iWay Software

An Information Builders Company

The 21st Century Integration Challenge

Serving e-Business, e-Government, and Enterprise Computing

Another Technology Report From Ken North

Prepared for iWay Software, September 2001

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Introduction: Computing in the 21st Century

Sharing data between applications is a classic computing problem that continues to spur innovation. In first- and second-generation systems, applications managed files on an ad hoc basis and information was not easily shared between applications. Innovation produced the database management system (DBMS) as a resource for sharing data, but the introduction of networking raised the data-sharing problem to a new level. Network topologies introduced distributed data managed by heterogeneous database managers and disparate applications. The evolution of programming and query languages, with new types and access methods, increased the diversity of computing platforms. Integration and aggregation became more difficult so the industry produced another innovation – integration middleware.

In the 21st century, the integration challenge is more complex. Internet computing is ubiquitous and we have new models for electronic commerce. We have distributed applications and a new generation of information consumers, including portals, commerce servers, pervasive mobile devices, and data warehouses. The integration challenge today is not lack of databases, but proliferation of databases. Strategic alliances, corporations, governments, and even small businesses often use heterogeneous data sources and a mix of applications, so we still have a serious aggregation, integration, and information sharing challenge.

The information user today is no longer internal staff operating behind a corporate firewall. Web sites, commerce servers, and virtual enterprises create demand for information for staff, partners, and customers using a variety of applications and client devices, from locations around the globe.

Distributed Computing, Collaboration, E-Commerce

The 21st century application model is changing. The new generation of software is based on a model of distributed computing, Web services, collaborative applications, and data integration. The challenge is to maintain a customer focus and make information available–when it is needed, where it is needed. The new model puts great emphasis on integration because, in a collaborative processing environment, data resides on networks having distributed servers. Logic and data is distributed, and companies need enterprise and inter-enterprise integration technologies. Global e-commerce is moving along the continuum from planning to reality, changing business models, and spurring the development of business-to-business (B2B) software solutions.

Government is also a major force for change by encouraging more electronic links to streamline business processes and communication between public sector and private sector organizations. New government initiatives are building e-government infrastructures to conduct business, to receive tax returns and other document filings, and to deliver services over the Web. These new frameworks deliver information from databases at multiple agencies across the Internet using integration technologies such as XML.

Economics and Market Forces Driving Integration

Why are software companies focusing on integration technologies and e-business?

- IDC predicted that by the end of 2004, 1.3 billion people will be plugged into Web-enabled phones and another 800-plus million will have other Internet connections. It also predicts that by 2005, Internet commerce will approach $5 trillion.
- Forrester Research predicted that by 2004, business-to-business (B2B) e-Commerce trade in North America would exceed $2.7 trillion annually. e-Business networks will be the "new mar ket structure of the Internet economy."
- Gartner Group predicted global B2B Internet commerce would reach $6 trillion by 2004 and $8.5 trillion by 2005.
- IDC predicts e-business investments will approach $300 billion in 2001 and "grow more in 2001 than all the venture money put into Internet start-ups since the Web was invented."
- Morgan Stanley Dean Witter reported that in 2000 only about 5 percent of B2B exchanges have some integration with ERP back-end systems.
- Forrester Research surveyed 51 e-Commerce managers at Global 2500 companies and found that 71 percent planed to use XML for e-business.
- An IDG survey of 500 CIOs reported that companies predict their XML technology budgets will increase by 86 percent over last year. That contrasts with an 8 percent increase in IT budgets reported in a separate survey by Morgan Stanley Dean Witter & Company.
- The *New York Times* reported analysts expect electronics sector B2B purchases to be $600 billion by 2004. It also reported the Covisint B2B exchange of the auto industry will handle $200 billion annually in purchasing.
- Forrester Research predicts that European EDI trade will peak in 2002 at 1.5 trillion euros, and decline thereafter as companies switch to Internet commerce using industry-specific XML devel opment and e-marketplaces.
- Gartner Group predicted that by 2002, all leading software vendors would offer integrated e-business infrastructure platforms. It also predicts that by 2004, more than 60 percent of new e-business applications will use an integrated single stack e-business platform infrastructure.
- Wintergreen Research reported license revenue for application integration software grew 110 percent from 1999 to 2000. It predicts 2001 growth will be 75 percent to reach $2 billion.
- Based on a recent survey, IDC predicted marketplace services spending would increase at a compound annual growth rate of 27 percent, from $5.2 billion in 2000 to $17 billion in 2005.
- Gartner Group predicted organizations having an integral e-business infrastructure would

reduce operating costs by 15 to 40 percent and increase earnings per share by 30-to-80 percent in the year 2006.

