



WebSphere software

**Break through the complexity
of integration with IBM's total
integration advantage.**

*By Mary Forlenza
Dave Cavallero
IBM Software Group
WebSphere Business Integration*

Contents

- 2 Introduction**
- 3 –Tame complexity with a strategic view of integration**
- 4 Capabilities required in an overall integration strategy**
 - Business Integration
 - Technology Integration
 - IBM provides the middleware for integrated e-business
- 7 To achieve business strategy— increase IT agility**
- 8 Business and Technology Integration**
 - Business Integration capabilities
 - Information Integration
 - Application Integration
 - User Role and People Integration
 - Business Process Integration
 - Technology Integration capabilities
 - Directory/Security Integration
 - Providing a common directory
 - Strengthening security through integration
 - Storage Integration
 - Managing storage resources
 - Operating Environment Integration
- 19 An example of a fully integrated e-business**
- 19 The IBM middleware difference**
 - Experience
 - Innovation
 - Standards
- 23 Summary**
- 24 For more information**

Introduction

As with many things in life, integrating the systems and processes of a business has an upside and a downside. The upside is essentially to create competitive advantage. Companies integrate to achieve seamless process execution, which helps drive increased levels of customer satisfaction, revenue growth, and improvements in efficiency and productivity. Once it achieves integration, an organization can then implement better business management controls.

These benefits explain why companies of all sizes are investing heavily in integrating applications, automating processes or providing user portals. Business integration has become necessary to respond to demands from customers and partners, and pressure from competition. Major industry analysts report that businesses are spending as much as 40 percent of IT budgets on integration projects. When integration projects succeed, companies substantially save costs and development time, achieve faster return on investment (ROI), and boost productivity. They also meet their overarching e-business goals: to improve customer, partner and employee relationships and gain the business agility to outpace the competition.

The downside to all of this can be the sheer cost and complexity of unifying disparate business systems that have evolved across an organization over time. An individual company might need to integrate not only numerous diverse business processes, applications and information; but also incompatible operating environments, security policies and storage devices in the underlying infrastructure.

In today's business environment budgets are tight, IT skills are in short supply and relief for this situation is not near the horizon. Organizations need an integration strategy that contains costs and doesn't disrupt critical working systems. A cost-saving approach includes building bridges between existing IT assets – and with new e-business solutions – rather than discarding these investments and starting over. The current economic slowdown makes it all the more important to increase near-term ROI, reduce risk and accelerate time to market. It's all about time-to-value and doing more with less. Companies can avoid the downside to integration altogether by having the right approach and the right tools for the job.

Tame complexity with a strategic view of integration

The right approach starts with a strategic integration plan that identifies the total integration requirements of an organization. Practical considerations, such as today's economy and how far a company has evolved in its adoption of e-business, will determine the scope of integration projects that can be implemented initially. When implementation is incremental versus enterprisewide, a comprehensive strategy can guide individual technology decisions so that they support long-term business goals for total integration.

Through a comprehensive and well-architected portfolio, IBM helps companies manage the potentially high-spend and highly critical area of integration, not just to solve today's problem but to support strategic goals. A total integration approach provides the greatest flexibility, capability and return. The application or process integration solutions provided by many business integration vendors often do not support the overall integration needs of most businesses. Partial solutions won't break through the complexity of integrating across an organization, the end-to-end integration that can bring the strongest business benefits over time.

IBM solutions reduce the complexity of integrating the total business, from processes to people, and from directories to storage. These solutions enable companies to build an e-business on the base of their existing, diverse assets, streamlining and automating operations project by project or throughout the business infrastructure. By making the right choices, companies can start small and expand their integration infrastructure over time as needs dictate. An integrated e-business also meets a key requirement for becoming an on demand business, one that is highly responsive to market changes and customer needs.

This paper, intended for IT strategists, explains how companies can break through the complexity of integration and achieve business strategy goals. It defines the key Business and Technology Integration requirements. It introduces the IBM middleware that supports each integration need, and includes the experiences of specific customers that have chosen IBM middleware to solve their integration issues. Future directions in integration are also described.

Capabilities required in an overall integration strategy

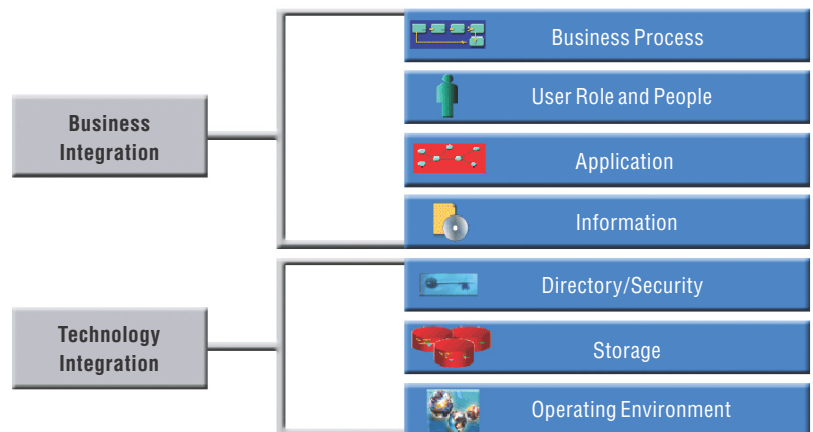
Integration enables people and computing resources, both within and outside a company, to work together in support of business strategy. IBM has identified two major areas of integration, each accomplished through distinct integration capabilities.

