WebSphere. software

IBM

A comprehensive approach to business integration.

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Introduction

Business is conducted as a sequence of interactions. A customer contacts a supplier to place an order, the order is taken by sales, and it's passed on to accounting and manufacturing. Through other departments, goods or services are delivered, the customer settles the invoice and the process is complete. Each interaction in a process that includes people and systems involves passing of information. The promise of computing technology is to make this kind of information processing more efficient. And when business is complex and fast changing, the challenge — for people and systems — is to change behavior to keep pace. At the same time, the connected world of e-business makes these internal processes more visible to the outside world of customers, suppliers and trading partners. And disconnects in the processing of information are no longer just an inefficiency the business can conceal. In today's world, disconnects are a problem that has a direct impact on the company's success.

Changing business needs drive updates and innovations in information technology (IT). However, because the future isn't certain, it's difficult to match current capabilities to future requirements. For instance, systems and technology proliferate while the need for workers to access comprehensive information remains consistent. The form and meaning of business information is updated, for example, switching between two-digit and four-digit year dates, yet it's impractical to modify every system all at once to accommodate every update. Integration is the task of bridging these disconnects, facilitating the interactions, to help businesses operate more efficiently. Integration also enables greater effectiveness because each resource can change at its own pace in response to business requirements while remaining connected to others.

This white paper introduces multiple aspects of integration that span information, processes, applications and users. It discusses the different types of integration and the benefits that can be gained from integrating a business. It also introduces how products within the IBM WebSphere® software platform and IBM Data Management portfolio deliver integration capabilities that can help make integration easier, faster and less expensive.

An integration scenario

Without integration, information is confined to individual systems. A sales order is passed from customer to sales person, entered into a sales system, passed on to the accounts department, reentered in another system, and a credit check is required which involves the credit control department. Exceptions in the processing of the order, like exceeding a credit limit, require multiple steps to coordinate across all of the departments — and keep the customer informed. Each manual step introduces the potential for error in handling the information. Compared to the speed at which a computer can process information, significant delay can occur as well. Working in parallel on the same order across many departments is difficult for people, because they must rely on slow communication, like telephone and fax. As a result, the process is made more complex and takes longer because it requires extra steps to coordinate.

Unleashing information

By connecting applications so that information can be shared, the need for manual reentry of information can be avoided. As a result, the quality of the information can be maintained and the speed at which the process continues can be improved. The integration infrastructure can take responsibility for controlling where information is delivered and isolate applications from changes by manipulating the information as it passes through. That means, if the structure or meaning of the information changes in one application, all of the other applications are insulated. Sharing information need not be limited to systems within the organization: Streamlining communication with suppliers can bring faster and more accurate responses for customers.

WebSphere MQ runs on more than 35 platforms and across virtually all major networking systems.

IBM WebSphere MQ (formerly known as IBM MQSeries®) is messaging middleware built to address the needs of application developers and integrators that want to distribute information between applications across a wide range of operating systems and networks. WebSphere MQ capabilities extend beyond network connectivity. They provide a simple and standard programming interface for use in multiple programming languages and environments that helps make solutions more portable and skills reusable. WebSphere MQ takes responsibility for end-to-end delivery of messages, even when networks and applications may be unavailable. Taking care of routing messages with WebSphere MQ applications can be less complex and more flexible. It's easier to update the WebSphere MQ configuration than make a change to an application.

With WebSphere MQ, you're not limited to the internal network of a single organization. WebSphere MQ Everyplace™ runs embedded in small-footprint pervasive computing devices with limited resources, and provides a secure service for reliable exchange of messages. WebSphere MQ can communicate over the Internet and pass through firewalls through HTTP standard Internet protocol.

