


hp white paper

# when enterprise application integration is not enough

**table of contents**

Enterprises that seek a competitive advantage in today's global markets need the ability to act on new information instantly. When a business event occurs anywhere in the enterprise, they must be able to perceive it, know its content, and react with an appropriate response in moments. Those companies that embrace real time as an operational requisite stand to realize substantial payback: increased revenues; streamlined operations; instant personalized marketing; and reduced exposure to fraud, attrition, and other business risks.

In August 1998, Gartner introduced the concept of the *zero latency enterprise*, a strategy by which "all parts of the enterprise can respond to events as soon as they become known to any one part of the enterprise." In a zero latency enterprise (ZLE), information can be shared in real time among disparate locations and people as well as across technical and organizational boundaries, enabling immediate action.

The problem facing most companies today is that their information technology (IT) infrastructure contains disparate and stovepiped applications and databases. Most integration efforts entail one-time and batch-driven processes, which are prone to latency and data replication. The IT infrastructure of a zero latency environment, on the other hand, must

- Route and synchronize new information immediately upon occurrence
- Establish a single view of the enterprise that is current, integrated, and detailed down to the event level (transactions and interactions)
- Enable real-time decision making and appropriate responses to events
- Enable fast time-to-market for new zero latency products, services, and applications
- Be noninvasive and synergistic with existing infrastructure

## enterprise application integration solutions

Maintaining the disparate, sometimes duplicate, databases owned by each application in the enterprise poses numerous problems. Many companies have tried to cope by implementing enterprise application integration (EAI) solution suites that help to synchronize the dozens to hundreds of applications in the enterprise. Examples of such solutions include TIBCO BusinessWorks, SeeBeyond E*Gate Integrator, IBM WebSphere MQ, webMethods, Vitria BusinessWare, Mercator Enterprise Broker, and BEA WebLogic Integration.

While each EAI suite is different, in general they commonly provide services such as

- Data transformations
- Mapping
- Routing
- Workflow
- Rules engine
- Cleansing
- Aggregating
- Triggering
- Application adapters

While the powerful capabilities offered by EAI solution suites are essential to building a dynamic, proactive infrastructure, they also involve significant "gaps." The following sections describe the performance, availability, and data quality pitfalls and issues associated with an EAI-only approach.

## onerous EAI virtualization overhead

In the EAI world, if a new application, for example, *Z*, is developed that requires a "single image" of the customer, that image is "virtualized" dynamically each time it is needed. Figure 1 shows how this process works.

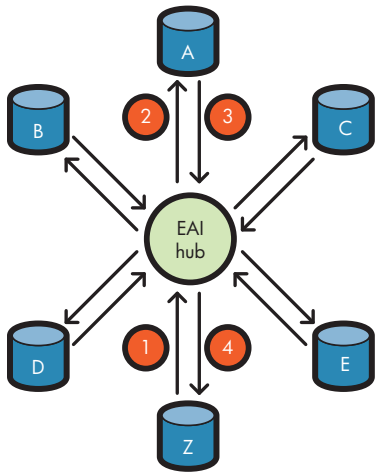


Figure 1. Virtualization process flow

1. Application *Z* posts a message to the EAI hub in the form of a request for information.
2. The EAI hub reads the request, applies the necessary data transformations, and routes the request to the appropriate local applications (*A, B, C, D, E*).
3. Those local applications receive the request, access the corresponding local resources (applications and databases) as needed to pull together a version of the customer, and post a response message back to the EAI hub.
4. The EAI hub reads the response message, reformats it as necessary, and posts the message back to application *Z*.

The virtualization performed by the EAI architecture is expensive in terms of the overhead placed on local applications and databases. And as the transaction load increases (for example, additional applications), the infrastructure becomes overwhelmed, resulting in poor performance (response times) or failures. Continued development around the EAI hub architecture only exacerbates the problem by creating additional stovepipes of information.

## excessive demand on host resources

For companies trying to build zero latency solutions around the EAI hub, the overhead associated with virtualization quickly becomes prohibitive. Transaction loads increase dramatically, frequently by more than an order of magnitude, creating a workload that local applications and databases were not designed to handle. Possible corrective actions include

- Purchasing additional hardware resources (processors, memory, and disks) at each local site to accommodate the increased workload
- Redesigning and rewriting the local applications and databases to accommodate the growth in transactions
- Restricting the number of applications and databases that are integrated in this manner
- Restricting the types of events that are handled by the infrastructure

In any case, added investment costs will be incurred in terms of capital expenditures, personnel expenses, reduced functionality, and lost time-to-market.