Business Integration

Business Integration helps integrate business processes, people, applications and information. These capabilities can enable companies to deliver a holistic view of their value-chain and business relationships. Business Integration can change occasional customers into repeat purchasers, reluctant business partners into strategic allies and employees into efficient, informed team members.

Technology Integration

Technology Integration helps integrate the underlying IT infrastructure that supports business processes, such as directory services and security policies, storage, and operating environment. These capabilities can enable companies to reduce their total cost of ownership by using all the computing resources in an IT environment more efficiently. Companies can do more with existing assets without compromising the availability and security of the infrastructure. Technology Integration boosts the performance of the business systems themselves.



Levels of Integration

Businesses will likely need to invest in applying these integration levels over time. For example:

- *One company may need to support growth through mergers and acquisitions. This company would need a foundation that efficiently integrates applications and business processes with those of the new company partners. Using the right middleware could yield faster time-to-market and reduce the cost of developing required interfaces. This example includes primarily Process and Application Integration. Other levels that could apply are Information and Directory/ Security Integration.*
- *Another company may have purchased best-of-breed solutions to achieve business goals and needs a means to link the data from both new and legacy solutions—without substantial investments in time and costs. This is an example of Information Integration.*
- *Or a company may want to promote customer loyalty and garner new business by providing secure online access to its e-commerce site. An additional goal of the company may be to cut operational costs. This example includes Security, Storage, and User Role and People Integration. In addition, Application or Process Integration to back-end systems may be required.*
- *Another company may need to enable trading partners and customers to place orders online. They may need to cut operational costs and leverage limited resources, while improving quality and increasing speed to market. To achieve such goals, a company would develop a complete integration strategy that could guide better decisions in IT infrastructure asset re-use and new investments. This is an example of a business requiring a fully integrated infrastructure.*

Examples of actual customers having similar needs are described in the section titled, “Business and Technology Integration.”

IBM provides the middleware for integrated e-business

IBM solutions help integrate IT assets to support business strategy, while minimizing costs and complexity. IBM provides the most comprehensive set of e-business technologies and product offerings in the industry. Our four IBM software brands – IBM WebSphere®, IBM DB2®, IBM Lotus® and IBM Tivoli® – form the backbone for a complete e-business infrastructure. Companies can apply an individual IBM integration solution, or create a complete, unified environment from demand-to-delivery, as needed. In a demand-to-delivery environment, all business processes are linked to provide higher levels of service to users across the value chain.

In addition, businesses can leverage existing investments and have a choice of vendor products when using IBM middleware, because IBM products are based on open standards. IBM's commitment to open standards gives companies the ability to infuse new technologies into existing infrastructures. IBM's software portfolio is also enabled for Web services, a powerful, emerging industry-standard technology that businesses can use to reduce the cost and time involved in integration.

Businesses routinely operate across diverse platforms, and IBM middleware provides the broadest platform support in the industry. IBM middleware also makes it possible for companies to extend existing investments in skills and technology as they build a fully integrated business. These are just some of the ways IBM middleware reduces the cost and time needed to integrate complex IT environments.

To achieve business strategy— increase IT agility

Evolving business drivers and strategies spawn the need for a flexible and agile IT organization. It is this relationship between IT and business that makes an integration strategy so important. Such a strategy is supported by integration middleware that enables the IT organization to respond to the quickly changing needs of its internal and external constituents.

From an IT perspective, the goal of integration is to increase the effectiveness of the enterprise's entire IT investment portfolio. Increasingly, IT organizations are driven to extract more value out of technology acquisitions and infrastructure, as well as to reduce overhead costs. IBM customers have shown that these kinds of benefits can be realized over time as integration projects are implemented, integration expertise is learned and applied, and integration technology is leveraged for re-use. A sound integration strategy should guide all these activities.

Beyond improving IT agility, the primary goal of integration is to increase the speed and capabilities of the business. More agile businesses are better able to achieve their tactical and strategic objectives. The faster a business can execute its strategies, the more successful it can be. Executing business strategies and strategy changes is inextricably tied to IT solutions. A more responsive organization, able to quickly implement new business processes and workflows, will benefit long-term by successfully generating revenues, attracting and retaining customers, and controlling costs.

*John Deere**

John Deere cuts the cost of integrating diverse data

When John Deere sought to improve its inventory management and purchasing through a more state-of-the-art solution, the company chose to use SAP, with IBM DB2 software as the underlying database. John Deere is the logo of Deere & Company, the world's largest producer of agricultural equipment, and a major supplier of forestry, construction, and lawn and turf care equipment. The company selected DB2 because it was identified as providing the best performance with the SAP solution. DB2 is a modern database architecture known worldwide for its scalability and extensibility.

John Deere's solution faced one hurdle—most of its legacy solutions were based on Oracle. If the SAP solution was going to function effectively, the data from multiple databases would need to be accessed and managed from a unified view of the information within the new system. IBM DB2 DataJoiner® provided the federated data-access capability to integrate the data from the Oracle legacy applications with the new data within the SAP solution, without requiring any incremental application logic or integration software. John Deere could link its diverse data sources without the typical high costs of integration.