When multiple applications share information, it makes sense to deploy extra function in the messaging middleware to help reduce interconnection complexity. WebSphere MQ supports optimized message routing with distribution lists, and dynamic message routing with publish and subscribe. Publish and subscribe allows subscribing applications to select messages these applications receive by topic (as specified by the publishing application) or by content (by specifying filters). It's not important for publishing applications to select which applications receive the messages they send. Publish and subscribe enables integration of applications that is flexible and able to change on a second-by-second basis.

Beyond publish and subscribe, the ability to transform messages as they are distributed provides further relief for applications by isolating them from the message formats that every other connected application uses. It is the responsibility of integration middleware to understand every message exchanged between applications, and to translate from a sender's format into each receiver's format. WebSphere MQ Integrator provides this message brokering capability to act as an intermediary between applications and to allow them to exchange business data without being explicitly connected.

Integrating information
In today's business environment the ability to leverage information within and outside the enterprise is essential to be competitive. Initiatives, such as customer relationship management, supply chain management and business intelligence, depend upon the integration of information from structured and unstructured data sources. Because of organizational or operational constraints, these data sources do not generally consolidate easily into a single database. Yet hidden information can be unlocked, opportunities more readily recognized and customers better served when information is correlated.

IBM data management portfolio provides support for integrating almost all forms of business information across and beyond the enterprise.

IBM information integration technology can enable consolidated, realtime access across all types of distributed data sources and can help transform information to meet the needs of business analysts. It also manages data placement for performance, currency and availability, and helps foster fast, reliable and easy access for e-business solutions. The IBM Data Management portfolio provides robust capabilities for integrating many types of information. The IBM DB2® Universal Database™ family provides the foundation for storing, managing and federating many forms of content. DB2 Extenders™ provide structured query language (SQL) extensions to query, access, update and manage specific data types including Extensible Markup Language (XML), text, audio, visual, image and spatial data. This also includes traversing XML documents, queries by image shape or color, or inquiries based on proximity to a given location.

XML is at the heart of integration solutions and IBM provides a flexible XML implementation that enables customers to choose storage mechanisms — in tact for fastest whole-document access, decomposed for fast component access, or externally minimizing document redundancy and data movement requirements. DB2 also embraces Web services. Together with IBM WebSphere Application Developer, you can allow DB2 to act as a Web services provider that enables SQL and XML access, and stored procedure calls from Web services clients.

Providing responsive and coherent access to diverse information, the DB2 family provides federation technology. Federation is the concept that a collection of resources can be viewed and manipulated as if they were a single resource while at the same time retaining their autonomy and integrity. The DB2 optimizer function provides high-speed access to diverse and distributed databases. A single query can access, correlate and transform data across DB2, Informix, Oracle, Microsoft® and Sybase databases, enabling fast response to your information requirements. The optimizer feature integrates current data without the requirement for synchronizing or moving the data first, significantly extending deployment timeframes. Extensions built for the life sciences industry extend access to Microsoft Excel spreadsheets, flat files and proprietary genomic and proteomic data stores. This also demonstrates the flexibility to extend the technology to arbitrarily complex data stores. IBM has contributed to and implements the ISO SQL/Management of External Data(MED) standard.

IBM DataJoiner® is a stand-alone federation engine, which in addition to distributed queries, delivers read and write support, two-phase commit across heterogeneous relational sources and heterogeneous replication among DB2, Informix, Oracle, Sybase and Microsoft. IBM Enterprise Information Portal provides broad information integration and access to:

- *Unstructured digital content, such as text, XML and HTML files, document images, computer output, audio and video*
- *Structured enterprise information through connectors to relational databases*
- *IBM Lotus Notes® Domino™ databases and popular Web search engines using IBM Lotus® Domino Extended Search*
- *Business intelligence information stored in the DB2 Universal Database Information Catalog metadata store and objects within business process workflows*

IBM is an industry leader in exploitation of integration standards, including XML, Web services, SQL, and Java™ technology. Its delivery of real-world federation performance, extensibility and tight integration with a comprehensive business integration platform embraces and leverages diversity.