## inability to handle event data volumes

In a zero latency environment, business events that must be processed are very detailed and prolific (millions or even billions per day). For example:

- For a telecommunications company, the ZLE architecture processes a detailed record of every call made, every IP data packet transferred, and possibly even uncompleted calls attempted.
- For a banking institution, the ZLE architecture processes a record of every loan payment, ATM withdrawal or deposit, credit card purchase, check, and more.
- For a retailer (brick and mortar or e-store), the ZLE architecture processes a record of every purchase line item, payment type used, every pallet, every shipment, details of delivery, returns, discrepancies, and more.
- For an airline reservations system, the ZLE architecture may process a record for every flight operation, agent, or user activity, such as availability requests and segment changes.

With new device types and touch points (Web, kiosk, ATM, and wireless), ZLE events reflect interactions as well as transactions. Mouse clicks, wireless keypad touches, and voice-activated interactions offer valuable information on interests, behaviors, and preferences. Knowing what transpired during each interaction and the respective responses gives a company invaluable insight that can be used to promote customer or user satisfaction and increase sales revenue.

EAI suites are designed to process and synchronize “state” changes to enterprise data. They are not designed to handle event-level detail. Attempts to process event-level detail have resulted in poor performance, excess hardware, or outright failure.

## lack of message store or event history

Unlike traditional EAI, in which the processed message is eliminated once guaranteed delivery is ensured, a zero latency environment requires a memory of recent messages or events. This history is essential to evaluating prior behavioral patterns (transactions and interactions) and enterprise events and their impact on the organization and its customers. Only through an analysis of previous events, for example, by applying

business rules, can the appropriate response be determined to an event or interaction that is occurring now. Historical information is also valuable in supporting instantaneous, enterprisewide information needs, such as handling customer service inquiries, settling billing disputes, or fulfilling legal or regulatory information requirements.

EAI suites are not designed to readily provide this historical image. Likewise, most host operational environments do not retain event data so that it can be accessed online or in a transactional manner. Frequently, historical event data is stored in a data warehouse that lacks the transactional access and 24 x 7 capabilities demanded by the ZLE architecture.

### inferior synchronous transaction model support

In a zero latency environment, immediate responses are delivered as events occur. This typically means subsecond performance (for example, online transaction processing). For the most part, EAI suites are built around an asynchronous messaging model (the application posts a message to a queue, and processing continues asynchronously). While some EAI suites support synchronous transactional models, this is not their forte. Significant systemwide resources may be held in limbo while each local host processes the request. This leads to unpredictable performance, poor response times, and wasted system resources.

### inefficient rules engine invocation

At the core of the ZLE architecture is the ability to offer an appropriate response to events as they are processed. This implies that each event must be captured, relevant historical and current information pertaining to the event assembled, and business rules applied to determine the appropriate action—all in under a second. The preferred and more dynamic method of defining and executing business rules is through a rules engine as opposed to customized code development. Herein lies the formidable challenge:

- The EAI hub lacks the current and historical information necessary to determine an appropriate response. The rules engine must solicit information (via virtualization) from the applications around the hub before rules execution is initiated.
- Aggregates essential for rules execution must be extracted and calculated dynamically from the detailed information.
- Real-time scoring of the assembled information may be necessary, perhaps based on multiple data mining models.

EAI-centric rules engines are not efficient at collecting and assembling the information necessary to execute business rules. Virtualization yields excessive path lengths per event, making event-level handling impractical. Attempts to process events in this way invariably overwhelm the rules engines, resulting in poor performance and scalability.

### inability to host applications

Companies embark on building a zero latency environment because they need new zero latency applications. If this were not the case, EAI alone would suffice. EAI hubs are not designed to host applications or services, that is, application servers. In the EAI-only scenario, new applications are built around the outside of the hub and integrated with other applications and databases through the EAI infrastructure. Enterprise information is virtualized, with all of the pitfalls associated with that approach. Furthermore, continued development around the hub promotes additional stovepipes and complicates the ability to get an accurate real-time picture of the enterprise.

## how lack of 24 x 7 availability affects information quality

In the real world, very few application hosts and their associated databases are available on a 24 x 7 basis. With the exception of fault-tolerant platform-based solutions, they are subject to hardware, software, or network failures that render the servers unavailable until recovery is complete. Even with high-availability support systems, many hosts are periodically taken offline to maintain the applications or their associated databases. During these downtimes, the information owned by these systems is unavailable. ZLE applications are thus left with few choices:

- Reject or postpone requests for enterprise views. This either adds significantly to enterprise latency or results in outright application failure in the eyes of business users or customers.
- Process information based on a partial enterprise image. Making real-time decisions based on incomplete data can negatively impact customer satisfaction or internal operations. Poor-quality data leads to a lack of trust in information as well as the overhead associated with validating data quality.