Impressed by the performance and functionality of DB2, John Deere has standardized its new IT projects on DB2 as its corporate relational database management system.

Business and Technology Integration

Companies wanting to streamline value-chain processes and provide a unified view into their business to improve relationships with partners and customers will use *Business Integration* capabilities. These include Business Process, User Role and People, Application and Information Integration.

In addition, *Technology Integration* capabilities help companies reduce their total cost of ownership by delivering a more efficient and more manageable IT environment. These capabilities integrate the underlying infrastructure that supports the business. Technology Integration levels include Directory services and Security policies, Storage and Operating Environment Integration.

Business Integration capabilities

Becoming an e-business doesn't happen all at once, but is an evolutionary process. For example, a company might begin by connecting to the Web and publishing information. By using Application Integration capabilities, it could link new Internet applications with existing business-critical applications. Then, as a company begins to conduct customer or partner transactions over the Internet, the ability to present a single, unified view of the business, personalized to each user's needs becomes critical. This could be accomplished through integration levels that include, but are not limited to, Application Integration, and User Role and People Integration.

Next, a company could connect its business processes with its business partners' processes or perhaps the processes of a newly merged company. To ensure these types of projects are timely and cost-effective, companies can employ Business Process Integration as well as Application Integration.

As more and more data is generated, Information Integration becomes necessary for accessing and gaining intelligence from business data that is often housed in separate sources within and across companies.

Together, these four levels represent the essential capabilities needed to meet the Business Integration requirements of most e-businesses. The following sections describe the four levels of business integration:

- *Information Integration*
- *Application Integration*
- *User Role and People Integration*
- *Business Process Integration*

Information Integration

In many organizations, islands of information limit the ability to view current and comprehensive data, to share information across the value chain and to gain the insight that could drive strategic initiatives. The forms of information include structured and unstructured data, relational databases and file-based systems, to name just a few. To provide a holistic view of a business, companies must integrate these islands by using federated data access and content management.

Federation is the concept that a collection of resources can be viewed and manipulated as if they were a single resource, while retaining their autonomy and integrity. It simplifies the program-to-data access by providing a single means by which to locate and then reference data. This reduces the level of skill required to develop applications. IBM DB2 software provides federated data access – a single SQL query can be used to join data from disparate sources and present it to the user in a single interface.

IBM software has the ability to federate relational databases, Open Database Connectivity (ODBC) sources, flat files, XML documents, spreadsheets, content repositories, specialized data stores and more. In addition, IBM plans to federate Web services, message queues, transactions (such as an IBM CICS® or an SAP transaction) and even workflows.

<i>ComputerWorld*</i>
ComputerWorld reported how one company applied the DB2 capability of federated data access, "After just two months, a new software tool enabled Aventis Pharmaceuticals Inc. to discover a promising candidate for a new drug to treat asthma, arthritis or even perhaps cancer; it's a chemical compound that might well have been overlooked using traditional IT tools. 'Using this integrated framework, scientists were able to pull data from many different sources around the world, visualize it in a new way that they could never do before,' says Peter Loupos, vice president for Drug Innovation and Approval Information Systems at the Bridgewater, N.J.-based company." (From the October 14, 2002 article, "Bridging Data Islands")

*Best Buy**

According to Best Buy's COE Leader, Jamey Salsberg, "Both MQ [WebSphere MQ] and MQSI [WebSphere MQ Integrator Broker] provide a range of powerful functions 'off the shelf.' Together with [IBM] MQSeries® connectors, we were able to just pick the products we needed to integrate all our new applications and very quickly transform our IT environment." Salsberg continues, "With MQ and the support of IBM, we have been able to build an IT infrastructure that will grow with us. We've gone from having an over-stretched IT architecture that had performance problems, to a leading-edge system that interconnects every single application in our growing IT environment."

IBM Data Management software provides content-management capabilities that handle unstructured data formats – for example, Web, document and digital media – by enabling access, search and rapid delivery over the Internet. Lotus software provides integration capabilities so that external data can participate in a collaborative application.

Application Integration

Most business infrastructures have a variety of home-grown, legacy and packaged applications, built up over the years. These are often isolated islands of applications, having incompatible data formats and communication protocols. Businesses can use Application Integration to link these islands and make their output available whenever and wherever it is needed.

The IBM WebSphere platform delivers Application Integration for existing applications through industry-leading middleware for messaging, information brokering, and connecting to popular legacy and packaged applications. Integrating applications avoids costly re-engineering of older applications. IBM technology reduces the complexity of integrating large numbers of applications. For example, publish and subscribe technology is used to shield one application from having to "know" all of the other applications to which it must connect.

In addition, businesses can use the build-to-integrate capabilities of Websphere software to rapidly create and deploy new applications that integrate with existing applications within and outside the enterprise. WebSphere software provides a modular and scalable J2EE technology-based approach for building and deploying new integration-ready applications that leverage existing software assets and Web services.

WebSphere is one of the first production platforms to provide support for the emerging Web services standards of Simple Object Access Protocol (SOAP), Web Services Description Language (WSDL) and Universal Description, Discovery and Integration (UDDI). These technologies offer new, flexible, reusable and lower cost options for integrating applications and business processes within the enterprise or across the Internet.