- Forrester Research predicted 111 million Americans would use mobile data services by 2005.
- Strategic Analytics, Inc. predicted m-commerce would grow to $230 billion by 2006.

What can we conclude from these predictions and expect from market forces?

- There will be continued growth in Internet commerce involving B2B and exchange transactions.
- Many organizations are still in the planning stage for integrating Internet commerce sites with back-office systems. They do not have connectivity solutions for serving Internet transactions by flowing information through back office and ERP systems.
- A dramatic increase in wireless computing and Internet connectivity will increase demand for new applications and Web services. This will intensify the search for easier integration of Web sites and commerce servers with back-office systems.
- The failure of Internet startups will not diminish the importance of Internet commerce because of the commitment of brick-and-mortar companies to e-business.
- Demand for integration technologies is increasing at a rapid pace. XML-based integration technology spending will grow at a much faster rate than total IT spending.

The Role of Middleware

Middleware plays an important role in traditional client-server applications and the emerging model for distributed Internet applications. Middleware is software that sits between the back-end or database tier and the front-end, presentation tier of an application. Various types of middleware perform functions such as data access, messaging, data aggregation, data integration, and transaction management.

Middleware uses different models for sending and receiving data or invoking remote procedures or methods. An SQL server remote procedure call (RPC) uses a request-response model for synchronous data transfers. Web servers use a request-response model for communications with Web browsers requesting HTML pages. Messaging middleware can provide a "fire-and-forget" model by using asynchronous messaging and queuing. Another type of middleware uses a push model to send continuous streams of data such as stock quotes. Yet, another type uses a publish-subscribe model for purposes such as aggregating content for Web publishing.

Integration middleware is middleware used for process integration or data integration and aggregation. Data access middleware includes drivers, libraries, and other software whose primary function is database connectivity.

Data Access

Because many organizations share data internally and with partners, many developers are involved in multi-platform, multi-database programming. Database developers have moved away from proprietary application programming interfaces (APIs) to standard data access APIs such as Open Database Connectivity (ODBC) and JDBC™. Standard APIs simplify programming for multi-database environments, but integration, aggregation, and universal connectivity are value-added features that involve middleware.

The motivation to simplify development and integrate data from multiple sources expanded the role of middleware in the last decade and companies such as Information Builders rose to the challenge. Information Builders developed sophisticated integration and connectivity solutions using ODBC, JDBC, OLE DB, and proprietary APIs to connect to heterogeneous databases. Its Enterprise Data Access (EDA) technology – now part of iWay – provides connections to dozens of data sources such as databases, applications, and legacy data stores, including IMS and CICS.

Scalability and Integration

Enterprise computing typically involves a high level of integration of business processes. Collaborative computing and inter-enterprise computing extends business process integration and data integration beyond the firewall. Internet commerce involves connections to partners and customers. This new model of computing mandates scalability.

To create scalable enterprise and inter-enterprise Web applications, the architecture of choice has become a multi-tier, distributed computing architecture as shown in figure 1. The work of an application is distributed across multiple tiers of servers with presentation logic running in clients, including thin clients and mobile devices. Multi-tier applications use different types of servers, including application servers, transaction servers, Web servers, and integration servers. Integration servers typically use EDI or XML for data integration or process integration.

They play an integral role in exchanges and other business-to-business applications.

