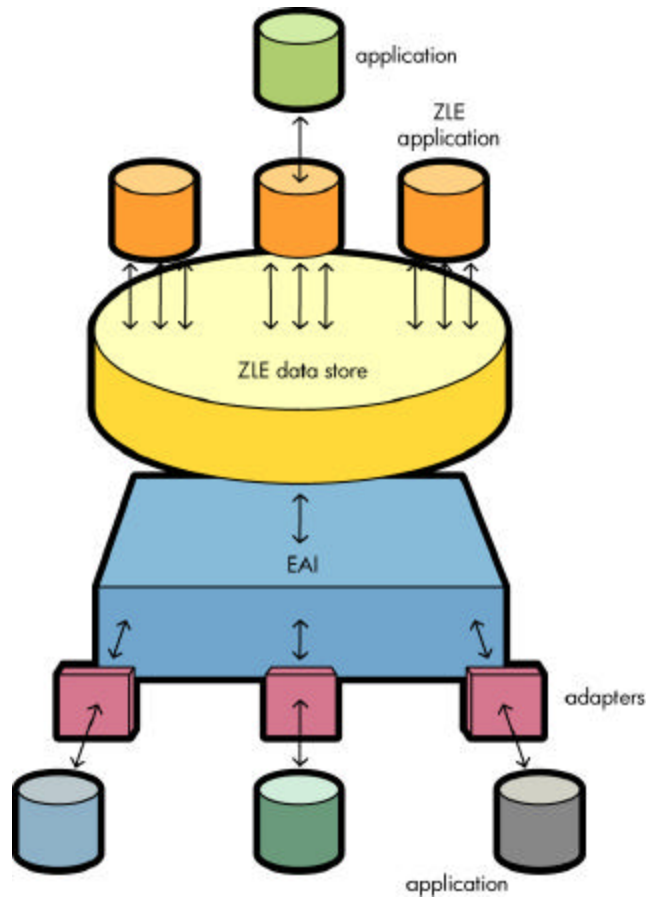


Figure 2. The ZLE data store.

enabling the ZLE data store: hp NonStop SQL database

The ZLE data store is based on the HP NonStop SQL database management system, a cluster-aware database that handles the majority of the world's securities, point of sale (POS), and ATM transactions and underpins many of its largest business intelligence systems. Unique in its ability to handle large volumes of concurrent mixed workloads, the NonStop SQL database is optimized to handle massive database inserts, updates, and reads on a wide variety of priority levels simultaneously.

The NonStop SQL database also leverages the parallel performance, fault tolerance, and linear scalability of NonStop servers; provides comprehensive online manageability features to minimize planned downtime; and possesses an integrated publish/subscribe capability for reliable, high-performance messaging.

### ZLE core services

In addition to the ZLE data store, the ZLE core consists of an array of ZLE core services, including transactional and asynchronous (publish/subscribe) messaging services, ETL (batch) services, and event capture services. All are tightly integrated with the ZLE data store and can leverage the parallel performance, scalability, and continuous availability of the NonStop platform.

For example, core transactional services run on top of a choice of industry-standard transaction server environments, including J2EE-compliant HP NonStop Enterprise Application Server (EAS) software and CORBA or Tuxedo technology-based transaction monitors. They include a unified business rules service, a high-performance data transformation service, and a sophisticated scoring service for personalization. Tasks performed by these services are run in parallel and are load balanced dynamically across NonStop server nodes.

Industry-leading partners and HP itself supply the technology behind these ZLE core services (see sidebar). Working side by side with the ZLE data store, these services are at the heart of the ZLE framework.

#### marshalling an industry

The ZLE framework comprises the world's broadest selection of ZLE-enabling software from leading independent software vendors (ISVs).

- Actional—Actional Control Broker technology for integrating applications residing on any platform into a ZLE solution
- Acxiom—AbiliTec customer data integration software for consolidated 360-degree views of individual customers across all business lines and channels
- HNC Software—Blaze Advisor business rules software for simplified, real-time control over business processes
- Mercator—advanced metadata-driven transformation technology, at the heart of the NonStop Data Transformation Engine service
- MicroStrategy—business intelligence software and Narrowcast Networks technology
- Protagona—high-performance database marketing solutions that leverage the ZLE framework
- SAS—analytic and data mining solutions for turning raw data—including the real-time data in the ZLE data store—into usable knowledge
- SeeBeyond—eBusiness Application Integration solutions for enabling the seamless flow of information within and among enterprises in real time
- TIBCO—total business integration solutions for seamlessly integrating business systems in real time
- Trillium—data quality software for cleansing, standardizing, and linking data based on business rules
- webMethods—integration software for linking business processes, applications, databases, and workflows across and beyond enterprises

#### seizing the moment: ZLE in the real world

The ZLE framework performs myriad business functions concurrently and in real time. Within a moment's time, vast amounts of data are captured, transformed, cleansed, integrated, hot-cached, and enriched. Thus the ZLE framework adds immeasurable value to the specialized ZLE applications it supports and all the enterprise applications that it indirectly integrates.

## enabling ZLE applications

ZLE applications are new kinds of high-value applications that could not exist without access to the real-time data that flows through the ZLE framework and the services that populate the ZLE core. At the same time, they “customize” the ZLE core for specific tasks. The HP Interaction Manager, for example, captures customer interaction information as it moves through the ZLE core, leverages the core’s rules and scoring services and real-time caching capabilities, and delivers recommendations based on current data to various customer touch points—all inside of a half a second.

