MyBEA Enterprise Infrastructure Services Architecture

White Paper

How Business Becomes E-Business™

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1. Executive Summary

1.1 Introduction

From a company that sells J2EE-based enterprise application infrastructure software, one expects a superb internal enterprise application. BEA Systems, a $1 Billion software company and the maker of the market-leading WebLogic eBusiness Platform, has built an impressive enterprise application architecture that demonstrates and showcases both the benefits of Java 2 Enterprise Edition computing and its own products. BEA's application architecture is, of course, web-centric and its innovation lies in a robust layer of BEA Enterprise Infrastructure Services. The EIS has been built by the Information Technology division – which has three basic objectives:

- Build a Robust IT Infrastructure – help scale the company and create the agile enterprise.
- Demonstrate the Integrated Enterprise – build differentiated business capabilities that demonstrate the value of BEA's solutions to customers and partners.
- Partner with BEA Product Engineering Groups – provide feedback and strategic insight to help our product groups create better solutions.

1.2 "Plug and Play" Application Infrastructure

At the core of BEA's enterprise application architecture is the "Infrastructure", a set of shared J2EE – based Web Services and frameworks leveraged by the business applications. The applications "plug into" the infrastructure to access services that run the gamut from high-end services such as application integration, content management, and presentation (portals), to low-level services such as security, data retrieval, and persistence management. In BEA's architecture, the services and frameworks make up a shared platform, upon which all applications are built, integrated, and extended. Although many of the benefits of the Infrastructure accrue to BEA's eBusiness applications, significant benefits also accrue to the core enterprise applications such as ERP, SFA, and the call center applications, with key services integration, LDAP, and/or content management.

Following were the business objectives for the group developing the EIS:

- Build a Robust IT Infrastructure
    a. Narrow the gap between the application and the platform by providing core services required by all applications across the enterprise
    b. Enable business owners to rapidly deploy solutions / applications
    c. Enable business owners to define policies across the Enterprise
- Demonstrate the Integrated Enterprise

a. Build differentiated business capabilities that demonstrate the value of BEA's solutions to customers and partners.

b. Provide a simple, secure and easy to use environment across the platform by leveraging the BEA Web Logic Platform

c. Be a customer showcase model by deploying the solution on the latest release of BEA products / Platform

- Partner with BEA Product Engineering Groups

a. Participate in the product beta program to achieve the above mentioned objective

b. Include product team in the design review process – especially for features that extend the product / platform