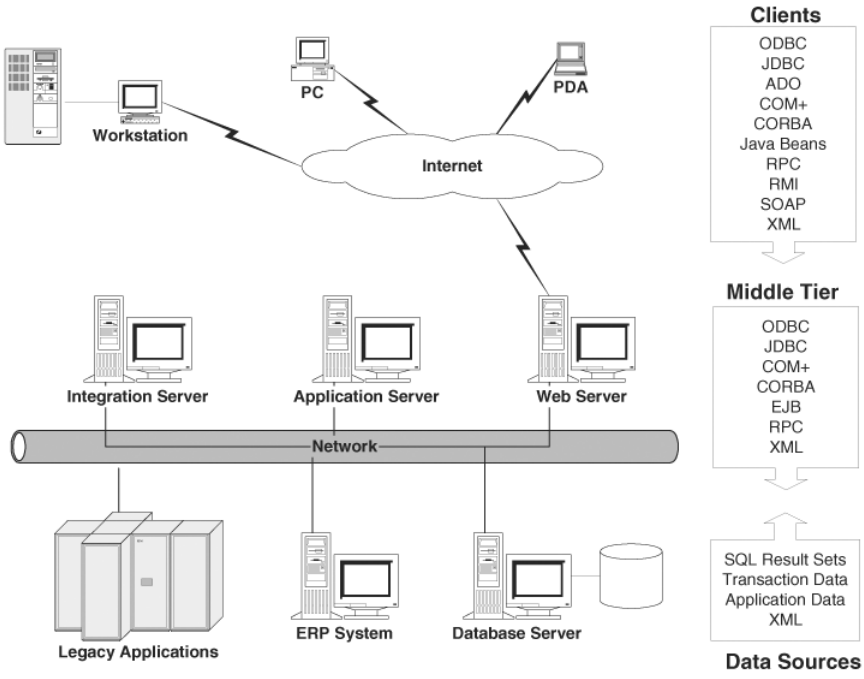

Figure 1: Programming distributed applications can involve multiple APIs and component models. Multi-tier architectures provide scalability but increase the complexity of integration problems.

Several factors have created the need for a new breed of integration middleware.

1. Disparate clients and computing paradigms (mainframes, servers, PCs, disconnected clients, mobile and wireless devices)
2. Global clients and multiple time zones require high-availability (24x7) solutions
3. Distributed computing with queuing and asynchronous messaging
4. Heterogeneous data access and legacy data
5. Long-running and distributed transactions
6. Collaborative Internet applications

Virtual Enterprises, Trading Groups

Organizations have adopted Enterprise Resource Planning (ERP) systems, workflow systems, and other automation solutions to streamline business processes. These systems lay a foundation for collaboration with trading partners, such as supply chain integration and business process integration. Vertically integrated organizations, horizontally integrated organizations, trading groups, and virtual enterprises require scalable computing solutions.

Virtual enterprises include strategic alliances, consortia, and franchise networks. Mail Boxes Etc. is an example of a virtual enterprise. It has franchise operations worldwide sharing the same applications. It is the preferred shipper for eBay so sellers can use the Internet to prepare shipping documents. United Parcel Service (UPS) recently acquired Mail Boxes Etc. and data flows to and from 4,300 global locations into Mail Boxes Etc. corporate databases, and into UPS shipping databases.

The Integration Challenge

Disparate platforms, distributed data, and global applications present an integration challenge. Successful data integration and process integration requires understanding the problems at several levels – top down and bottom up. A top-level architectural view of the enterprise and its partners will often reveal disparate platforms and heterogeneous data sources. Organizations must choose to adopt de facto and de jure standards to minimize the requirement to support too great a mix of hardware and software platforms. Relying primarily on proprietary technologies when organizations have diverse systems hinders data aggregation, date integration, and application development.

Today's developers are building virtual enterprise applications and inter-enterprise applications using the Internet model. Global and virtual enterprises have access to the Internet. Millions of computers communicate using HTTP over TCP/IP, so this has become the favored transport for building collaborative applications using distributed data and distributed services.

The new wave of collaborative applications involves exchanging information across multiple organizations. Applications such as enterprise portals and trading portals use middleware to integrate and aggregate data from multiple sources. An e-business portal is a single point of access to a corporate site that provides access to Web applications, business process integration, and content for partners, customers, prospects, contractors, and employees. Tax portals, for example, are used to collect tax information, align it with ERP systems, and use it for planning. Trading portals provide a common point of access for members of a trading group. Another type of portal aggregates services for use by small businesses.

Portals are a vehicle for collaboration and building relationships. Siebel Systems has grown to have a network of 750 global partners for products such as Customer Resource Management (CRM) systems. It uses a special portal for partners, with dedicated portals for strategic partners.

In the e-business world, there are business-to-business applications built on the integration and collaboration model. A B2B exchange, for example, consists of trading partners who exchange documents such as orders, invoices, and shipping notices. In some instances, a business-to-consumer (B2C) application might require inter-enterprise collaboration. Some businesses that sell to the consumer provide shipping via a B2B connection to a shipping company. Other forms of collaboration include application-to-application (A2A) integration and business process integration.