*The Bekins Company**

Randy Mowen, director of Data Management and e-business Architecture at The Bekins Company says, "We see WebSphere's Portal family as an elegant way to allow users to access Web-based applications and resources. . . . Customers and other users will find the site more useful to them, so they'll be happy to return, again and again. The fact that WebSphere Portal reduces development time and cost only enhances the return on investment."

User Role and People Integration

A business that provides a single, integrated view of the company that is tailored to individual customer or partner needs can benefit by gaining lasting customer and partner relationships, increased sales revenue and new business opportunities. A company that provides employees with a unified and personalized business view and the ability to collaborate more easily with colleagues can benefit from higher employee productivity. To achieve these benefits requires development of role-based, preference-based and device-independent front-end portals that integrate with back-end systems.

According to the Line56 article, "Consultants Push IBM's Portal," by Demir Barlas, August 15, 2002, "One reason that portal adoption (already underway at 60 percent of companies, according to Forrester Research) may continue to accelerate has to do with productivity gains and time savings. The Harvard Computing Group recently found that, just by rationally organizing documents, a portal can save each employee 120 hours of time a year."

The IBM WebSphere Portal family can automate and accelerate the creation of front-end customer, employee and partner portals, as well as the connection of those portals with back-end solutions.

WebSphere Portal leverages the strengths of IBM middleware, including:

- *Lotus for advanced collaboration and expertise location*
- *Tivoli for role-based access to business systems*
- *IBM Data Management tools for fast data access*
- *Commerce for business-to-business (B2B) and business-to-consumer (B2C) sell-side capability*
- *IBM wireless and voice technologies*
- *IBM WebSphere Application Server as the foundation*

With WebSphere Portal, user interaction is tailored, unified, made available through virtually any device, has full transactional support and integrates with back-end systems.

*Food Lion**

Food Lion can debut new products on demand

Food Lion, one of the largest supermarket chains in the U.S., is on its way to becoming an on demand business. The company needed to automate its manual product information processes to eliminate inaccuracies that hampered the availability of products in its stores. Food Lion implemented an automated communications system which integrates Food Lion's suppliers, based on the UCCnet item registry and the IBM WebSphere Business Integration for Retail offering.

Now Food Lion can change product information in real time and can maintain reliable and effective connections with trading partners. Internal decision-makers can quickly review and approve accurate product data that is automatically routed to them. These process improvements enable Food Lion to make customer-preferred products readily available on the store shelves. The company can avoid the costs that stemmed from inaccurate information and long cycles, and it can introduce new products on demand.

Synchronization gives Food Lion the flexibility to alter touchpoints throughout the workflow process, and dynamically change the business process to match its needs. The IBM business integration solution also gives Food Lion the room to expand its capabilities to exchange data through alternative industry registries, data pools and electronic marketplaces, as well as add multiple suppliers. "We're actually excited about the possibilities," says Carolyn Hager, the manager of e-business at Food Lion. "As we look to the future, we want to work with IBM to implement solutions in other areas where data passes from one person to another, such as human resources."

Business Process Integration

As businesses imperatives change, IT systems and processes need to respond. But the speed of adaptability depends on the characteristics of the applications and processes that run the business.

- *Are applications integrated across a complete business process? Or are they locked in separate application silos?*
- *Are routine business processes documented and automated? Or are they hidden within the organization or made up primarily of manual activities?*
- *Are current processes incompatible with those of a newly merged company or new business partner?*
- *Is the company's Web business operating on its own without being linked to back-office systems or, in the case of e-commerce, not synchronized with retail business operations?*

To quickly achieve business objectives and improve business performance, companies need to evolve from an environment of manual or isolated business processes to automated and connected ones. To provide higher levels of service to users, companies need unprecedented levels of integration to link legacy systems, such as customer relationship management (CRM), enterprise resource planning (ERP), supply chain management (SCM) and other intra-enterprise systems. This can be accomplished through modeling, integrating, connecting, monitoring and managing current and new processes within a company and across the value chain of partners and customers.

"Enterprises should expect BPM [business process management] to reach mainstream status by 2003, and should begin to retool legacy applications into services to take advantage of explicitly defined processes," states Jim Sinur, vice president and Research Area director for industry analyst Gartner. "Enterprises that continue to hard code all flow control or insist on manual process steps, and that do not incorporate BPM's benefits, will lose out on the agility and flexibility that is beginning to characterize 21st-century business." (From Gartner Application Integration and Web Services Conference presentation, "Business Process Management: Savings and Innovation in the Real World," October 28, 2002)

IBM provides comprehensive business process integration capabilities within and outside the enterprise. The WebSphere Business Integration offering handles human workflow, long-running transactions, and data transformation and routing. IBM WebSphere Business Integration can manage several discrete business applications as one. Included are numerous adapters to popular business applications, such as Clarify, BroadVision, Oracle and SAP. Workflow technologies are used to integrate and automate human interactions. Integration broker middleware is used to transform, augment and apply rules to message-based data, and then route and distribute it between high-performance systems.

WebSphere Business Integration also provides business-to-business process integration and data sharing among trading partners of all types. Businesses can connect and integrate business processes using proven technology and industry-standard protocols, as well as resource-management features like database connection pooling, thread management and security.