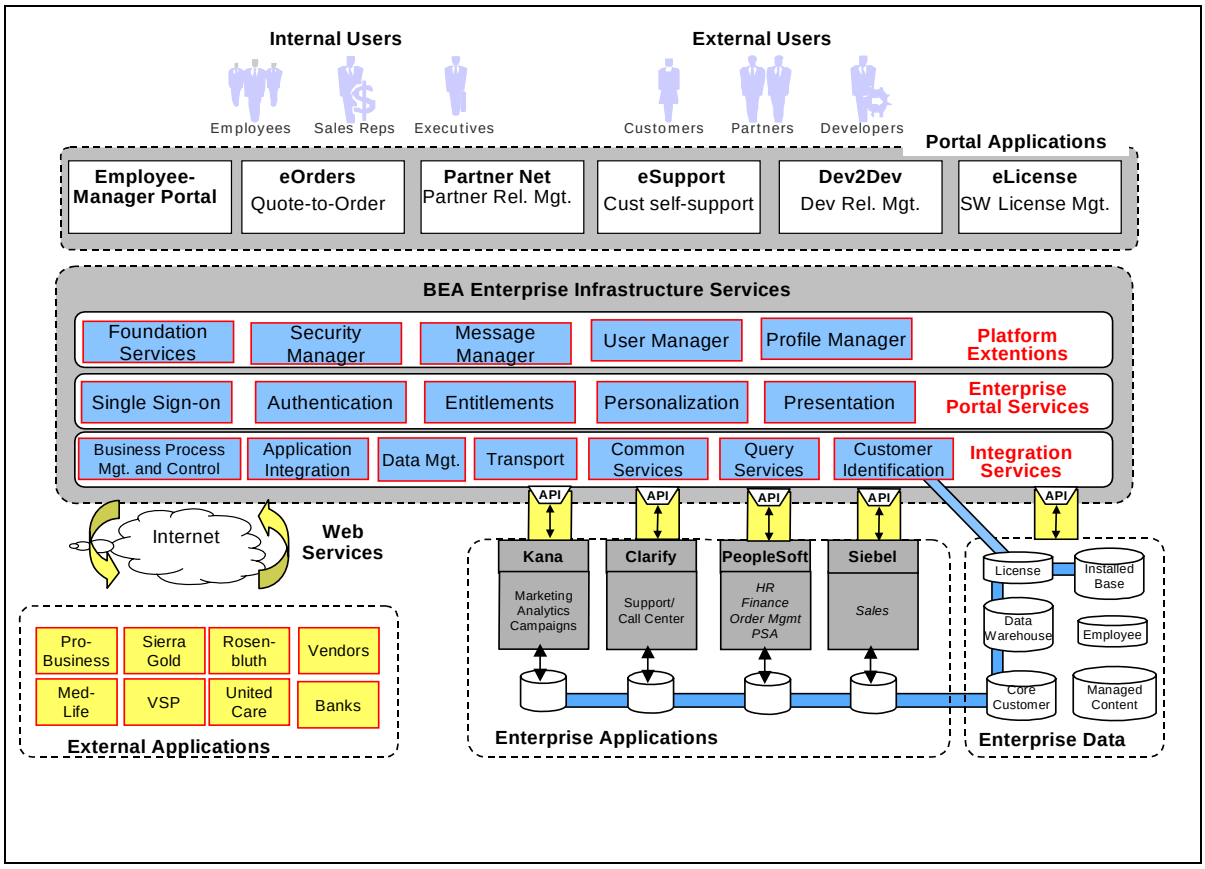

Figure 1: MyBEA Architecture Vision

The above diagram illustrates the MyBEA Architecture Vision for the BEA Enterprise Infrastructure Services. The vision is to provide a flexible solution that provides the capability to the various business units within BEA to rapidly develop and deploy applications that improve productivity and increase customer satisfaction. The application infrastructure services supports the ability to integrate with existing enterprise applications either by using adapters or going

directly to the data source. In technology terms, this translates into leveraging the capability of the Web Logic Integration server. In addition, all BEA products support Web Service interface, which provides an open, asynchronous, and secure integration with external applications.

The BEA-EIS provides those major components that are shared horizontally across the enterprise. These include services such as Subscriber Registration and Management, User Profile, Single Sign-on, Authentication, Service/Application Registration, etc.

1.3 The Journey – "12 by 4"

In 2001, BEA started implementing its vision with a new eBusiness program, called MyBEA, to build a series of eBusiness applications for the Sales, Services and Marketing functions. After facing initial challenges with the coordination of multiple eBusiness initiatives, BEA management decided to formalize MyBEA into a highly structured program, and infuse best practices to manage and coordinate the delivery and operations of all of BEA's eBusiness capabilities. The team developed "12 by 4", a new approach to rapidly develop applications within the integrated program. The objective is to develop applications in building blocks and release one major component every four months. This approach enables the business units to review the usage and ROI rapidly and determine if they should keep investing in that particular effort. In addition, the development team gets usage feedback earlier, which enables them to modify features rapidly, if required.

With eOrders applications, BEA's seven hundred sales representatives worldwide can generate quotes based on BEA's business and pricing rules, and then smoothly convert them into about 50,000 customer orders per year. BEA estimates that by streamlining what used to a very labor-intensive process, it will achieve a cumulative net savings in the order of $20 million over the expected life of the application. By deflecting a share of the customer support activity to the Web, eSupport is expected to achieve a 25% productivity improvement in the call centers with new savings upward of $10 million per year. Other applications that have been released include Dev2Dev, BEA's developer center site aimed at BEA's more than 2,000 business partners, and eLicense, which automated the creation and management of millions of software license keys.

All of these applications leverage BEA's infrastructure, which is continually developed and updated on a semi-annual release plan. The combination of infrastructure-centric architecture and best processes in eBusiness development has dramatically improved BEA's development prowess: throughput has been at least doubled, and quality has reached the point where, at release time, no known application issues, however minor, remained.