Transactions

Transactions play a significant role in enterprise computing, and online transaction processing (OLTP) is at the heart of applications such as airline reservations systems and ATM networks. The importance of transactional integrity will not diminish as organizations build more inter-enterprise applications, but traditional OLTP architectures are challenged by Internet commerce.

Business-to-consumer applications must scale up to support thousands or hundreds of thousands of concurrent connections. Customer interactions on the Internet are more complex and may hit on more data sources than traditional transactions, such as an ATM withdrawal. Collaboration among trading partners will mean that transaction processing extends beyond the firewall and will enlist participants using disparate computing platforms, operating systems, and databases.

Requirements such as scalability and maintaining transaction context differ for applications doing local transactions, distributed (XA) transactions, or transactions among collaborative partners. As requirements become more complex, so does the complexity of transaction processing software.

As one moves from local transactions to collaborative transactions, the levels of complexity increase. Despite the complexity of distributed transaction processing, developers have expectations of simplicity. They want programming for a large-scale distributed transaction to be as simple as programming for a local transaction.

Transaction processing monitors can provide context management and load balancing for enterprise applications, but collaboration across the Internet is driving the evolution of new transaction processing solutions, such as compensating transactions and document-centric transactions.

The exchange of standard business documents will often dictate the architecture of collaborative transaction processing software. Exchanging information with partners using solutions such as components or objects such as CORBA and COM+ is neither highly portable nor platform-neutral. On the other hand, exchanging documents coded in a portable data format is an interoperable solution.

The Open Group XA standard is widely supported for distributed transactions but transaction processing across the Internet provides new challenges. B2B exchanges and collaboration among trading partners has led to a new proposal for transactions based on the exchange of XML documents. The Organization for the Advancement of Structured Information Standards (OASIS) has chartered a technical committee to develop the Business Transaction Protocol (BTP) specification. IBM, Sun, Oracle, HP, and Bowstreet have come together to work on the Transaction Authority Markup Language (XAML) specification.

New standards will define how partners communicate, but organizations still need solutions for processing a transaction when a document is received. Data from transactions between trading partners must flow into and integrate with back-office systems.

Objects, Components, Services

Although organizations continue to run legacy applications programmed in C, COBOL, and other procedural languages, the '90s marked a move to visual and object-oriented programming. Visual Basic, C++, Java, and Delphi became important languages for reuse and object-based programming, but they needed a solution for language-neutral, shared objects. The industry responded with the Common Object Request Broker (CORBA) and Distributed Component Object Model (DCOM). UNIX programmers developed an affinity for CORBA and Windows developers embraced DCOM and COM+. Efforts to promote a common object model for COM-CORBA interoperability died, so many organizations became a "CORBA shop" or "DCOM shop." The desire to avoid this fragmentation and to promote interoperability gave rise to messaging protocols, RPCs, and services based on the Extensible Markup Language (XML). XML is a portable data format that is platform neutral when used with TCP/IP and HTTP.

Being able to integrate disparate object technologies is a major motivation for acquiring integration middleware.

Java

Java™ continues to gain mind share in the software community. There is widespread participation among developers and a cadre of application server and tool vendors who support Enterprise Java Beans™ (EJBs) and Java 2 Enterprise Edition (J2EE). Enterprise Java Beans (EJBs) are transactional components that are an important technology for database-enabled applications. Java provides a rich set of APIs including Java Message Service, Servlets, Java Server Pages, and the J2EE

Connector Architecture (JCA). For most data access applications, developers use JDBC™ and dynamic SQL or SQLJ and static SQL. iWay Software provides a JDBC connector that enables Java developers to use SQL to query diverse data sources.

In some organizations, developers are integrating Java into a mixed development environment. Although they use Java for new projects, their organization may have a substantial investment in other languages and object technologies such as legacy CORBA or COM+ components. To leverage that investment while going forward with Java, organizations often turn to integration middleware.

XML, SOAP, and Lightweight Components

The new model of collaborative computing via the Internet is changing the nature of components and object-oriented programming. Heavyweight technologies such as CORBA and COM+ are not a good fit for mobile computing, smart phones, and other thin clients. For lightweight clients, the computing industry has turned to markup technology such as XML and NTT DoCoMo's I-mode, a simplified version of HTML.

