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Bringing SOA to the mobile edge of the WebSphere enterprise

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WebSphere mobile software can be built, deployed, and managed within a service-oriented architecture (SOA), which is basically a framework for creating and managing network applications that use Internet standards and protocols to provide services to other network applications. With WebSphere mobile software, you can extend SOA services all the way out to the edge of your WebSphere enterprise, wherever your users are located and on whatever devices they are using.

Using the WebSphere Everyplace developer's toolkit and the SOA framework, developers can easily and quickly build Web services and Java-based applications. When deployed to intermittently connected client devices — including laptops, kiosks, smart phones, PC tablets, and PDAs — these applications can channel information over wireless or wire-line connections to the edge of your network. As such, they epitomize "business-facing" software: that is, software that brings information to where it is needed on demand. Business-facing solutions also include remote Java applications and Web services that connect to enterprise middleware on demand.

As Web services and Java applications move to the mobile edge of the WebSphere enterprise, the SOA framework will become the fabric of how developers build, connect, and integrate applications, servers, and mobile devices. Given the growing number of businesses that need to provide enterprise access to mobile and remote systems and devices, it is just as important for business developers to know how to apply the principles of SOA as it is for developers.

This article is for technical and business developers or architects who want to understand how to provide enterprise access to a wide variety of mobile and remote systems and devices. It provides a foundation for understanding how to use WebSphere mobility software to develop mobile applications that are either Java-based or Web services-compliant. It also paves the way for future articles on building, deploying, and managing mobile WebSphere applications in an SOA.

Mobilizing information to accelerate the speed of business

Consider all of the sources of information that you and your employees need to access in order to conduct business on a day-to-day basis. How much more productive could you be if all of the information related to a task was integrated into a single interface on a mobile client or laptop and available wherever you go?

The ability to move information from where it is created to where it is needed is key to increasing business process effectiveness. Business managers know that they can enhance productivity by providing self-service capabilities for processes like customer service, human resources, or procurement. They want people to have secure access to the information or process they need, right when they need it, and in the context of their work. Mobility products are the answer; they can deliver the necessary information or process to a mobile office or device whenever or wherever it is needed.

Enterprise information needs to flow from a wide variety of sources — industrial control systems, enterprise resource planning systems, customer relationship management systems — through the business processes that use these systems, to the people who need to act upon the information. By increasing the velocity of the information flow in your organization, you can enable your business to increase revenue, reduce costs, reduce time to service, and improve the quality of projects and business processes. Take the example of an insurance agent who submits claim information to a data center; getting updated information to the data center quickly could mean getting insurance checks processed faster. If the agent can submit the data from a mobile device rather than waiting to get back to the office or to a PC, the updated information reaches its destination much quicker.

Mobile devices also save time and prevent information overload because they enable users to have correct and relevant information for the task at hand. "Fit for purpose" information enables users to better manage commercial and industrial business processes, as they get only the information they need and respond to it in real time. For instance, at a rental car company, the customer service agent needs to focus on the task at hand — checking the availability of a requested type of car, fuel purchase option, or type of navigation system; validating a customer's license and credit; entering the date of expected return — all while maintaining contact with the customer. If the applications this agent uses are deployed to a mobile device, the agent gains the ability to work with customers at the service desk or in the parking lot as they return their cars, all while accessing inventory information or performing customer validation through direct interaction with back-end databases.

The role of the SOA framework

Earlier, we defined a service-oriented architecture as a structure for building, deploying, and managing Web services. But what exactly does an SOA consist of? In essence, the SOA framework is a set of open standards and interfaces for Web services, including Simple Object Access Protocol (SOAP), Web Services Definition Language (WSDL), and Business Process Execution Language (BPEL). An SOA provides the flexibility to treat elements of business processes and the underlying IT infrastructure as secure, standardized components (services) that can be reused and combined to address changing business priorities.[1]

Services at the mobile edge

What services can you build and deploy to accelerate the speed of your business? Services fall into three basic categories: interaction, access, and client management.