1.4 The Future

"Creating a "plug and play" infrastructure for the entire enterprise is really where we are going. We want our development teams to focus on business logic and business processes primarily, and not be too concerned about how to do integration, or portals, or security," says Rhonda Hocker, BEA's CIO. "Our next release of Infrastructure, release 7.0, will further embrace the entire enterprise architecture, with a more powerful integration layer that will make any of our applications, eBusiness or not, even more useful" she adds. Hocker's infrastructure team is now

working at standardizing its integration services and business process management layer on BEA's own WebLogic Integration product. Hocker believes that BEA's architectural choices will give the businesses unprecedented agility: "One of the great things about building on top of an infrastructure platform is that once we decide to invest in a new app, we can catch up very fast in areas where we don't have leading capabilities. Our developer center application for example, will soon be ahead of the competition's." Speed, agility, and efficiency are indeed remarkable benefits for any organization.

2. Overall Design & Architecture

2.1 Design Principles

The BEA EIS is a set of shared J2EE – based Web Services and frameworks leveraged by the business applications. The objective is to provide a simple, easy to use method to configure, develop, and deploy business applications in a secure environment. It is aligned with BEA's product design criteria, which are based on strict adherence of open standards. As a result of this approach, the EIS is software that is designed to provide 99.999% availability and it provides real-time functionality, a must to support the concept of "the network is the computer". The software by itself does not provide the 5-9's availability, but it works in conjunction with the infrastructure and management tools to provide this capability.