XML is a meta-language that developers use to define markup languages and application vocabularies. Its self-describing nature makes it an excellent solution for exchanging data in an interoperable manner. It has become a favored solution for exchanging business documents over the Internet.

HTTP and TCP/IP have become an important transport for distributed applications that cross firewalls and corporate boundaries. Developers are writing messaging middleware that uses XML-encoded messages and RPCs over HTTP and TCP/IP. XML messaging over HTTP and Simple Object Access Protocol (SOAP) have a following among developers looking for lightweight object solutions. CORBA and COM+ continue to have a market share, but the Internet places a premium on platform-neutral technologies.

The major software companies have endorsed SOAP as a solution for invoking methods on remote computers. In addition, the W3C has chartered an XML Protocol Working Group that is evolving SOAP into a W3C recommendation for an interoperable messaging standard (XMLP). SOAP, and eventually XMLP, provides the plumbing for a category of software known as Web services.

Web Services

As ERP systems, mobile computing, integration brokers, and integration servers adopt XML technologies, the industry continues to evolve towards a model of collaborative Internet computing. Applications will no longer be monolithic entities. Even "shrink-wrapped" package vendors are adapting to a computing model that includes Web services, portals, and application service providers.

IBM, Microsoft, Sun, and other major software companies have been promoting Web services as the next major wave of application development technology. The premise of IBM Web Services, the Microsoft .NET framework, and Sun Smart Web Services is that next-generation software will employ an Internet computing model and operate over HTTP and SOAP (or eventually XML Protocol). Applications will collaborate over the Internet by invoking remote methods exposed by lightweight Web services.

> *"e-Business is driving the merging of Web, IT, and object technologies to form the foundation for Web services. Web services will bootstrap heterogeneous systems communication to a global space."*
>
> – Steve Holbrook (IBM) speaking at the International Conference for Java Development, February 2001

To write code that exploits Web services, a developer works with an XML vocabulary known as the Web Services Description Language (WSDL). It provides a standard way for applications, components, and services to describe their capabilities to clients, including Internet clients. Web services use XML-based RPCs instead of a shared object model such as CORBA and COM+.

Just as ODBC and JDBC simplified access to multiple data stores and eliminated the need to write to multiple APIs, Web services are intended to simplify the problem of collaboration across disparate applications. Repackaging major applications as collections of Web services will require integration technologies operating behind the Web service veneer. Developers building Web services will often require access to disparate databases, aggregation across multiple data sources, integration servers, or other integration middleware.

Enterprise Integration

In an era of mergers, acquisitions, and global enterprises, distributed computing involves pulling data from diverse sources. Applications deal with different character sets. Networks include heterogeneous computing platforms. Enterprise computing includes online transaction processing (OLTP), online analytic processing (OLAP), online complex processing (OLCP), and batch processing.

This diversity of databases, custom applications, and packaged application suites makes application integration and data integration a daunting problem. To make it easier to exchange information with their products, ERP vendors are developing custom adapters and exposing functionality through remote services. However, a product-by-product solution does not simplify programming and solves only specific integration problems. Developers still need additional integration middleware for other applications and data sources, which introduces other programming models.

Internet computing has extended enterprise applications beyond the corporate firewall. Customers and partners expect access to our information systems, and applications must scale to hundreds of thousands of users. We must also integrate information from more sources. Development of "inside-the-firewall" enterprise applications has evolved to include "over-the-Internet" collaboration models and inter-enterprise applications. Organizations are also moving from using internal staff and systems to hosted applications and Web services. Companies are joining to create exchanges, auction sites, trading portals, and other online marketplaces.

The Internet provides the foundation for new models for aggregation and collaboration and new types of applications such as enterprise information portals, trading portals, and business-to-business (B2B) exchanges. Internet collaboration models externalize enterprise application functions and extend beyond the firewall to invoke Web services.

ERP, SCI, and CRM Integration

Certain types of applications have become a focal point of enterprise computing. Most large organizations run some type of Enterprise Resource Planning (ERP) software and many run Customer Resource Management (CRM) and Supply Chain Integration (SCI) systems. Some companies buy integrated suites from a single vendor and others take a best-of-breed approach to their enterprise software needs. Because ERP and CRM systems capture information that's of great strategic and tactical value, their adoption has increased the demand for application integration middleware.