WebSphere Business Integration provides predefined business process logic for easily integrating and automating business processes across industries, such as for sales processing, e-Procurement, and inventory management. Predefined business process templates are also provided for specific industries, including telecommunications, financial services, retail, insurance and manufacturing. These templates support new government regulations, such as Health Insurance Portability and Accountability (HIPAA), as well as commonly used formats such as Electronic Data Interchange (EDI).

WebSphere integration middleware is based on IBM's reliable, scalable, market-leading products. With added capabilities from IBM's recently acquired companies, such as CrossWorlds[®] software (including prebuilt process collaborations) and Holosofx[®] software (modeling and monitoring), WebSphere provides the broadest business integration capabilities available in the industry, centered on a common, integrated platform.

Siebel Systems has chosen WebSphere Business Integration software, including the pre-built process templates, as the integration infrastructure for its Universal Application Network solution, a standards-based approach to the design and development of cross-application business processes.

Technology Integration capabilities

Technology Integration underlies and supports business processes. Companies can lower total cost of ownership by improving how they integrate and manage IT infrastructure. Directory Integration, for example, can help companies synchronize and manage business information, from product and pricing data to network resource and user information, in a common directory or central data repository for the network.

To avoid security threats, companies need to continue to strengthen the security of their business assets in a cost-effective way. This can be accomplished through integration of multiple security mechanisms for authentication and authorization of users, as well as identity automation and improved security management.

As data storage proliferates, companies using varied and numerous storage types can make better use of data storage capacity, and automate and improve management of storage resources through Storage Integration. Software for integrating diverse operating environments can decrease total cost of ownership through mechanisms such as automating the event monitoring and system recovery process.

The following sections describe the three levels of Technology Integration:

- *Directory/Security Integration*
- *Storage Integration*
- *Operating Environment Integration*

Directory/Security Integration

Providing a common directory

Directories are taking on a greatly expanded role in enterprise computing and are becoming the central data repository of the network. Companies need synchronized and accurate information – from product and pricing data to network resource and user information – and the ability to manage business-critical identity data as a corporate resource independent of their applications.

A common directory is the key integration point where identity, security, applications, systems and network management, and other network services converge to store and retrieve data. Metadirectory software connects directory data from disparate sources across an organization and applies logic to make sure that this enterprise-view is accurate and comprehensive.

IBM's directory portfolio provides a common directory infrastructure, including metadirectory capabilities. IBM is deploying a common directory service based on Lightweight Directory Access Protocol (LDAP) across our software so businesses can maintain a single directory solution when deploying IBM middleware across the enterprise. From the Metamerge acquisition, IBM gained metadirectory capabilities that help enterprises tie together data residing in directories, databases, collaborative systems, applications used for human resources (HR), CRM, ERP and other corporate applications. IBM's solution establishes a flexible synchronization layer between a company's identity structure and the application sources of identity data – eliminating the need for a resource-intensive and inflexible centralized datastore.

Applications, like those developed using WebSphere software, can use IBM's directory software to securely identify network users and resources. Security applications, like Tivoli applications, leverage this common directory infrastructure for user provisioning and access management across Web and legacy applications. When companies can reliably authenticate their users, they can have greater control across the enterprise and a protected e-business environment as they open up their internal business processes to their customers, supply chain partners and automated transaction systems.

*T. Rowe Price**

**T. Rowe Price secures Web access—
saving time and reducing complexity**

T. Rowe Price, a mutual fund manager based in Baltimore, Maryland, has 8 million customers worldwide. To maintain competitive advantage, the company wanted to give its customers easier access to information about their financial accounts and to provide new self-service options. The company decided to provide account access over the Web.

This project required a uniform security implementation for the company's network resources to ensure that information could only be accessed by the appropriate people. However, the company had chosen a next-generation target architecture for its network, based on Java and Common Object Request Broker architecture (CORBA). Since CORBA implementations do not provide security, the company didn't have a standard security implementation for its Web and other applications. The T. Rowe Price development team had to code authorization into each corporate application separately. This duplication increased development time and created a complex security infrastructure.

To solve this problem, T. Rowe Price chose IBM Tivoli Access Manager (formerly Policy Director) to provide a single authorization framework for all of its applications. The company also uses the IBM Directory Server, which is LDAP standards compliant, for its user registry. IBM WebSphere software is its software platform.

(continued on next page)

The open platform support of IBM's directory portfolio means customers are not limited to proprietary technologies and have the flexibility to gain the greatest value from their current IT investments. IBM's directory offering can play a key role in enabling strategic initiatives such as the deployment of grid computing or any advanced IT capabilities that depend on a comprehensive enterprise directory. IBM provides the software infrastructure for identifying enterprise resources, controlling access to networked systems, and securely deploying advanced software architectures like Web services across all leading operating systems, including Linux[®], for Intel and IBM @server™ xSeries™ servers.

Strengthening security through integration

In a diverse e-business environment, users access business systems using multiple security mechanisms for authentication and authorization. A single individual could be represented by a variety of user identities in multiple registries or directories, for example: SAP, IBM Lotus Notes[®], IBM RACF[®], IBM AS/400[®], Kerberos and PKI. Each of these security registries has a unique format for User Identification, for example, JohnD, JDoe or JD. And software vendors continually define new security registries without retiring existing ones.

