

Tamino

Software AG's Tamino XML Server with the
HP Bluestone Total-e-Server

WHITE PAPER

CONTENTS

Table of Contents	3
Table of Figures	3
Executive Summary	3
Key Business Features	5
Investment protection	5
Cost efficiency	5
Accountability	5
Full utilization of existing corporate assets	5
Flexibility for future demands	5
Key Technical Features	5
Full support of XML-based applications	5
Support of W3C standards	6
High performance	6
Examples of Use	6
Application server infrastructure	6
Uses in EJBs and Java applications	7
Separation of Web applications from operational systems	9

Table of Figures

Figure 1: Application wrapping with HP Bluestone Total-e-Server and Tamino XML Server	4
Figure 2: HP Bluestone's XML server with Tamino XML Server	6
Figure 3: Tamino XML Server as a transitional data store	8
Figure 4: Tamino XML Server as an Internet data cache	9

EXECUTIVE SUMMARY

To many organizations, the Internet economy means uncertainty. It is a totally new way of doing business in regards to products, customers and business partners. The market is moving at break-neck speed and, with it, products and services. Products and information about them must always be kept up to date. The number of customers may go from a few hundred one day to hundreds of thousands the next. The profile of the customers themselves may change as a new target group suddenly discovers a new product. Supply chains need constant adjustment as materials and business partners change. Everything is in flux and everything must happen at the speed of the Web. The old saying "get it right the first time" no longer applies, as the rules of the market change. New and finer instruments are called for to do the job, but the dilemma is how to create an ever changing, living Web presence that adapts constantly to market demands without losing the strengths and value of an IT infrastructure developed and proven over the years. This infrastructure is a major business asset and must be preserved and fully integrated into new Web strategies.

The Internet way of doing business constantly requires new applications. This means that new ways of constructing them must be found. Just as the maintenance and construction of industrial machinery has been simplified by the introduction of complex mechanical components, Internet applications are assembled today from reusable complex business components and deployed in runtime environments optimized for the Web. The HP Bluestone Total-e-Server™ creates an "Internet Operating Environment," based on

Java™ 2 Enterprise Edition (J2EE™) standards, that is ideally suited to the task at hand.

In the same way that the Internet drives new applications, it also requires a new data model. The traditional spreadsheet view of data in fixed rows and columns was adequate for text-based information systems but the Web thrives on rich media: Pictures, audio and video clips and much more. A more complex but yet flexible view of information objects is much better equipped to cope with the hierarchical structures prevalent in the Web. The Extensible Mark-up Language (XML) has emerged as the standard for document exchange, storage of meta data and complex objects. The HP Bluestone Total-e-Server is unique among the application servers on the market because it includes a dynamic XML server that greatly simplifies the processing of XML. There is hardly a software product on the market that does not support XML in some way or another, but many of these merely use a wrapper to present data stored in legacy form in an XML format. While this may be sufficient for organizations satisfied with simple content publishing from corporate assets residing in a single system, enterprises with sophisticated IT structures dedicated to leading their industries will need more. Software AG's Tamino XML Server™ is the world's first XML server capable of compiling and storing XML documents in native format. Tamino is market leader in this area. Working together, the HP Bluestone Total-e-Server's dynamic XML Server and Tamino, a repository XML server from Software AG, cover all functions necessary for XML document handling and exchange.

Teamed up, the HP Bluestone Total-e-Server and Tamino XML Server prepare your organization for the uncertainty the future holds by providing the flexibility, ease of use and speed vital to stepping up to the challenge and, most importantly, without replacing any of the applications that have proved invaluable to the enterprise in the past. With the HP Bluestone Total-e-Server and Tamino XML Server no data or application migration is needed.

The Web revolves around standards. Three of the major standards driving the Web are:

- The Hypertext Transfer Protocol (HTTP)
- Java
- XML

The first supplies the transport protocol, the second the logic and the third the content. On the software level these are represented by:

- A Web server
- HP Bluestone Total-e-Server
- Tamino XML Server

Working closely together the three cover all environment aspects for Web-based applications, isolating the applications from the technical intricacies of the Web.