Not every organization is feeding a corporate portal or data warehouse, but internal management systems are ubiquitous. ERP application suites from SAP, PeopleSoft, J.D. Edwards, Baan, and Oracle are entrenched in the enterprise, holding data that is often needed for inter-enterprise applications.

ERP and application suite vendors have been cognizant of the move to collaborative computing. They've responded by adding integration points or connectors to their application suites.

- SAP supports collaborative processes with c-business blueprints or maps that define the points of connection for external business processes.
- SAP contributed to the specification for the Java Connector Architecture and offers Connectors for R/3.
- SAP MiniApps can use push technology to provide alerts and content from SAP systems.
- J.D. Edwards partnered with RosettaNet to develop XML-based e-business interfaces for its applications.

The move by ERP vendors to expose interfaces to their application suites validates the premise that inter-enterprise applications will be necessary to remain competitive. However, ad hoc solutions from ERP package vendors will not be the optimum solution for Internet collaboration. To integrate data sources when writing Web services, developers will be faced with learning a variety of APIs.

The alternative is to use a solution such as the iWay Service Channel Architecture to simplify programming. It provides a single pipe solution for accessing data from Web services or integrating Web services with enterprise applications.

Business Intelligence

The power of today's processors, the capacity of storage devices, and the economics of customer acquisition and retention have been contributing influences to the growth of business intelligence. In today's highly competitive global business environment, organizations use data mining, Web farming, and other forms of business intelligence. Organizations feed data marts and data warehouses from operational systems and from Web site analyses.

Being able to correlate information with times and locations, for example, might require aggregation of data from tables, multidimensional databases, and spatial databases. In large organizations, effective business intelligence applications are not possible without powerful integration middleware.

e-Business Integration

The complexity of the integration problem increases when we try to link e-business sites, portals, and exchanges to back-office systems. The difficulties are multiplied when we must integrate multiple application suites with commerce servers and Web sites.

Global e-business creates additional integration scenarios. Initiatives such as electronic business XML (ebXML) and Universal Description, Discovery, and Integration (UDDI) defined an infrastructure or framework for building e-business applications. To communicate with trading partners, many organizations will add integration servers. Business-to-business software will use global business registries to discover new partners or new product and service offerings.

In recent years, many of the largest software companies focused their attention on exchanges and e-business standards initiatives. The United Nations, in partnership with OASIS, sponsored the ebXML initiative to develop specifications for an e-business software infrastructure based on the exchange of XML documents. IBM, Microsoft, and Ariba launched the UDDI initiative to provide a global repository for businesses to register their products and services.

e-Business integration software comes in several flavors. One class of software integrates business-to-business servers with public and private exchanges and with traditional management systems. Participating in exchanges requires agreed-upon protocols, a common messaging transport, and a standard set of documents to be exchanged in the course of transactions. In a business-to-business scenario, the “what and how” is specified by trading partners who define messages and transaction sets.

To participate in global e-business today requires multi-personality integration servers. To trade with multiple partners and different trading groups can require a variety of schemas, messaging protocols, and solutions for expressing business semantics. To address this problem, iWay Software partnered with XML Global to create the iWay XML Transformation Server (XTS).

e-Commerce, Wireless, and Back-Office Integration

Many organizations are looking for comprehensive, front-to-back integration solutions. They want middleware for integrating link portals, B2B applications, e-commerce and mobile commerce (m-commerce) servers, legacy databases, data warehouses, ERP systems, and business intelligence applications.

Wireless devices are pervasive and many developers are focusing on integrating Internet and wireless technologies. NTT DoCoMo's I-mode has been extremely successful in Japan and third-generation (3G) wireless technologies will provide high-bandwidth connectivity. The 3G wireless technologies will make it feasible to build new classes of applications and contribute to the growth of m-commerce. Creating m-commerce applications requires servers that can transform data for thin clients and disparate devices. It will often require integration with back-office systems for purposes such as order processing.

UDDI APIs and ebXML specifications provide a blueprint for B2B integration and define how partners collaborate. What remains undefined is how an organization integrates B2B and mobile computing applications with its ERP systems or other back-office application. Solving this problem of integrating mobile applications, Web applications, and B2B applications with legacy applications and back-end systems is a primary function of iWay Software's integration middleware.