Integration capabilities are needed to provide single sign-on, consistent security, minimal duplication of directory information and common policy-driven administration across the diverse hardware, middleware and applications used by solutions in an IT environment. Tivoli technology management solutions provide a solid foundation for handling multiple directories and identities.

In addition, IBM identity management software is integrated into the Tivoli portfolio to help organizations consolidate identity data and automate the deployment of resource access rights for users inside and outside the firewall. This supports IBM's goal to extend the reach and power of security, while reducing IT security management costs. Identity management is becoming increasingly important as companies face growth in numbers of users as well as the data that must be maintained.

T. Rowe Price (continued)*

The new Tivoli solution provides strong access controls, and it can secure Web, CORBA and legacy applications. Customers can authenticate securely over the Web using a user name and password or a digital certificate from any Secure Sockets Layer (SSL)-enabled browser. Tivoli provides a single sign-on to all resources that a user is authorized to access. Authentication and authorization are shared services, which don't need to be developed separately for each application.

T. Rowe Price now has a unified view of security and can centrally manage security for all network resources. This reduces administrative overhead and the possibility of security breaches due to inconsistent policy or human error. The company estimates it has achieved a 61 percent reduction in help desk password reset calls. More than 109 of the company's applications leverage Tivoli Access Manager. More than 1 million users are in production.

Storage Integration

Most IT environments currently use numerous and varied storage devices. By integrating, monitoring and managing storage, these organizations can lower total cost of ownership. Efficiently leveraging all storage capacity is a key IT requirement today. IBM offers the most comprehensive storage solutions known in the industry, including storage hardware, software and services.

IBM Tivoli solutions protect an organization's data from hardware failures and other errors by storing backup and archive copies of data in offline storage. Without compromising reliability, Tivoli solutions scale to protect hundreds of computers, running a dozen operating systems, ranging from laptops to mainframes and connected through the Internet, WANs or LANs.

These solutions minimize data-protection administration costs and impact to computers and networks through centralized Web-based management; smart data move and smart data store techniques; and comprehensive, policy-based automation. Tivoli solutions protect business-critical applications that must run 24x365 through use of centralized data protection with no interruption to service.

In April 2002, Frost & Sullivan awarded IBM Tivoli Storage Manager "Best in Product Class" for storage backup and recovery software. According to this consulting firm, IBM Tivoli Storage Manager obtained the highest rating from customers in terms of its ability to provide the most comprehensive storage management solution, and it also received high marks for product innovation and best pricing structure.

"While conducting the analysis, we were thoroughly impressed with the return-on-investment (ROI) that an all-encompassing storage management solution like IBM Tivoli Storage Manager provides businesses," said Rufus Connell, industry business manager, Frost & Sullivan. "After speaking with end users, there was consistent feedback regarding the efficiencies a storage management solution provides an organization: significant reduction of necessary staff to manage the storage environment, ease of use and broad overall capabilities. For this, end users praised IBM Tivoli for its Storage Manager offering."

IBM Tivoli Storage Manager also was named the industry's top storage management product in June 2002 at the 9th Annual Network Storage Conference in Santa Clara, California.

Managing storage resources

In August 2002, IBM acquired TrellisSoft, Inc., a privately held provider of storage resource management (SRM) software, to help meet a growing customer need to manage costs associated with the proliferation of data storage and to increase storage resource availability. TrellisSoft products are available from IBM Tivoli software. The TrellisSoft SRM solution will complement SRM products currently under development at IBM.

Storage resource management serves as the dashboard for the storage environment by providing a set of automated tools that address multiple aspects of the storage infrastructure including capacity, availability, event, performance and asset management. TrellisSoft specializes in Java™ and Web-based storage resource management to support multiple platforms including Microsoft® Windows NT®, Windows® 2000, HP-UX, Sun Solaris, IBM AIX®, Red Hat Linux and others.

Operating Environment Integration

Today's e-business applications, which usually span multiple operating platforms and several network hops, require new end-to-end management capabilities. For example, service level agreements (SLA) cannot be monitored or enforced without end-to-end workload management. Providing business with policy-driven management of a diverse, distributed server infrastructure and self-management of individual servers are key integration requirements.

For the integration of diverse operating environments, Tivoli solutions perform event collection, correlation and automation; examine incoming events for important relationships; and provide status results. By fully automating the entire event-monitoring process and restoring systems to normalcy *without* user intervention, Tivoli software can help to dramatically decrease total cost of ownership.

*Whirlpool**

Whirlpool improves ROI through a fully integrated business model

The world's leading manufacturer of quality, major home appliances, Whirlpool needed to extend its order fulfillment processes to more trading partners along its selling chain. The company turned to IBM to help it develop a B2B portal to enable its middle-tier trading partners to place orders online.

The resulting solution was a fast and easy-to-use Web self-service ordering system for Whirlpool's partners. Whirlpool's benefits include savings on order processing costs of more than 80 percent, and a 100-percent return on investment in 8 months.

Jim Haney, Whirlpool's vice president of Architecture and Planning, says, "At Whirlpool, we see the opportunity to gain important operating efficiencies and increase speed to market through a fully integrated business model. From WebSphere Portal at the front end, through CrossWorlds and WebSphere MQ to our DB2 databases running on our IBM enterprise server, we have achieved an unparalleled degree of integration. Our portal implementations have dramatically increased internal communications; while our integrated WebSphere implementation has reduced order processing costs more than 80 percent."