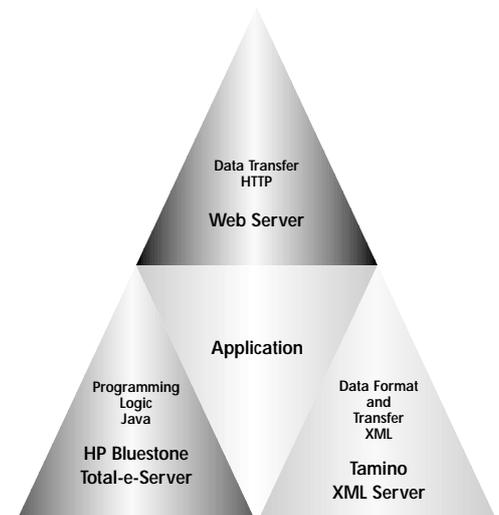


Figure 1: Application wrapping with HP Bluestone Total-e-Server and Tamino XML Server

Key Business Features

INVESTMENT PROTECTION

When the market is a moving target, yet it is essential to make decisions before the final word is spoken, a company can sometimes go in a direction that proves problematic later on. Market leaders of the past sometimes do not offer the best approach to new challenges. One way to minimize the risk of an early decision is to build on industry standards that many manufacturers embrace. This reasoning proved itself when SQL became an industry standard 20 years ago.

The HP Bluestone Total-e-Server and Tamino XML Server adhere to recognized industry standards for the use of Java and XML. They do not rely on proprietary modifications to SQL to access XML data. This means that the investment made in new applications is protected by wide independent industry support. No danger of a technological cul-de-sac. Interaction with other products supporting the same standards is straightforward.

COST EFFICIENCY

Key to implementing applications quickly and to keeping them well maintained is the availability of qualified personnel for initial development and to replace resources lost through fluctuation. Since these technologies have become mainstream, skilled Java and XML experts are not hard to find.

The object-oriented structure of Java makes reusability of previously developed components simple. This all equates to lower development costs and speed to market.

ACCOUNTABILITY

The HP Bluestone Total-e-Server and Tamino provide your business with the most complete infrastructure to create, process, archive and transport XML documents over the Internet. Other products still view XML documents as temporary by-products of Web-enabled legacy applications. They assemble XML documents as a one-time snapshot of operational data from two-dimensional relational tables. As the source data is modified, it is no longer possible to recreate the document for auditing purposes. In the worst case scenario, the integrity of an XML document can be compromised since the source system does not recognize the document, only a number of unrelated atomic bits of data. This can have serious consequences for an organization.

FULL UTILIZATION OF EXISTING CORPORATE ASSETS

Tamino XML Server takes full advantage of existing applications and data without replacement of proven systems. Tamino features unparalleled capabilities for constructing complex XML documents from a sophisticated IT environment. Competitive products all can produce XML "views" of their own legacy data but only Tamino allows a simple mapping from disparate data sources into a single XML document. Where a complex environment of highly specialized software systems has developed over the years, the only alternative to Tamino's integration ability is custom programming. This adds unnecessary effort to projects, consuming development resources that should be concentrated on solving a business problem. And as the resulting XML document evolves to meet new competitive needs, the cost of maintaining the customized code increases.

FLEXIBILITY FOR FUTURE DEMANDS

In a dynamic world, data structures grow and adapt to changing requirements. As a result, XML document structures can change. No other repository system allows the structure of XML documents to be changed with such ease without effecting documents already archived in previous layouts. Tamino XML Server can access these documents automatically using the new structure, delivering the new items of information with valid null (empty) values.

Key Technical Features

FULL SUPPORT OF XML-BASED APPLICATIONS

Tamino XML Server is Software AG's product offering for storage, maintenance, publishing and exchange of XML documents. In addition to highly efficient native XML storage and query capabilities, Tamino offers, in conjunction with Software AG's EntireX integration server, all functions required for Total Business Integration. A wide range of services and solutions complement the core XML storage component. For more details on Tamino XML Server refer to the white paper published on the Software AG product.

All of the leading application servers on the market support parsing of XML documents and stylesheet transformations. Only HP Bluestone's Total-e-Server includes a dynamic XML server that allows an installation to define rules for processing specific XML documents based on DTD, XML Schema or content. But it lacks functionality to save these documents. A special type of

servlet, called a document handler, can be defined to process one or more document types. This unique feature of the HP Bluestone Total-e-Server supplies services to exchange and dispatch XML documents but it does not address the construction of XML documents from other data sources nor the archiving of these documents. This is where Software AG's Tamino XML Server comes into play.