## federated database products: another form of virtualization

Several vendors are touting next-generation federated database products as a means of exchanging, consolidating, and integrating business data across the enterprise, independent of its location or format (e-mails, databases, spreadsheets, XML files, Web applications, and so forth). Two examples of these products include IBM DB2 Information Integrator and BEA Liquid Data for WebLogic. The basic concept of these products is predicated on a federated database approach in which multiple heterogeneous databases appear to the user as if they were a single database. This is another form of virtualization in which data is accessed where it resides. From a ZLE perspective, the usage of federated database products suffers from the same (or variations of the same) shortcomings as noted for EAI-only solutions, namely:

- Onerous virtualization overhead
- Excessive demand on host resources
- Inability to handle event data volumes
- Lack of message store or event history; that is, the historical image must be virtualized (some products provide for limited query caching, but this is insufficient for ZLE purposes)
- Inferior synchronous transaction model support—mostly query-only access
- Lack of integrated rules engine support—predominantly a query-only tool; business rules logic needs to be coded into the client application requesting the data
- Lack of 24 x 7 availability, affecting information quality

These products can play an important role in the enterprise data integration strategy, but used alone they sorely lack the capabilities needed to create a ZLE infrastructure.

## hp's EAI model for ZLE

**build customer loyalty**

While EAI is essential to ZLE, alone it fails to deliver on the ZLE promise. Many EAI issues revolve around the overhead associated with information virtualization. The HP ZLE framework (see figure 2) extends EAI by adding a ZLE data store. The ZLE data store captures relevant enterprise information as it passes through the EAI infrastructure and serves in the following capacities:

- *EAI message store.* Processed EAI messages are recorded in the ZLE data store. The EAI hub guarantees that revisions are propagated (mapped, routed, and applied), even if one or more of the systems cannot process the change when the EAI hub receives notification. Some EAI transactions are very complex or require multiple steps to complete. In this case, the ZLE data store acts as a message store to track the "workflow" of the transaction until all execution steps are completed. Additionally, it can be used to enrich EAI message flows as they are processed, reducing EAI virtualization overhead.
- *Convergent and integrated view of the enterprise.* The ZLE data store maintains a single, 360-degree view of the enterprise. Information is cleansed, stored, and enriched for distribution to all applications in the enterprise. Likewise, many additional subjects that are maintained in the ZLE architecture are consolidated into a single location. Thus, the ZLE data store represents the single view of the enterprise data set that serves as the basis for next-generation ZLE applications, eliminating the need for dynamic information virtualization.
- *Enterprise state engine.* The ZLE architecture maintains the current state of the enterprise. ZLE applications can leverage that information for fast response determination.
- *Real-time data warehouse.* The ZLE data store contains current and integrated information that cannot be found in any other data store in the enterprise, including the corporate data warehouse. Additionally, it contains a limited historical data view that is essential for efficient rules execution and ZLE operational requests for recent event details. As a result, it serves the real-time business intelligence needs of the enterprise. It also supports direct queries via industry-standard business intelligence tools. The ZLE data store can be used to extract information for batch processing, data marts, or even online transaction processing (OLTP) systems that need clean, current, and integrated data.

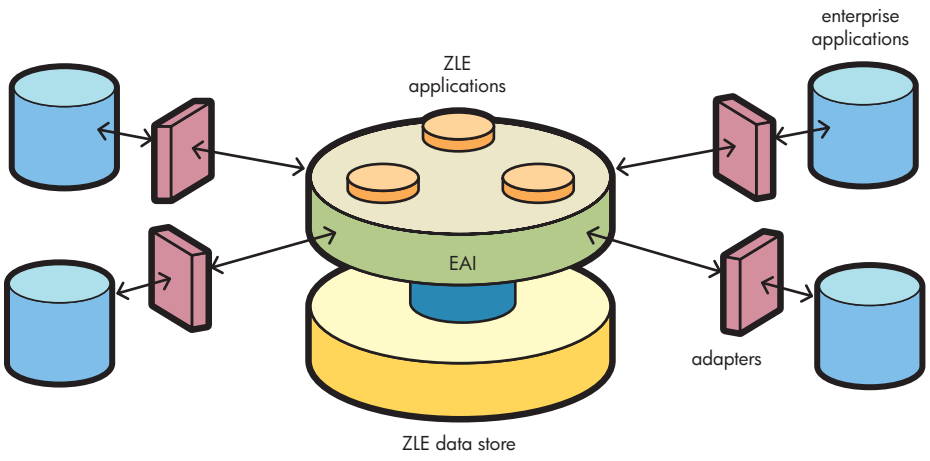


Figure 2. HP ZLE framework

## hp ZLE framework functional overview

The HP ZLE framework is designed to address the shortfalls of an EAI-only approach. HP has identified four key functional components:

- *EAI asynchronous messaging.* The ZLE architecture must embrace EAI messaging suites to provide enterprisewide asynchronous integration services such as publish and subscribe. In this case, the ZLE framework is positioned as one of the many applications or databases sitting off the spokes of the EAI hub.
- *Transactional (OLTP) processing with two-phase commit capability.* This is essential for high-volume, subsecond request/response applications. This is typically the primary interface for real-time event handling and for hosting ZLE applications. HP provides robust OLTP middleware services for key application service models such as CORBA, Tuxedo, and J2EE.
- *Batch services.* While not glamorous, this function provides the basis of processing requests where the interface is batch by design. Examples of these include extraction, transformation, and load (ETL) for data marts; high-speed and parallel insertion capabilities for large-volume event handling; and data mining tool integration.
- *ZLE data store*

As shown in figure 3, the HP ZLE framework provides facilities to support each of these components.