Whirlpool was one of the first companies to integrate a Web-based solution with a SAP R/3 inventory system. Its B2B portal was also integrated with the company's Tivoli system management tools. Whirlpool uses IBM Lotus collaboration products to enable the entire company to adapt quickly to changing needs. Development, engineering and manufacturing personnel can work in real time on changes, and customer service staff can respond quickly to customers.

Tivoli solutions also enable businesses to deploy software and track hardware and software configurations across an enterprise. Businesses can rapidly deploy complex, mission-critical applications to multiple systems and users from a central control point. An inventory component can reduce IT expenses through efficient planning and implementation of technology changes that leverage a comprehensive catalog of hardware and software assets. Home-grown applications can easily be added to the master catalog. Mobile client support is included, along with management across firewalls and granular scanning of asset configuration.

An example of a fully integrated e-business

Some organizations may use a broad range of IBM integration middleware to achieve their goals of having a fully integrated e-business. One example is Whirlpool Corporation, whose complete integration strategy covers integration areas including Business Process Integration, Information Integration, User Role and People Integration and Operating Environment Integration.

The IBM middleware difference: experience, innovation and standards

IBM middleware is supported by experience, innovation and standards. These strengths make all the difference in IBM's advanced integration capabilities.

Experience

From the knowledge gained through providing computing services to customers and partners, IBM, unlike other vendors, can identify integration patterns that cut across the stages of e-business evolution and the boundaries of industry specialization. IBM applies its integration knowledge in the creation of best practices and services. IBM's experience is shared with customers through our developer programs, IBM business partner community and professional services organizations. Here are some examples:

- *Early adopters benefit from programs including jStart, IBM alphaWorks® and IBM developerWorks™. These programs indicate our technology direction and provide an early hands-on experience with advanced technology. We use the feedback and results from customers to evolve the technology from the alpha stage into the finished products that will meet their needs.*

- *The IBM Global Services (IGS) team provides computing consulting, data center management and IT outsourcing. IBM Business Consulting Services, formed through the acquisition of PriceWaterhouseCoopers consulting, augments IGS' experience with industry business insight and an increased understanding of customers' integration problems.*
- *IBM Patterns for e-business distill the lessons learned from more than 25,000 Internet-based customer engagements into blueprints and tools that architects use to design e-business solutions. Integration patterns are included in IBM Patterns for e-business.*

Innovation

IBM leads in the creation, adoption and support of key technology advancements to help ensure companies have the advantage of cutting-edge technology and the highest levels of cross-platform capability. IBM offerings leverage the technology and standards from these industry efforts and from our own IBM Research team, the world's largest IT research organization. IBM applies those emerging technologies that have sound business value to your Business and Technology Integration issues.

One example is Web services, a powerful, emerging integration technology that enables business applications to dynamically interact across networks through the use of open XML-based standards. Web services promises the major business benefits of:

- *Accelerating and reducing the cost of integration*
- *Lowering the costs of deploying and managing infrastructure*
- *Leveraging existing skills and assets*
- *Improving re-use*

IBM leads the industry in Web services enablement. Our middleware brands – WebSphere, DB2, Lotus and Tivoli – all support the development, deployment, storage and management of Web services solutions.

<i>E2open*</i>
According to E2open's CTO, Greg Clark, "E2open's unique solutions for enterprise-to-enterprise integration would be nearly impossible to implement without Web services. By leveraging IBM's WebSphere functionality and IBM's service capability, we have been able to bring to market in a very short time a very reliable and globally scalable offering."

Other examples of innovations: IBM research laboratories have been instrumental in creating *XQuery*, a standards-based query language for XML data sources, and for evolving *federation*, a technology for enabling unified access to any digital information, in any form. IBM has led the standards effort around federation, and its implementation is based on the ISO standard: Structured Query Language/Management of External Data (SQL/MED). SQL is a mature, powerful query language with widespread adoption in the marketplace.

IBM's autonomic computing and grid initiatives seek to achieve improved management and increased utilization of IT resources. These initiatives for optimizing operations are part of IBM's vision of an on demand business, one that dynamically responds to the needs of its customers and partners.

Several grid projects are currently underway, for example, on February 1, 2002, InfoWorld reported, "IBM recently announced a massive computing grid centered at the University of Pennsylvania that will connect the servers and databases of hospitals around the world to share information on mammogram procedures and research. As the Globus tools become available, Big Blue will make it possible for participating hospitals to have Web service access to the data available on the grid without having to invest in the infrastructure." (From the article, "Grid project nets Web services tools," by Dan Neel and Ed Scannell)

Standards

IBM's continuing commitment to open standards helps ensure that companies can introduce new products into existing infrastructures with ease and minimal cost. Companies can also avoid vendor lock-in and select new products based on value rather than proprietary constraints.

IBM collaborates with industry partners to define and to mature the emerging industry standards that provide the foundation for Web services. For example, IBM co-authored the Simple Object Access Protocol (SOAP) specification and the Web Services Description Language (WSDL) specification. The first WSDL toolkit implementation was made available on the alphaWorks developer Web site. IBM is also a leader in founding and supporting standards organizations, such as the recently formed Web Services Interoperability Organization (WS-I.org). This organization promotes interoperability between vendor offerings for Web services.