Synchronizing application processes

In today's fast-moving business world, leveraging information is only the first step in integration. When several applications are handling a job, you want to ensure these applications are working in harmony. To help keep key business information synchronized. And to potentially lead to more timely and accurate decisions. For example, a consistent view of a customer's credit position requires information from the sales application for orders in flight, the accounting application for outstanding invoices and the credit control application for credit history. Because a single customer could have many orders in various stages of processing at any given time, it's essential to synchronize the processing of the multiple systems involved, so at any moment, a true picture of that customer's situation is available.

IBM CrossWorlds® products address this application synchronization require-ment. CrossWorlds provides adapters that link to the applications and deal with events occurring within the application. When a significant event occurs, such as creation of a new order, it is passed to the IBM CrossWorlds InterChange Server, where a synchronization process is triggered. That process coordinates

CrossWorlds provides industry-specific process collaborations for the telecommunications, finance and manufacturing industries.

updates within other applications and helps ensure that the business event is reflected consistently everywhere. Many of the different items of information that need to be synchronized across multiple applications are standard in business — inventory levels, purchase orders, customer records and so on. CrossWorlds also provides standardized process definitions, known as collaborations, which can be deployed quickly with minimal customization, helping to shorten implementation schedules and reduce risks.

Orchestrating business processes

Of course, the real world is more complicated and it's easy for a process to break down when something unexpected happens with a direct effect on the service that your customer experiences. It is one thing to catch a problem and take the appropriate actions to reset the customer's expectations — for example, a delay in delivery — but quite another if an order just gets lost. An integration infrastructure can control the process so that every step is followed by another step until completion. Exceptions to the normal process can be captured and handled reliably. An audit trail can be used to analyze the errors and uncertainties that cause exceptions and improve the process overall.

MQSeries Workflow, in conjunction with BPM Suite from HOLOSOFX, supports the complete lifecycle of business process management from definition, deployment, through to execution and monitoring.

Certain steps within a process may be able to happen in parallel, which results in a shorter elapsed time for the end-to-end process. The integration infrastructure can be used to coordinate simultaneous steps that may involve systems and people. IBM MQSeries Workflow is a solution to manage complex business processes to help ensure integrity, and automate these processes where possible. In combination with the Business Process Management Suite from HOLOSOFX, an IBM Business Partner, business processes can be modeled in a tool easy for business managers and analysts to use. Once a process is captured in the tool, it can be simulated and optimized based on cost and capacity factors. The process can then be deployed to the MQSeries Workflow runtime engine and actually executed. For business activity monitoring, information from the workflow engine can be fed back to the HOLOSOFX Business Monitoring Dashboard to be analyzed by the business manager. You can also use this information to compare the process model in a production environment and identify opportunities to further optimize the process.

Complex business processes typically involve human intervention and auto-
mated work by applications. MQSeries Workflow is capable of handling
organizational models that define the way people work, with teams of peers, lists
of reviewers and managers responsible for escalations and exceptions. MQSeries
Workflow provides you with several methods for worklist management, includ-
ing a utility to automatically generate a Web-based interface to a workflow.
Integration with applications is important when automating the flow of work,
and MQSeries Workflow can take advantage of new technologies, like Web
services, to be able to automatically discover and invoke services. For integra-
tion with trading partners, CrossWorlds Trading Partner Interchange acts like
a gateway to handle common business-to-business communication protocols,
such as Electronic Data Interchange (EDI). CrossWorlds Trading Partner Inter-
change can link the exchange of business events with trading partners into
the internal processes of the organization. IBM WebSphere Partner Agreement
Manager gateway provides RosettaNet technology-based communications.

Unifying user interaction
Integration is not only useful for applications and business-to-business communi-
cation. Benefits from integration can result when people interact with systems.
Accessing relevant information from multiple systems can be difficult, requiring
multiple user IDs, passwords and knowledge of the systems' interfaces. The result
for users can be lower productivity and less value from business knowledge.