2.2 BEA Enterprise Infrastructure Services Architecture Framework

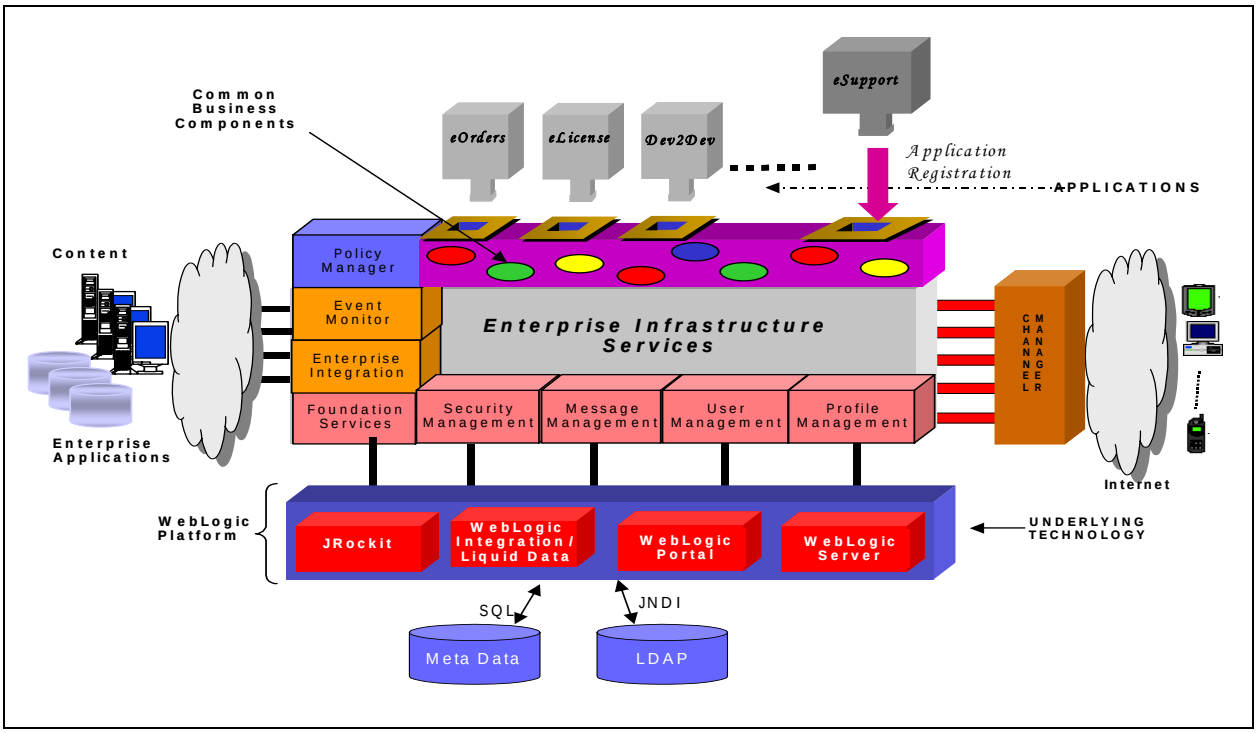

Figure 2: Enterprise Infrastructure Services Architecture Framework

The above diagram is the illustration of the EIS architecture framework. Some of these components are already provided in version 3.x. The architecture vision of the EIS is to provide additional components, based on the priorities of the various business units, in addition to enhancing the functionality of the existing components.

The BEA-EIS contains the following components:

- User Registration / Management
- Profile Management

- Message Manager
- Security Management
- Enterprise Integration
- Event Monitor
- Policy Manager
- Common Business Components
- Multi-Channel Manager

2.3 Meta-Data driven approach

Meta-data in the EIS refers to configuration information that dictates the behavior of the core services and applications. One crucial advantage of a meta-data approach is that it isolates oft-changed parameters - outside of the code - meaning that changing or adapting the system does not require recompiling the product code. Most importantly to a customer, it means that they need not wait for prolonged release update cycles from software manufacturers in order to add new functionality to the system. The BEA Web Logic Platform already uses meta-data to drive its own logic and the EIS is based on similar principles.

3. BEA Enterprise Infrastructure Services Components

3.1 User Registration and Management

User Registration and Management is one of the key components that address the needs across the enterprise. Various departments such as Marketing and Customer Support want the BEA customers to use the web self-service approach to access data. This requires the existing and potential customers of BEA to register, which makes it easier for applications to provide them information in a secure fashion. In addition, organizations such Sales and Services would want employees to enter and access enterprise data. Both of these requirements are satisfied by the User Registration and Management component. This component provides the following benefits:

- Simplified managing of account on the web
- Single sign-on capability
- Enables the creation and management of multiple profiles
- Provides the persistence of user profile and preferences across multiple registered applications / services
- Enables the dynamic rendering of menu options
- Lowers cost of access across the enterprise
- Provides a secure and trusted platform for business applications

There is also a need to create hierarchal permissions where a managing role can modify the permissions of a managed role. A typical example of this functionality could be used both by eSupport and PartnerNet. A privileged user (customer) of each of these applications should be able to maintain and control the access to their company-specific information by using this module.

Examples:

- The primary contact of PartnerNet can provide some users from his/her company to order software from BEA.
- The privileged user of a company is the only one who can review all the open support requests created by everyone in the company and all other users can review only the ones they created.
- The privileged eSupport user of a company can assign privileges to other users within the group to have access to the same applications / services.

The User Registration and Management component also provides the ability to create and modify groups as well as providing the administration tools for single sign-on capability.

3.2 Profile Management

The Profile Management component is responsible for capturing as much user information as possible that is required horizontally across the enterprise. Some of the standard profile information such as language, time zone, currency, etc. is defaulted whenever a user registers to the system. The other common profile attributes captured are the contact and address details. For contacts, the user can enter all the contacts information, and then choose if he/she wants

them to be private (i.e. not shared among the group) as well choose the primary contact preference. The user could also enter various addresses such as Billing & Shipping addresses. Both the contact and address details can be used to default this information to the various applications.

Examples:

- eSupport defaults the primary contact information whenever a support request is created.
- The Education system defaults the primary contact as well as the billing address whenever a user purchases education using the web.

3.3 Message Manager

Communication is key to increasing productivity and customer satisfaction. Research indicates that it is not the delay in resolving issues that infuriates customers; rather it is a lack of information or communication that contributes to the development of a negative image. As part of user profile, the EIS has captured the contact information. The objective of the Message Manager is to facilitate real-time communication as well as allow applications to define their own messages. The Message Manager consists of the following components.

- Message Administration – allows application developers / business owners to define their own message types as well as enable them to take appropriate actions
- Intelligent Notification – this component sends alerts to the user based on environment as well as event
- Message Viewer – enables users to review, configure, and administer their own messages
- Message Library – APIs provided by application infrastructure services for application developers

The objective is to expand the call handling into this component and potentially integrate with web collaboration.