IBM MQSeries and WebSphere

Developers wanting to create robust, scalable applications use multi-tier architectures with message queuing and application servers that support transaction processing, load balancing, and fail over. IBM WebSphere is one of the leading J2EE-compliant application servers and IBM MQSeries is one of the leading messaging middleware products.

MQSeries provides real benefits to developers writing messaging applications:

- It understands the distinction between transactional messaging and nontransactional messaging
- It supports lightweight message queuing and remote queues for mobile clients
- It can associate the appropriate user with a mobile application's input queue

Some iWay products bundle value-added software with IBM middleware. The iWay product line does not preclude, however, the option of using other messaging software or application servers. For example, you can use iWay connectors and adapters with BEA Web Logic servers.

iWay Products

iWay Software offers products for e-business integration, enterprise application integration (EAI), Web and back-office integration, and inter-enterprise integration. iWay inherited extensive connectivity solutions from its parent organization (Information Builders) and its flagship EDA product. To provide much of the plumbing required for application integration, iWay offers more than 120 different connectors and adapters. To provide a foundation for e-business applications, iWay offers a message broker, application server, and XML-enabled integration server.

The process of connecting Web sites and e-business servers to enterprise applications can be daunting. iWay's e-Business-to-Enterprise (e2E) integration products include messaging middleware, application connectors, adapters, and an e-business integration server.

Service Channel Architecture

To address the diverse requirements of e-business and enterprise application integration, the architects at iWay saw a need for universal connectivity and abstracting the programming interfaces to diverse software. They responded with a Service Channel Architecture that's the core technology for iWay's integration middleware solutions. The Service Channel Architecture provides a universal model for connecting to back-office systems, application suites, databases, and other data sources. iWay provides the service channels, or plumbing, and your software can exploit the power of the service channels.

One of the biggest problems of programming an integration server is writing ad hoc code for connecting to applications and databases. The service channel ameliorates the hard-wiring logic problem so programmers can use a consistent programming model to get information from disparate sources. An application can approach a service channel at several levels because iWay provides interfaces for application-level, data-level, and transaction-level requests. Service channels can provide data as SQL result sets, HTML, XML, wireless, and other data formats.

The Service Channel Architecture is like an information bus for both iWay Adapter Suite and iWay Enterprise Connector Suite. iWay adapters and connectors plug into service channels to retrieve and update information. Connectors provide access to heterogeneous sources, and adapters deliver information in a desired format. Connectors and adapters enable an application to issue requests against a virtual database. An application can use multiple adapters and connectors or issue a single request and access multiple data sources. iWay's middleware caches metadata and query results, transforms data, and performs other services under the covers. There are service channel plug-ins for DCOM, EDA, JDBC, ODBC, OLE DB, and XML.

The Service Channel Architecture provides flexibility because it's a solution for diverse integration problems. Developers can use it to integrate applications such as ERP and CRM systems, to integrate Web sites with back-office systems, and to access heterogeneous data sources. The Service Channel Architecture can support integration brokers such as NEON/Sybase, Mercator, and TIBCO, connectors for various enterprise applications (e.g., Candle Roma), and standard connectors such as ODBC, JDBC and XML.

Messaging and Application Servers

The iWay's product line enables developers to develop multi-tier applications that include application servers and messaging middleware.

The iWay Enterprise Integrator and Enterprise Connector for MQSeries Integrator are solutions for building applications that require synchronous messaging or queuing and asynchronous messaging. Developers can use them for point-to-point or publish-subscribe applications. The Enterprise Integrator and Connector can communicate with MQSeries and Java Message Service (JMS) applications.

The iWay Enterprise Integrator is value-added messaging middleware: an integration broker that bundles IBM MQSeries Enterprise Integrator (MQSI). For organizations who already have MQSI, iWay offers an extension called the Enterprise Connector for MQSeries Integrator. MQSI developers use high-level visual tools to define message flows between applications and iWay enhances that visual development environment. The iWay's MQSI connector adds an icon to the MSQI palette to enable developers to exploit iWay's Service Channel Architecture.

