

Creating New eBusiness Opportunities

Enterprise Application Integration

“Stand-alone, ‘stove-piped’ applications can’t meet today’s business needs. The greatest challenge to I/S in every large enterprise is finding better and simpler ways of making application systems work together more effectively.”
—Roy Schulte, VP of Research Advisory Services, Gartner Group

eBusiness has forever changed the landscape of business. In the drive to become eBusinesses, companies are continually seeking competitive advantages, additional revenue sources, cost savings, and improved customer retention. To achieve these goals, more and more companies are increasingly leveraging their enterprise application investment. Enterprise applications that were once “built to last” are transforming into being “built to change.” As such, companies are rediscovering their enterprise applications and integrating them with their web sites to create new opportunities. Enterprise Application Integration (EAI) makes it possible to rebuild and align the applications and focus applications’ features and functions on eBusiness opportunities. EAI requires significantly more than a “data exchange” focus. Implementing EAI draws upon technical skills, business process, reengineering skills, and business acumen to discover rich eBusiness opportunities. In turn, these opportunities enable companies to increase internal productivity and enhance relationships with customers and strategic partners. This white paper focuses on enterprise application essentials, EAI itself, and eFORCE’s methodology and approach to EAI engagements.

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Enterprise Application Essentials

Enterprise Applications are programs designed for the management of the entire company and/or the core competencies of the company. Examples of enterprise applications include SAP, J.D. Edwards, MRO (Maintenance, Repair, and Operations) applications, and any other application critical to the running of the enterprise.

Enterprise applications exist in many different types of computing platforms including mainframes, mini-computers, and even personal computers. Figure 1 illustrates how these applications may exist in a conventional mainframe environment.

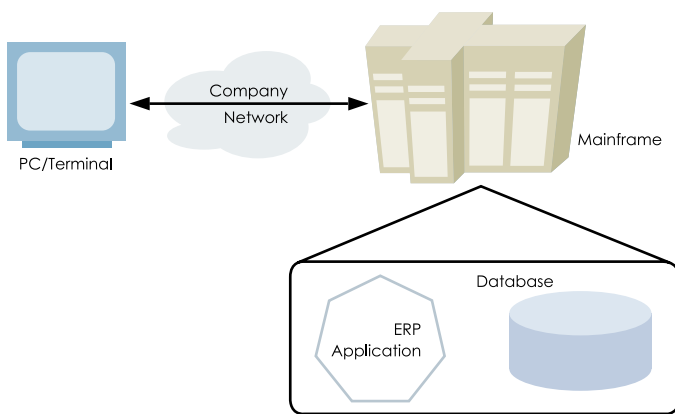


Figure 1. Enterprise Applications in a Mainframe Environment

In Figure 1, the enterprise application interacts with users, represented by the PC/terminal, to present and capture data. What is displayed on the terminal is an enterprise application with data that resides in a database. The application is responsible for presenting data stored in the database as well as applying business rules to data given by the user. Unfortunately, most companies have significantly more complex environments. Figure 2 illustrates a realistic enterprise application architecture.

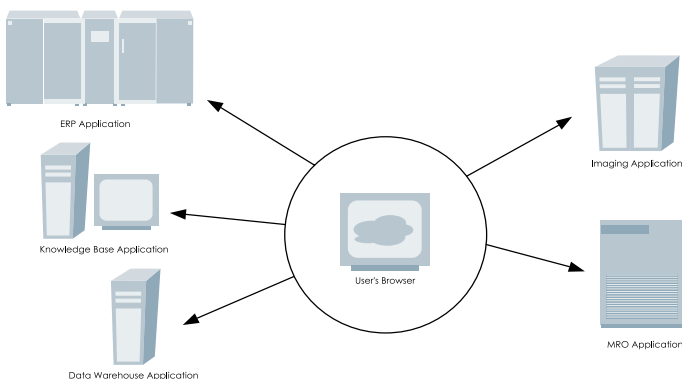


Figure 2. A Real-World Enterprise Application Architecture

In the previous example, the five enterprise applications exist on multiple platforms. This would require multiple terminals in a conventional architecture. The challenge at hand is to provide access to relevant enterprise applications and their respective data through a browser.

Of particular note is the need to analyze which enterprise applications and corresponding data must be accessible to implement an eBusiness solution. Since most companies already use the web to provide information to customers and suppliers, there is already a need for integration. But what is the appropriate level of integration?

Figure 3 shows a basic web-based architecture to which the previously mentioned enterprise applications must integrate.