A portal provides a single point of interaction for users, combining information
and processes into a unified view that can be tailored to suit individual needs.
Building a portal as an extension to the other types of integration means that
the same infrastructure dealing with information and processes for applications
can be leveraged. A portal also simplifies access to alternative channels, which
can drive down costs for a business because low-value interactions can be
handled through low-cost channels. For example, routine customer queries
about order status can be handled through a Web page instead of a call center.
Portals also help to hide the internal complexity of organizations from your
users, so your customers can be insulated from multiple functions — sales,
service, billing and marketing — that may affect them. Your employees can
access a holistic view of any customer spanning all of the products and services
the customer purchases from your organization.

The IBM WebSphere Portal family delivers a unified portal strategy, allowing you to quickly capitalize on your application and human assets while presenting first-class portal sites to customers, trading partners and employees. Supporting a wide variety of computing mobile devices, the WebSphere Portal family enables your users to interact with their portals virtually anytime, anywhere, using many types of devices. The IBM WebSphere Portal Enable offering allows you to build scalable portals that simplify and speed up a user's access to personalized information and applications. The IBM WebSphere Portal Extend offering provides your portal users with the ability to act on information and applications accessed by collaborating with other portal users. It adds an integrated team room, instant messaging, extended search, community and Web site analysis capabilities.

The IBM WebSphere Portal Experience offering is the complete IBM solution for developing, deploying and maintaining enterprise portals that can provide a first-class experience for employees, trading partners and customers. It includes all the capabilities of WebSphere Portal Extend offering and adds advanced e-meeting, application sharing, enterprise content management and industry-leading security features. For commerce interactions with customers and trading partners, the IBM WebSphere Commerce family extends beyond the traditional Web storefront. Advanced capabilities help you build and maintain meaningful business relationships by providing Web-based interaction with your customers and trading partners. Personalization for specific roles and expectations ties nondisruptively into business applications within the organization by leveraging the integration infrastructure.

WebSphere Portal , Version 4.1 delivers marketplace-exclusive, embedded collaboration components as the first proof point of Lotus Next Gen Strategy, combining the best of both worlds by merging the value of the Lotus collaboration platform with the Java 2 Platform, Enterprise Edition (J2EE) technology-compliant WebSphere Portal infrastructure.

Building on integration

The need for integration comes from applications that are built to solve current problems without the flexibility to adapt to changing circumstances. But constantly changing business requirements result in disconnects that arise because circumstances change as existing applications are updated and new applications are created. Using integration infrastructure solves problems that already exist. How do you create new applications that are built ready to integrate, inherently able to cope with the changing topology of other systems?

The answer is to use the same integration technology to develop new applications that are more flexible, without additional complexity. Using integration technology can help simplify the creation of new applications, and give you flexibility you never expected before. This is because almost all applications created today are required to connect to an existing database or application to leverage information and functionality. IBM WebSphere Application Server provides the essential e-business functions of handling transactions and extending back-end business data and applications to the Web. IBM WebSphere Studio helps you build applications that perform these functions with security-rich features, reliability and scalability — the capacity to change as your business grows.

IBM WebSphere Application Server Standard Edition is a robust deployment environment for e-business applications. Its components let you build and deploy dynamic Web content quickly and easily. Using the open Java technology-based and application programming interfaces (APIs) and the latest Extensible Markup Language (XML) technologies, the WebSphere Application Server Standard Edition lets you leverage your existing resources, shorten development cycles and helps ease administrative burden. IBM WebSphere Application Server Advanced Edition is aimed at professional Java developers who require J2EE and Web services functionality for dynamic e-business applications.

IBM WebSphere Application Server Enterprise Edition allows you to integrate your existing enterprise applications through the development and deployment of application adapters. Based on the J2EE Connector Architecture (JCA) open standard, you can adapt existing Microsoft, CORBA and C++ assets for use in your application. WebSphere Application Server Enterprise Edition increases flexibility by enabling your Web services and J2EE technology-based applications to adapt to changing business requirements through adaptable business rules. Enabling application logic to be altered without stopping, redeveloping and restarting the application allows application functions to be published as reusable Web services for access by other applications.