The iWay Application Server is value-added software that works with J2EE-compliant application servers. The iWay Application Server is an extended version of IBM WebSphere Application Server (Advanced Edition). The extensions include Java Beans for integrating with mainframe applications and for simplifying development with VisualAge. The product includes Java Beans for mainframe integration with IBM CICS, IMS, and 3270, 5250, and telnet sessions. For Web-commerce applications, the iWay Commerce Suite is an extended version of IBM WebSphere Commerce Suite. The iWay Commerce Suite includes ETL Manager, a collection of routines for loading an e-commerce storefront.

iWay Enterprise Connector for WebSphere enables IBM's Web application server to connect to more than 120 relational, nonrelational, transactional, and application data sources on 35

platforms. Developers using other message brokers or application servers can extend their range by using iWay connectors and adapters, such as standard connectors for JDBC and XML.

Adapters for Network Transports, OLTP, ERP, and XML

iWay's adapter inventory includes adapters for working with a variety of networks, applications, and transaction processing software. There are network adapter for a mix of transports including TCP/IP, APPC, LU2, DECnet, NetBIOS, HTTP, IIOP, and Named Pipes. There are application adapters for PeopleSoft, J.D. Edwards, Baan, SAP, Hogan, Siebel, Broadvision, and Shared Medical Systems. There are transaction adapters for IMS, CICS, and SAP.

Besides providing connections to dozens of data sources (databases, applications, transaction processing software), iWay also supports XML data integration. XML gives iWay software a universal solution for interchanging data. In the absence of a custom adapter or connector from iWay, an application can export data to the iWay XML Connector. For data interchange and B2B integration, organizations can add the iWay XML Transformation Server (XTS).

e-Business Integration Server

iWay partnered with XML Global to create XTS, an e-business integration server that supports the exchange of XML documents. Besides supporting B2B integration, the XTS server can also access legacy data. It supports transformations of business-to-business documents so they conform to schemas required for collaboration. It also supports trading relationships between partners based on ebXML specifications, including agreements that conform to the ebXML Collaborative Partner Protocol.

The "Swiss Army Knife" Advantage

Taken as a whole, the Service Channel Architecture with adapters and connectors represents a "Swiss Army Knife" of integration solutions. There are plenty of tools for working on integration problems. Developers can use iWay middleware for integrating applications with ERP and CRM systems, for linking Web sites with back-office systems, and for accessing heterogeneous data sources.

iWay Software is a subsidiary of Information Builders, a company that's been a long-time vendor of enterprise computing solutions and data access middleware. Besides mature technology, there are other benefits from iWay's connectivity solutions.

1. iWay's middleware products support front-to-back integration, including enterprise application integration and e-business integration. Integration is simplified by the Service Channel Architecture.

2. Developers using iWay middleware are not locked into a single component model or messaging strategy. The iWay developer can integrate CORBA, Enterprise Java Beans, or COM+ components.

3. The iWay e-Business Integration Suite provides access to more than 120 data sources and support for message queuing and multiple messaging models (synchronous, asynchronous, publish-and-subscribe, push).

4. Building middleware on top of MQSeries messaging is a sound decision for the long term. MQSeries protocols have been adopted in messaging products from IBM, Microsoft, and Level 8.

5. iWay offers more than a messaging solution and its integration strategy is not completely dependent on messaging middleware. iWay provides connectors for databases, flat files, and application data stores. It supports dynamic and static SQL queries and integration with rules-based integration brokers.

6. When applications require connectivity to multiple or disparate data sources, iWay middleware is a value-added proposition. Besides SQL, CICS, and legacy data sources, iWay provides connections to SAP R/3, J.D. Edwards, PeopleSoft, and other applications.

7. Global e-business today requires integration servers that support different messaging protocols

and business semantics. The eBIX Integration Server and XML Connector support the exchange of XML documents and document transformations using style sheets. The eBIX server supports messaging with partners using different protocols and APIs, including RosettaNet, BizTalk, ebXML, and UDDI.

8. iWay products and the Service Channel Architecture can be used with XML-enabled applications, mappers for EDI, and HL7, SWIFT, Siebel, OAG, Oracle, and i2 applications. XML provides a catchall link for XML-enabled software such as HL7, and iWay provides adapters for Siebel and Oracle Applications.

Final Thoughts

The popularity of programming interfaces such as ODBC and JDBC are evidence that software developers prefer a single model for data access programming. The developer mindset is similar for integration programming – one powerful solution is better than many ad hoc solutions. This describes the iWay approach to integration middleware, so in a sense, iWay offers for process and data integration what ODBC and JDBC have done for data access.

iWay's integration middleware provides back-office integration with applications and databases, and can play a major role in integrating Internet commerce sites with back-office systems.

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