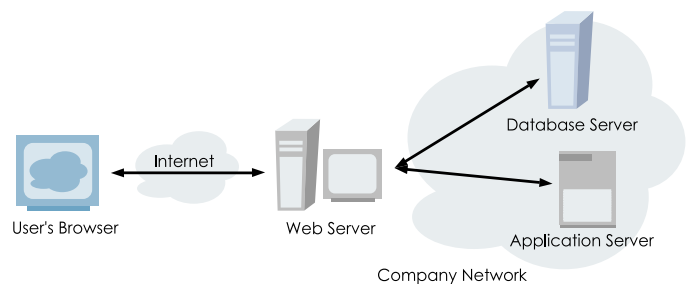


Figure 3. Standard Web-based Architecture for EAI

When a user's browser contacts the company's web server across the Internet and requests a page for display, the web server requests relevant information from the application server, which in turn may look to a database server to provide data. This results in the database server providing data that the application server combines into a web page, which is pushed to the web server to give to the user's browser. Since the application server creates the web page to pass to the user, the enterprise applications must interact with the application server if necessary. This is essentially the purpose of EAI software.

Enterprise Application Integration

At its most basic level, Enterprise Application Integration enables:

- Programs to interact with enterprise applications
- Enterprise applications to interact and pass data between themselves

EAI enables programs to communicate with enterprise applications in two ways. First, EAI allows access to a platform-independent extract of the enterprise application's data. As such, the data remains the same even if it is moving from a Windows NT platform to a mainframe platform. Second, EAI allows interactivity with the business logic within the enterprise application. For example, data entered by the user through a browser can be validated with the business rules within the application. Many EAI tools differentiate themselves based on this ability. More powerful EAI tools interact with the application business rules directly, while other tools use an indirect approach (such as "screen scraping") to validate data.

EAI also enables enterprise applications to interact and pass data amongst themselves. For example, data synchronization is a common issue in larger companies. Master level data, such as employees, tend to be duplicated in many enterprise applications: when an employee's record changes in one application, the changes do not automatically propagate to other applications that maintain the same data. Using EAI, a change made in one application can propagate to other applications.

Both capabilities of EAI are critical to eBusiness initiatives. For example, Figure 4 illustrates how data from legacy systems can be pushed to a user through a browser.

In Figure 4, an external user utilizes a browser across the Internet to request information from the company. This request goes to the application server, which in turn asks the EAI server to provide the requested information. As a result, the EAI server retrieves the relevant information

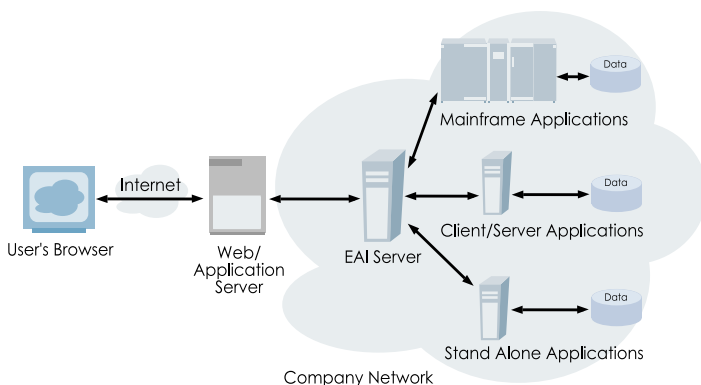


Figure 4. Legacy Data Pushed to a User Through a Browser

from the connected enterprise applications. After fetching the data, the EAI server returns the information to the application server, which ultimately passes the information to the user through the Internet.

The end result is that instead of having multiple "point-to-point" interfaces, there is a consolidated interface that coordinates the integration. In using such an approach, the integration is easier to support and maintain.

So what happens within the "Company Network" cloud in Figure 4? How does the EAI server operate at a conceptual level? There are many methods of implementing EAI, including:

- Point-to-point custom interfaces
- Remote procedure calls
- Database integration
- Message oriented middleware

Currently the most flexible approach involves using Messaging Oriented Middleware (MOM) with a Message Broker. This method passes messages and data between enterprise applications and a centralized Message Broker. This approach uses several software components:

Messages

Messages are standardized electronic packages that identify business events and data. For example, a message (at a high level) could be "Update the address of customer 929 to reflect that her zip code has changed to 09132". Messages can be distributed, shared, and managed.

Designing for message exchange requires discipline and focus. It is critical to understand the data flows between applications at a technical level.

Message Broker

The Message Broker is the software that queues, distributes, and manages messages among the connected adaptors. It tracks adaptors that are available, keeps lists of access between adaptors, and coordinates message flow. Equally important, Message Brokers are responsible for maintaining security. Powerful Message Brokers can even encrypt messages and data in transit.