In August 2002, IBM announced, along with Microsoft and BEA Systems, new specifications to describe how to reliably define, create and connect multiple business processes in a Web services environment. The specifications help organizations coordinate business processes and transactions within a company and with external partners and customers across diverse systems.

These specifications are:

- *Business Process Execution Language for Web Services (BPEL4WS). For defining the business process and connections with external and internal entities*
- *WS-Coordination and WS-Transaction. To provide a way for companies to coordinate and integrate a number of distinct Web services and business processes, consistently and reliably, across a variety of implementation environments*

To support the specifications, IBM also released updated tools: the IBM Business Process Execution Language for Web Services Java Runtime (BPWS4J) and an updated Web Services Toolkit (WSTK). These are available on the IBM alphaWorks site for trial download at no charge. BPWS4J is a platform for executing business processes defined with BPEL4WS. BPWS4J includes a plug-in from the Eclipse open-source tool vendors' consortium, which developers can use to create the BPEL4WS-defined processes. The initial Eclipse software development environment was the result of a \$40M contribution of software technology from IBM to the open-source community in 2001.

Even though some aspects of Web services could take time to mature, our customers are achieving value today. Businesses like The Bekins Company are realizing benefits from modest investments in the technology. IBM is helping these companies use Web services to reduce costs and integration complexity, and to establish standardized, cost-efficient integration with partners.

Summary: IBM's total integration advantage

Time, cost and complexity are major barriers to integrating business systems. Even so, these barriers are not preventing companies from spending a major portion of their IT budgets attempting to integrate their processes and systems, because they are driven by customer and partner demands as well as competitive pressures.

As each organization begins to implement projects, it should be guided by a strategy that encompasses all integration needs – from processes to people, and from operating systems to storage devices. Each area of integration can be tackled one at a time, but by adopting a comprehensive strategy to guide the activities of the IT team, companies can achieve the best return on investment. A thorough integration strategy eliminates shortsighted technology decisions and establishes an end-to-end view of key integration requirements.

IBM middleware delivers the Business and Technology Integration software that businesses need to ensure their computing systems and people work together in support of business strategy. No other vendor can provide the breadth of integration capabilities that IBM offers. IBM has united the integration solutions across WebSphere, DB2, Lotus and Tivoli software brands to provide the strongest integration capabilities in the industry. IBM enhances this strong portfolio by acquiring best-of-breed software capabilities from industry leading companies such as Metamerge, HoloSoft, Access360 and Trellisoft. The result is that IBM can deliver a complete set of solutions for end-to-end integration.

“IBM is establishing the high-water mark in terms of the breadth of their offering,” IDC’s [Michelle] Rosen said. “They’re sort of setting the rules of the game and other players have to decide how to differentiate themselves.” (From the Reuters article, “Database champ IBM now aims at middleware market,” May 2002)

As companies begin to integrate existing applications and processes, they can use individual IBM integration products to satisfy business requirements. As their integration needs grow, companies can add solutions incrementally to create a unified e-business infrastructure that builds on past investments and adapts to new business demands.

IBM’s comprehensive vision for integrated e-business is based on experience with tens of thousands of customers. Our integration middleware portfolio is fueled by innovation and open industry standards. Together our vision and middleware help companies simplify connecting their applications inside and outside the firewall, streamlining the most complex of business processes and managing the impact on the business. Companies can build an end-to-end infrastructure that handles demand through delivery, across their enterprise and extending to partners and customers.

By leveraging integration technologies based on open standards, which is how IBM software is built, customers can achieve much faster time-to-value and return on investment. IBM’s commitment to open industry standards, such as Web services, helps organizations avoid vendor lock-in. Companies can build an infrastructure that is poised to adopt future technology advances, such as pervasive, autonomic and grid computing. Our strategy is to help companies build open, flexible and integrated infrastructures that operate at peak performance across all the leading platforms.

For more information

With our breadth of integration capabilities, IBM is best equipped to solve the critical integration challenges facing companies today and to prepare them for on demand computing tomorrow. To learn more about IBM’s integration solutions, visit ibm.com/software/integration.



© Copyright IBM Corporation 2003

IBM Corporation
Software Group
Route 100
Somers, NY 10589
U.S.A.

Produced in the United States of America
02-03
All Rights Reserved

AIX, alphaWorks, AS/400, CICS, CrossWorlds, DataJoiner, DB2, the @server logo, Holosofx, IBM, the IBM logo, Lotus, Lotus Notes, MQSeries, RACF, Tivoli, WebSphere and xSeries are trademarks of International Business Machines Corporation in the United States, other countries, or both.

Java and all Java-based trademarks are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Microsoft, Windows, and Windows NT are trademarks of Microsoft Corporation in the United States, other countries, or both.

Linux is a registered trademark of Linus Torvalds.

Other company, product, and service names may be trademarks or service marks of others.

Any customer performance data contained herein was determined in that customer's specific environment. Therefore, the results obtained in your environment may vary significantly. There is no guarantee that your results will be the same. Users of this document should verify the applicable data for their specific environment.

All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only. This information is for planning purposes only.

*These scenarios are composites based upon typical customer requirements and not intended to represent a specific customer engagement. Individual customers will have different requirements. Contact your IBM representative to discuss your specific needs.