Based on administrator-defined rules, Tamino can construct XML documents from many different data repositories letting XML applications concentrate on solving the problem at hand. The administrator can make extensions to existing XML documents or compile data from other data sources into them without effecting the existing applications. Tamino's native XML data store allows XML-oriented applications to store and retrieve the documents.

SUPPORT OF W3C STANDARDS

Tamino XML Server uses standard interfaces set forth by the World Wide Web Consortium® (W3C), the body responsible for the definition of XML. In particular the implementation of XPath in Tamino allows access to exactly that part of the XML tree that is referenced by a particular query. When the XQuery standard is approved Tamino XML Server will move quickly to adopt this standard for XML access as well.

This support of W3C standards means that, as Web services exploiting them appear on the market, they will interface to Tamino's XML store with ease.

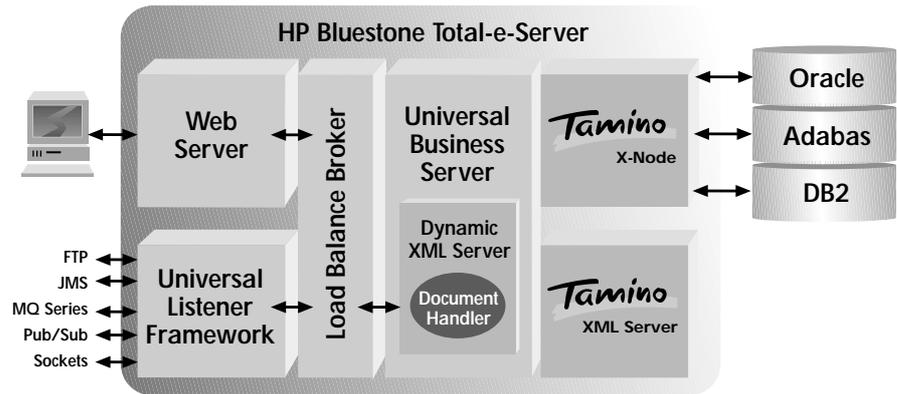


Figure 2: HP Bluestone's XML server with Tamino XML Server

HIGH PERFORMANCE

Not only does Tamino XML Server employ a sophisticated caching algorithm to retain recently used documents in memory thus reducing access to storage media, it also pools connections. This feature allows unused links to Tamino XML Server to be associated with any session requiring one. In this way the process of connecting to the server is kept to minimum.

Examples of Use

APPLICATION SERVER INFRA-STRUCTURE

Two programming models are crystallizing as standards for Internet application programming: the Microsoft® infrastructure with IIS, ASP, COM+ and C# on the one hand, and J2EE on the other. Whereas the former is by and large embedded in a whole Microsoft architecture, Java is available on every major computer platform. Although Java code can run in any environment where there is a Java Virtual Machine available, in order to handle the erratic workload spikes that so often occur in the Web, more than a simple Java Virtual Machine is necessary. The key to scalability and high availability is distribution of resources across

server boundaries. The HP Bluestone Total-e-Server excels in this area. Additional images of the HP Bluestone Total-e-Server can be started dynamically as workload increases. They can be on the same server or on different servers. There are a number of ways in which Tamino XML Server can be utilized to add value to an HP Bluestone Total-e-Server environment.

To insure that the context of a complex transaction that consists of a number of steps can be preserved and that the transaction is not bound to a single image of the HP Bluestone Total-e-Server, persistent objects are required. This means that a Java object, which may have an intricate structure, must be saved to a storage medium. This can be done in a number of ways, but when the system needs to administer hundreds or thousands of objects it is most expedient to place the object in a repository where it can be indexed for fast retrieval. Most application servers offer object-relational mapping so that these objects can be inserted into a relational database. But this mapping may result in the object being dissected into a number of two-dimensional parts, each to be stored in a separate database table. Object-XML

mapping is much more straightforward. The resulting XML document can be stored in Tamino's XML data store and retrieved in a single operation without joins and with significantly few disk access operations. In many cases the caching facilities of Tamino XML Server can deliver the requested object from memory without accessing any external storage medium. A busy system may require many hundreds of object retrievals per second. Avoiding superfluous I/Os and join operations increases the throughput of the application server considerably.