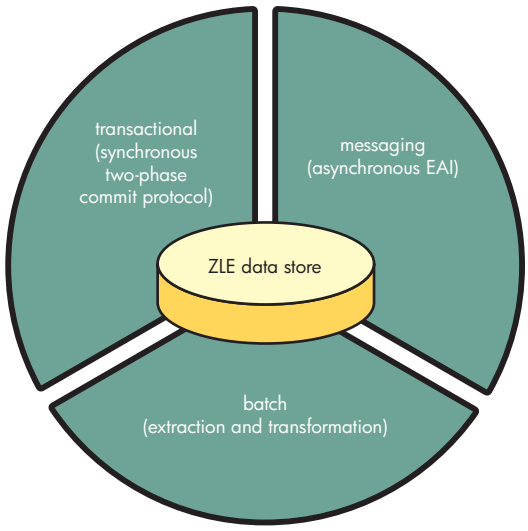


Figure 3. HP ZLE framework functional capabilities

## embracing and enriching industry-leading EAI suites

Recognizing that many companies have already made a commitment to a particular EAI product suite, HP partners with a number of leading EAI vendors to incorporate EAI capabilities into the ZLE framework. The EAI suite can coexist alongside the ZLE data store on the same server or independently on a separate server through robust and high-speed interfaces (adapters).

Examples of EAI suites that will run natively alongside the ZLE data store on the HP NonStop server include TIBCO BusinessWorks, SeeBeyond E*Gate Integrator, IBM WebSphere MQ, and Mercator Enterprise Broker as HP NonStop Data Transformation Engine (DTE) software. These solutions demonstrate the enhanced availability, scalability, mixed workload, and performance attributes inherited from running on the NonStop server. No matter which approach your company chooses, the HP ZLE model will protect and extend your investment when combined with the ZLE infrastructure components.

## hp: the proven ZLE solutions provider

As proposed by Gartner, zero latency enterprise represented a concept, a vision for the future. HP alone recognized the technology ingredients that would transform the zero latency vision into reality. Today, HP has capitalized on its head start and continues to outpace all other vendors in terms of architecture, partnerships with independent software vendors (ISVs), proof points, references, and understanding of the impact of ZLE on finance, retail, telecommunications, and government.

HP offers four distinct advantages as a ZLE vendor:

- *HP has extensive experience with enterprise environments.* HP has more than 30 years of experience integrating the most complex and demanding computer environments.
- *HP platforms deliver the capability to handle mixed workloads in environments that require unsurpassed scalability and availability.* When companies consolidate all their application data, the platform itself becomes mission critical. "Five nines" availability is not sufficient; only continuous availability satisfies the demands of global businesses that never close. In the ZLE framework, EAI and the ZLE data store reside on the highly scalable NonStop server, which delivers the parallel performance, scalability, and availability requisite for business-critical operations.
- *Only HP has developed the software services and tools that can translate the ZLE vision into reality.* For example, HP's Interaction Manager enables businesses to respond to events and states in real time with intelligent action. And the HP Customer Manager enables the creation of a single, unified customer view shared by all applications in the enterprise. Both are patent-pending technologies based on standards.
- *HP provides complete life-cycle services to plan and implement a ZLE solution that is tailored to the unique needs of the company and that leverages its technology investments.* For proof of concept, many organizations begin with the HP QuickStart for ZLE program to create a tactical solution for a single business initiative, typically in three to six months.

## see, know, act now

EAI plays a key role in enterprise IT strategies. Used alone, however, it creates new problems even while it solves others. EAI alone is simply not enough. The solution is to supplement application integration with data integration and transaction management. With this combination of technologies, businesses gain

- The power to process information and transactions while applications run against that data
- Very large-scale storage, real-time retrieval, and immediate action on information
- A single, up-to-the-second view of the business and its customers
- The ability to process, distribute, and act on information now


As Ross Altman, Gartner research director, states: "Companies are going to move to reduced latency environments; it's just a question of when. The longer one waits, the worse it gets. The sooner an enterprise embraces and implements the concept of zero latency, the stronger its competitive position is likely to be." Only HP delivers full-scale, comprehensive, and proven ZLE solutions today.

For more information, go to www.hp.com/go/nonstop.



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