WebSphere Studio and WebSphere Application Server provide comprehensive support for developing and deploying Web services. This support includes automatic generation of service definitions, a private UDDI directory for internal deployment and a gateway that works across firewalls.

WebSphere Studio is a comprehensive development environment designed to meet all of your development needs — from powerful Web interfaces to server-side applications, from individual development to advanced team environments, from Java component development to application integration. Available in a number of configurations, with extensions from IBM and IBM Business Partners, WebSphere Studio enables developers to use a single development environment that is designed to meet their specific development needs.

Summary
Business integration enables people and systems inside and outside an enterprise to work together in support of the company's business strategies. It helps break down barriers to information access — among applications, departments and organizations. It can also lead to greater efficiency, improved business control, enhanced flexibility and new opportunities. Because business integration has multiple dimensions to it, most organizations will, at some point, need to solve more than one type of integration problem.

Integration capability can be broadly categorized into five types across areas of customer needs. Together the IBM WebSphere software platform and IBM Data Management portfolio of products address the five types of integration:

1. *Application connectivity that links various applications to share and leverage information*
2. *Information integration that leverages information across and beyond the enterprise*
3. *Process integration that changes how business runs through process automation*
4. *User interaction that creates a single interactive user experience across applications and devices*
5. *Foundation and tools that help you develop and deploy new integration-ready applications*

The WebSphere software platform for e-business, as illustrated in Figure 1, addresses three major areas of customer need. *Reach and user experience* provides users with a unified and personalized point of interaction through a wide range of devices to access information and applications. *Foundation and tools* provides a robust environment and comprehensive tools to develop and deploy e-business applications. *Business integration* connects applications to share information and coordinate processes. In addition customers have a need to integrate information.
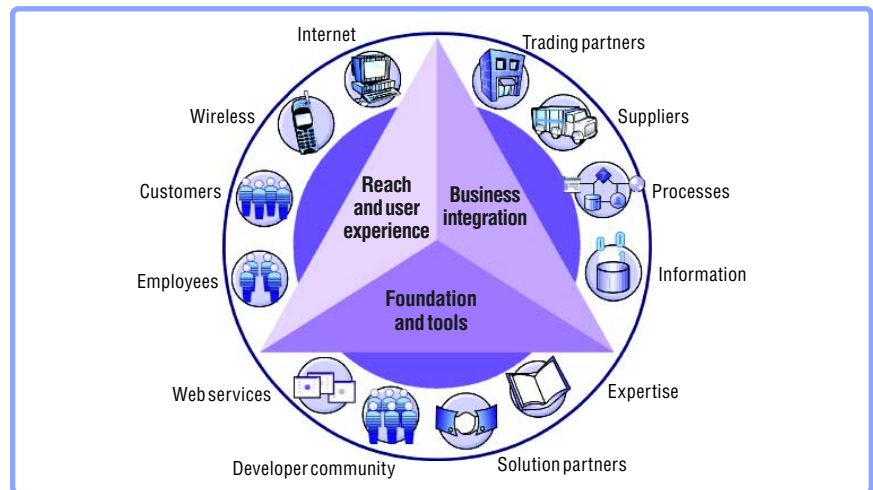
Figure 1: The WebSphere software platform

IBM software has the breadth of capability that can address all of the different types of integration. When you select your integration infrastructure, consider the long-term implications — additional complexity and cost — of needing several solutions from other vendors with niche capabilities. Let IBM software help transform your business into a dynamic e-business.

For more information

For more information about WebSphere software integration,
visit: **ibm.com**/websphere/integrationinfo

For more information about the WebSphere software platform
and products, visit: **ibm.com**/websphere

For more information about the CrossWorlds solution, visit:
crossworlds.com/**ibm**

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