The HP Customer Manager verifies, de-duplicates, and cleanses customer-related data in real time to ensure that the most timely and accurate customer information is available to all applications that need it. It can also enrich customer data by making calls to programs such as Acxiom AbiliTec to access additional customer information.

ZLE partner products can be integrated into the ZLE core as well so that they can leverage its services for such purposes as real-time campaign management, real-time authorization of e-payments, and narrowcasting real-time information out to a user’s workstation.

## enriching enterprise applications

Enterprise applications that are connected to the ZLE framework are uniquely enriched. To start, they are synchronized in real time with other applications across and beyond the enterprise. Yet they are not directly dependent on the performance and availability of any other application because the only direct integration and synchronization is with the ZLE core and its cache of enterprise information. Hence system A may go down, but system B can still access the information it needs from the continuously available ZLE data store.

Synchronization is enabled by adapters embedded directly into applications from such companies as BroadVision, Baan, SAP, Siebel, and PeopleSoft, which allow high volumes of messages to pass between these applications and the ZLE core. As messages come into the ZLE framework, the data can be aggregated, cleansed, and cached. Messages can also be enriched by data already cached in the ZLE data store and by the application of business rules resident in the core.

Concurrent with these activities, the perpetually updated data cached in the ZLE data store can be profiled by the core’s HP Mining Integration Facility and delivered directly to data mining and business intelligence tools from such companies as MicroStrategy and SAS. The models created by these tools can then be deployed back into the core for use by the business rules service and the scoring service, which scores customer interactions while they are taking place to drive personalized customer service.

The ultimate payback comes with the delivery, in real time, of valuable knowledge to customer-facing applications and touch points such as websites, call centers, WAP devices, and more.

### ZLE advantages of the hp NonStop platform

- Highest availability platform—continuous uptime
- Best linear scalability—grows cost-effectively
- Best absolute scalability—grows quickly and massively
- Only database system with ZLE concurrent mixed-workload capabilities
- Seamless integration with ZLE middleware components
- Lowest total cost of ownership—2002 Standish Group TCO study

## extending the real-time enterprise

With the introduction of the next-generation S76 and S86 family of HP NonStop servers, ZLE customers can take advantage of significant technology advancements and substantial increases in performance. These enhancements deliver new types of ZLE functionality, which enables companies to do new things in real time.

Advances that are of particular value to ZLE implementations include

- Enhanced Java™ performance—up to 200 percent increase for selected Java applications
- Enhanced I/O capacity and overall processing performance—up to 86 percent increase in processor performance over previous NonStop servers
- Increased memory size—so that data can be analyzed even faster and without having to retrieve it from disk
- A complete package of integrated Web services

## making real time more real

In a ZLE context, the boost in performance for selected Java applications—as well as the boost in overall performance, memory, and I/O—enables high-value decisions to be made earlier in a business process. For example, in telecommunications, as soon as a telephone call is completed, it becomes a call detail record (CDR) that can be stored and analyzed with other CDRs for a variety of business purposes.

But what if you could derive business value from calls before they become CDRs—while the call is still taking place? You could get a better handle on fraud. You could make more efficient use of resources. And you could better serve subscribers. The enhanced performance of NonStop servers brings real time to the real world in myriad ways, at no incremental cost.

## Java and web services

ZLE technology provides as many benefits beyond an enterprise's walls as it does within them. Web services enable applications to be invoked in a standard fashion by other applications over the Internet and intranets. Standard XML and the Simple Object Access Protocol (SOAP) are used to define the services you want to provide and to find the services you want to use.

The latest NonStop servers integrate a complete contingent of Web and Java services that make it possible to safely expose the full array of ZLE core services to trading partners, customers, and other entities over the Internet without custom coding. The ZLE data store audits all records of messages and transactions that flow inside and outside the enterprise, while the loosely coupled integration of applications enabled by the ZLE framework serves to protect enterprise systems in a Web services environment.

Just as important, a Web services-enabled Java or C/C++ based application running on a NonStop server inherits all the reliability and scalability of the NonStop architecture. Hence the ZLE core can deliver services reliably, regardless of how many concurrent SOAP messages it has to handle from inside and outside the enterprise.

## not a moment to lose

Business responsiveness is something that must be proved every moment of every day. The HP ZLE framework has the proven ability to create real-time enterprises. In a telco CRM environment, for example, this includes the ability to support 40,000 call center

agents, move 1.2 billion messages per day in real time, and manage 100 billion rows of call detail and other customer information.

In a major retail environment, it includes handling a rich mix of 1,000 POS events, 300 e-store transactions, 300 gift registry transactions, 300 refund transactions, and 300 call center transactions—all in the same second. This is on top of providing fraud alerts, campaign management capabilities, and data extracts for closed-loop data mining.

In a large-scale transportation environment, the ZLE framework has the proven ability to unfalteringly handle a challenging mixed workload while scaling linearly and absolutely above enterprise-scale alternatives. It also provides a more rapid and cost-effective development solution than the competition.

Embracing ZLE is not a question of “if” anymore. According to Gartner, “the sooner an enterprise embraces and implements the concept of zero latency, the stronger its competitive position is likely to be.” The ZLE framework stands alone in providing the blueprint, the architecture, the integrated HP and partner solutions, and the global professional services to cut the costs and take the risks out of moving to zero latency.

For more information, go to [www.hp.com/go/zle](http://www.hp.com/go/zle).

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