Adaptors

An adaptor is software that interacts with messages and a connected enterprise application. It listens for messages, sends messages, transforms data to and from the connected enterprise application, and allows access to the business rules of the application. Pre-made adaptors are available for specific package applications such as SAP or PeopleSoft. If a pre-made adaptor is not available, a custom-made adaptor can be created. Of course, it is more desirable to use an existing adaptor than it is to create one.

Developing adaptors also requires discipline and focus. Since adaptors make the business rules and application data accessible, attention must be given to the functionality of the adaptors. It is critical to align features of the application to eBusiness needs. In doing so, eBusiness needs may not require every feature of the enterprise application to be accessible through the adaptor. Such requirements impact the development complexity of the adaptor.

Enterprise Applications

Enterprise applications are programs designed for the management of the entire company and/or the core competencies of the company. Examples of enterprise applications include SAP, J.D. Edwards, MRO applications, and any other application critical to the running of the enterprise.

The Message-Oriented Middleware with a Message Broker approach to EAI provides a framework to connect additional enterprise applications. As such, the approach scales and adapts to the changing business environment. What does this architecture look like?

The following diagram illustrates the architecture to this EAI approach:

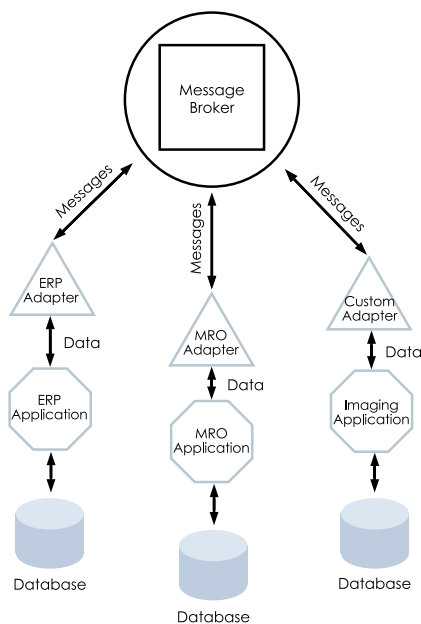


Figure 5. Company Network

As Figure 5 illustrates, the EAI software facilitates the movement of messages and data to and from applications. The Message Broker coordinates these messages. As such, the Message Broker routes messages to the adaptors, which interact with their respective enterprise applications. The end result of this coordination is that the applications become integrated. For example, Susan, a purchasing manager of Company XYZ, looks up the availability of parts using Company ABC's web site. She enters the site to perform a look-up on a part and then orders the part. Each of these tasks results in data being retrieved from enterprise applications.

When Susan requests information on a part, the request is given from the Application server to the Message Broker to retrieve relevant information on the part. In turn, the Message Broker passes messages to the ERP application, the MRO application, and the Imaging application. The ERP application responds by sending data on the inventory level, price, and cost. The MRO application supplies a data set that includes the bill of materials. The Imaging application supplies a high-level picture of the part. When this data is returned to the Application server, it is formatted and passed on to Susan.

When Susan sees that the part is available, she decides to order the part. The order request is passed from the Application server to the Message Broker. The Message Broker then coordinates the exchange of data from the user and the ERP application to create an order.

eFORCE's Methodology

eFORCE has extensive experience in EAI implementations. As such, eFORCE has developed a best practices-based, top down approach that is designed to initiate, design, implement, and manage application integration projects using multiple technology platforms.

To realize the full benefit of implementation and return on investment, it is critical that eBusiness goals be clearly defined and that the EAI project show alignment to these goals.

Top Down Approach

The eFORCE methodology subscribes to the hierarchical notion of a top down structure to an organization's processes. A business function typically breaks down into a number of processes, each of which may use data and/or business logic from one or more legacy applications. The first step in the methodology is to follow all the appropriate function paths and to identify candidate business objectives. Through interviews, eFORCE identifies all business objects and the data elements associated with each.

Data Validation

After gathering all of this information, it must be examined to ensure its completeness and accuracy. eFORCE consultants will conduct a qualitative examination of the data sets to identify any areas that require resolution and work with the client's project owners to identify suitable solutions.

Analyzing the Processes

eFORCE can identify deficiencies, inconsistencies, inefficiencies, and redundancies within an organization's processes. The process analysis is typically performed using a number of differing views of the business: by groups performing the processes, by the sequence of steps through the processes, and by organization-specific business rules.

Integration Process

Armed with an understanding of the organization and its processes, the integration process can now begin. There are three key phases to the integration process:

- Integration Planning
- Integration Design and Development
- Testing Administration and Management

Integration Planning

As with any software development process, the success of the overall project will always be constrained by the completeness and accuracy of the planning phase. The first decision to be made during planning is which applications require integration. An Application/Responsibility Matrix needs to be created to serve as the map for critical business transactions involved in satisfying the organizational objectives.