The component architecture of Java lends itself well to distribution of objects across servers. As we saw above, this improves throughput but recently a new and intriguing use for distributed resources has emerged: Web services. The idea behind Web services is that the functions of an application are no longer confined within corporate boundaries but may be distributed throughout the Web. An object providing a certain service can be developed by an organization and made available for public use as a Web service. Including tried and proven Web services within a framework to realize a new application shortens the development cycle dramatically and even on a pay-by-use basis can cut total costs substantially.

The success of Web services hinges on robust 24x7x365 application servers but also on high-speed directories that are used to publish the characteristics of those services. Application developers around the world need to find out what services are available, where they reside and how they are invoked. This information is stored in Universal Description, Discovery and Integration (UDDI) registries. Since the UDDI

repository depends on the Web Services Description Language (WSDL), an XML-based mark-up language, the UDDI repository is best realized using Tamino XML Server, removing the necessity of translating to and from relational tables.

In keeping with the spirit of the Web, the communication protocol used to invoke Web service methods is an XML-based protocol called the Simple Object Application Protocol (SOAP). There are many reasons that SOAP requests may need to be recorded, such as: billing, audit trail, error determination, etc. Again Tamino's XML data store represents an ideal repository for archiving and retrieving SOAP requests.

Tamino is also well suited to administering other directory-type look-up uses thanks to the power of the full-text search provided by Tamino and the ease with which complex directory structures can be realized using XML. By using Tamino as a directory server the performance of the HP Bluestone Total-e-Server can be improved considerably as compared to other repositories.

USES IN EJB AND JAVA APPLICATIONS

Thus far we have considered how Tamino XML Server can be used to improve the operating environment of the HP Bluestone Total-e-Server.

Of course the XML processing capabilities of the product can be used in a number of ways directly from an Enterprise JavaBean™.

Tamino XML Server is well integrated with J2EE interfaces in number of ways. The server registers itself with the directory services of the Java container, so it appears to all Java programs as a standard Java Naming and Directory Inter-

face™ (JNDI) resource. It also ties into the Java Transaction API (JTA) allowing it to participate in container-managed transactions. Soon Tamino XML Server will also conform to the Java Connection Architecture (JCA) that allows the server to become a full-fledged Java resource.

Obviously any Java servlet or Enterprise JavaBean processing XML documents profits from the complementary functionality available with the HP Bluestone Total-e-Server and Tamino XML Server. Of particular interest is Tamino's capability to "harden" XML documents in a high-speed XML repository and the way Tamino can assemble XML documents from various data sources off-loading this burden from the application developer who can then concentrate on solving a business problem. In the area of document transfer, the HP Bluestone Total-e-Server supports the HTTP Web standard as well as a wide variety of protocols including WebSphere MQ™, JMS, FTP, SMTP (e-mail), schedule, broadcast messaging, multicast messaging and socket for integration with existing networks. The dynamic XML server, a standard feature of the HP Bluestone Total-e-Server ensures that an XML document received from an external source is routed to the correct application to handle it.

As Web applications move away from pure-text-oriented information in the direction of rich media (audio, video, graphics), the ability of Tamino XML Server to archive this information and to quickly retrieve it querying XML attribute information will prove a powerful tool to organizations dealing with huge amounts of non-text data.

Another promising use of Tamino XML Server is to minimize the workload on a backend operational database system introduced by an unpredictable number of Web transactions. Many Web-based applications consist of a number of intermediate tasks that prepare a transaction - such as a purchase order - to be routed to an operational system for final processing. All but the most primitive transactions will be dialog-oriented. That is, they consist of a number of steps such as selecting items for purchase. The results of each of these steps must be recorded somewhere (persistence) and require the same transactionality as other processes. Of course this transitional data could be recorded in a production database, but this would introduce a potentially critical and unforeseeable load on the back-end system that could impact other critical workload adversely. In addition, the mapping of this data, which most often represents complex objects, into a relational system can be a non-trivial matter. Tamino XML Server functions ideally as a repository for this sort of temporary data. Mapped into XML structures, the complex data can be stored and retrieved with utmost efficiency. Once the purchase order has been completed, a single order can be submitted to the production system and, if no longer needed, the data can be deleted from Tamino.