Examples:

- Using this module the user could define his/her email address details as well as setup various filters for notifications.
- The business application developer can define new types of messages such as "Sales Lead", "Order Approval", etc. Of course, they need to be tied with the Event Manager in order for users to receive these alerts.

3.4 Security Manager

The application infrastructure services have been designed to address the following issues:

- Authentication & Non-Repudiation
- End-to-End Security Solutions

3.4.1 Authentication & Non-Repudiation

The EIS provides a strong application level authentication. As part of the roadmap, the application integration services plans to provide strong authentication and non-repudiation by

integrating with a Token Id and a unique pin based systems. To start with, this security option will be used to enable BEA employees and potentially BEA partners to access confidential data. This would require this set of users to possess not only a Token ID, but also a unique PIN.

3.4.2 End-to-End Security

The EIS provides end-to-end security by taking full advantage of the Web Logic Platform to enable Transport Level Security (TLS).

3.5 Enterprise Integration

The EIS plans to take advantage of WLI to provide the Enterprise Application Integration services. BEA has invested significantly in applications for managing different aspects of our business, including enterprise resource planning, sales force automation, etc. The EIS architecture allows BEA to leverage this investment with extensions that enable web self-service access to these applications. One of the main objectives is to provide a unified view of the customer in a simple, scalable and secure manner.

3.6 Event Monitor

The EIS provides the capability to monitor various events within the enterprise. These events are triggered by the database or any other environmental changes. The event monitor is generally configured to monitor any database changes and invoke a transaction whenever it meets the filter criteria. In cases where the developer is allowed to modify the workflow of the existing applications or use their APIs to access the applications, the developer would develop code to send the event notification to the application infrastructure services. The EIS will filter the event and invoke the appropriate transaction. The EIS supports three types of event monitors and leverages the WLI to meet the requirements.

1. Database listener – captures events on a real-time basis; integrated with database using rules & procedures
2. Database crawler – periodically crawls the database based on complex SQL query
3. HTTP (XML) listener – customer interfaces as well as based on standard HTTP listener.

3.7 Policy Manager

The Policy Manager is the main component that enables the Enterprise to be proactive and take action on any event that impacts its business. The Policy Manager makes the existing applications environment aware and requires the following components:

- Policy Designer – tool that enable developers, managers, employees, customers to define the policies that govern their business.
- Event Monitor – the component that monitors the environment for events.
- Policy Engine – this component is responsible for taking appropriate action, based on the event(s) that took place.

The Policy Manager is based on the Business Process Manager (BPM) provided by WLI.

Examples:

- Lets take the example of the message manager and define some policies. The application infrastructure services provide unique message concepts such as message forward, copy, hold, and notify. Based on the unique message type, each user can, if necessary and based on time, take appropriate action. The notification component can also be expanded further, such as in escalation of message to manager or other members if user does not respond to event within a given time frame.

This is the key component that enables the enterprise to be proactive to external environment changes.

3.8 Common Business Objects

The EIS has been designed to provide a set of pre-defined common business objects that are used across the enterprise. The common business objects are meta-data driven and contain key attributes such as pre-condition, post-condition, acknowledgement, expiration, duration, state, validation, etc. The objective is to enable WebLogic Workshop to allow developers to create / define these business objects as well as put them together to form enterprise applications.

3.9 Multi-Channel Manager

This component is responsible for formatting and presenting screens to the users. Currently the EIS supports only the regular browser and the long-term plan is to leverage the multi-channel support provided by the Web Logic Platform.

4. Summary

This document gives an overview on the architecture of the EIS. Businesses today grapple with how to improve productivity as well provide greater responsiveness to customers, partners, and business events. The EIS offers clear advantages as infrastructure software that empowers the employees and potentially partners to act instantly upon business events and processes. It helps improve the business performance of both the workforce and the enterprise as a whole. One thing remains clear, the eBusiness solution requires enterprises to develop and extend business processes for competitive advantage. The BEA Enterprise Infrastructure Serivces provides that advantage.

Appendix – References

- How an IT Platform creates an Agile Enterprise – A Blueprint for the New IT
- BEA IT Governance & Architecture
- BEA Platform Documentation