The Application/Responsibility Matrix will detail all of the functionality to be incorporated into the integrated system. That functionality will be segmented by the applications responsible for executing said functionality.

Integration Design and Development

There are two deliverables resulting from this component of the engagement: a detailed design specification document, and the alpha system. The detailed design specification will include the following system requirements:

- Infrastructure Design
- System Volumetrics (performance characteristics and constraints)
- Data and Application Distribution
- Adapter and Agent Strategy
- Adapter and Agent Design/Specification
- Architecture and Event Design
- System Security
- Data Import Process
- Migration Strategy
- Error Handling

The development process will be segmented along functional lines and executed in parallel by a team of eFORCE developers. Best efforts will be made to utilize existing adapters and agents, however, it is a near certainty that customized code will be written to satisfy particular requirements which cannot be met by existing integration tools.

Testing Administration and Management

The deliverables of the test process are as follows:

Test Plan Document

The test plan contains information about the purpose and goals of testing within the project. Additionally, the test plan identifies the strategies to be used to implement and execute testing and any resources required. Any automated testing tools to be used to assist in validating the functionality and technical requirements of the system will be outlined in the Test Plan as well.

Test Scripts

Test scripts contain the collection of documents that detail specific actions to attain an expected result from the system. Each script is traceable to a functional requirement.

Test Status Report

The Test Status Report will be the primary tool to track and report the current state of system testing. It will use a matrix to display all tests executed, all tests awaiting execution, and the pass/fail status of each executed script.

Measurement Plan

The Measurement plan will be closely tied to all requirements documents. It will outline the criteria to be used for evaluating the degree to which the system satisfies business, technical, and functional objectives. This document will define the measurement goals, the associated metrics, and the primitive metrics to be collected in the project to monitor its progress.

Conclusion

Enterprise applications that were once "built to last" are transforming into being "built to change." Instead of the traditional "the right data being at the right place at the right time," the drive to become an eBusiness mandates that "all data is always available from anywhere." EAI makes it possible to "rebuild" and align the applications and focus applications' features and functions toward eBusiness opportunities.

Recognizing the complexity in implementing an EAI initiative, eFORCE has developed a proven best practices-based deployment methodology and approach. In coupling the approach and focused teams, eFORCE brings deep technical savvy, business process reengineering experience, and industry acumen to any EAI engagement.

Essential EAI Questions

An EAI effort requires substantial analysis and synthesis to be successful. The following partial taxonomy lists the primary areas of investigation:

1 Transport Layer, dealing with the physical delivery of information and the quality of delivery service:

- Network Connectivity
- Message Handling and Queuing
- Security and Encryption
- Restart and Recovery
- Routing

2 Transaction Layer, dealing with the integrity and management of transactions between applications:.

- Transaction Management
- Fault Tolerance

3 Transformation Layer, dealing with the conversion of information between the applications being integrated:

- Data and Protocol Conversion
- Semantic Conversion
- Message Formatting
- Interface Conversion
- Data Validation
- Coding and Decoding Data

4 Application Synchronization:

- Request and Reply
- Synchronous
- Publish and Subscribe
- Asynchronous

5 Process Integration:

- Multiplexing
- Business Rules
- Workflow

About eFORCE

eFORCE specializes in the Fixed Time, Fixed Price implementation of solutions encompassing all areas of the Enterprise Value Chain - Enterprise Portals, CRM, EAI, Business Intelligence, Enterprise Content Management and Enterprise Infrastructure. Combining expertise in business architecture, technical architecture, design, deployment and maintenance, eFORCE delivers production-scale enterprise solutions that result in measurable ROI. eFORCE customers include Global 1000 organizations such as Alcatel, AT&T, Avaya, Baker Hughes, Bank of America, British Telecom, Cisco, DHL, FedEx, Fleet Bank, French Telecom, GE Capital, GE Power, Hilton, HP, Intel, Janssen, Janus, Merck, Mitsubishi, Morgan Stanley, Novartis, Reuters, Shell, Viacom, Visa and Wells Fargo. eFORCE delivers solutions based on best-in-class enabling technologies such as ATG, BEA Systems, BroadVision, Documentum, E.piphany, HP, IBM, Interwoven, Netegrity, Plumtree, Sun Microsystems, MatrixOne, Microsoft, Oracle, SeeBeyond, Siebel Systems, Stellent, TIBCO and webMethods. eFORCE (www.eforceglobal.com) is headquartered in Silicon Valley, has Development Centers in North America, Europe and India, and through its Global Delivery Methodology provides both onshore and offshore full lifecycle deployment – design, development, deployment, maintenance, support.

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