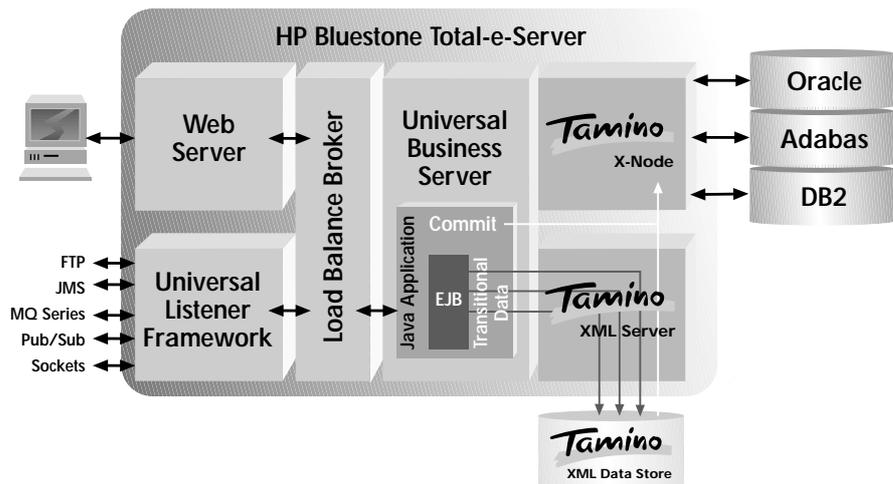


Figure 3: Tamino XML Server as a transitional data store

SEPARATION OF WEB APPLICATIONS FROM OPERATIONAL SYSTEMS

The unique caching features of Tamino allow Java applications running the HP Bluestone Total-e-Server container to access XML documents that are automatically mapped from multiple data sources. These documents are assembled once and reside in Tamino cache for future requests, thus avoiding the overhead of repeated access to operational databases and transaction-oriented systems. Optionally, they may be stored in Tamino's XML data store.

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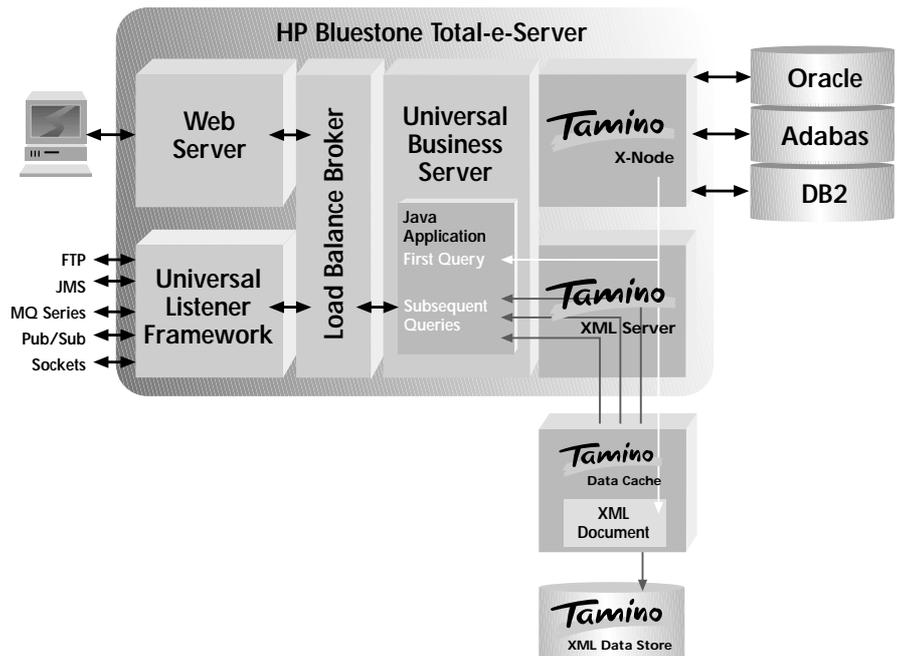


Figure 4: Tamino XML Server as an Internet data cache

Software AG
Corporate Headquarters
Uhlandstraße 12
64297 Darmstadt/Germany
Tel: +49-61 51-92-0
Fax: +49-61 51-92-11 91
www.softwareag.com/tamino

INS/WP09E1101 278

 **SOFTWARE AG**
THE XML COMPANY