Interaction services. Interaction services deal with how an individual interacts with a system; they also provide information in the context of what the user is doing. Interaction services involve the end-user interface and the form factors (i.e., physical size and shape) of mobile device clients. To provide interaction services, you must first evaluate many different types of inputs and outputs, such as messaging/MQ/ECF, HTTP, SOAP/WSDL, EJB, Servlet/JSP, stored procedures, and so forth. For example, browsers can be integrated locally on the client to eliminate the need for server connectivity. Larger devices can use the Eclipse Rich Client Platform

[1] IBM definition of a service-oriented architecture as given by the FAQ section of the Project Sonata announcement April 21, 2004, and referenced in the IBM paper "Service Oriented Architecture Business Value Proposition" ftp://ftp.software.ibm.com/software/websphere/SOA-Business-Value.pdf

while maintaining a consistent user interface with the device windowing system (on Windows and Linux) and facilitating end-user application integration. The Eclipse Rich Client Platform provides a developer environment and tools based on open standards for building and deploying new mobile applications. WebSphere Everyplace products enable a wide variety of end-user interactions to be easily integrated into the system.

Access services. Access services provide the means for connecting information across a wide variety of wireless (WiFi, Broadband GPRS, Cellular) and wire-line networks. The reality is that a mobile device (considered here as a requestor of information) is not always connected. Nevertheless, even though battery life is limited and network connections may be transient, the transaction integrity and data security of the overall system must be maintained. By storing data locally and forwarding it to its destination once a connection is established, you can compensate for battery problems and transient network connectivity. These "data store and forward" techniques are very beneficial when dealing with casually connected mobile devices and mobile workers. Using message-queuing technology to synchronize data once a connection is established maintains the transaction integrity of the overall system. Access services allow a business to maintain real-time access to information on the status of tasks. In this way, the flow of information is not gated by network connection availability; full application functionality is maintained on the system, and the network is leveraged when available, thus decreasing network connection costs. Integrated relational data stores (DB2 Everyplace) and assured messaging systems (MQ Everyplace) provide this functionality in the WebSphere Everyplace products.

Client management services. Once information is flowing in a system, the system has to change and adapt in order to handle changing business processes. Client management services deal with the integration of new sources of information, as well as new uses and users of that information. These services involve the deployment, maintenance, updating, and removal of software throughout the networks; they provide centralized administration to reduce the cost of deployment and maintenance. In the WebSphere Everyplace family of products, the client offering supplies client management services through the embedded Open Management Architecture standard-OSGi services platform.

The tools to get you there

A company faces some unique challenges in setting up reliable and secure access to its business applications from mobile devices and remote systems. Different user groups — such as sales, management, technical services, home office workers, and others — need access to their business applications over different connections using a wide variety of devices. In addition, a mobile environment demands a high degree of flexibility in areas such as data synchronization and casual connectivity; it also demands the ability to adapt to new business needs quickly.

WebSphere Everyplace products create a flexible technology base that you can deploy across a wide variety of platforms and business processes to securely expedite the delivery of information over wire-line, wireless, and cellular networks, moving it from where it is created to people (executives, field force, sales force), places (wherever mobile devices are used, with sensitive or intermittent connectivity), and things (the sources and consumers of information — machines, databases, transactions, and workflow).

The server and client framework of WebSphere Everyplace allows you to:

- Extend existing applications to new users, customers, and partners using your current programming skills.
- Dynamically deploy, update, and maintain software on devices.
- Deploy mobile software that can access enterprise applications whether the device is connected, disconnected, or occasionally connected.
- Use standards-based middleware to connect mobile applications to enterprise applications.

The WebSphere Everyplace family of products contains the following major components:

- **Server** — Java-based platform that supports and manages mobile clients. WebSphere Everyplace Server provides access from the mobile client to enterprise data and middleware and is a complementary extension to your existing WebSphere Application Server and server hardware.
- **Client for Windows and Linux** — extends the WebSphere programming model for Java and Web

services to mobile clients running on Win32-based or Linux-based laptops or desktops. This client provides a better-than-browser experience: i.e., in addition to Web interactions, it offers capabilities for message queuing and DB2 access and synchronization. These capabilities allow mobile software to better integrate all of the functions and information a user needs to access when performing a task.

- **Clients for Mobile Devices** — extends the WebSphere programming model for Java and Web services to mobile devices, such as smart phones and PDAs.
- **Mobile device developer toolkit** — provides an integrated workbench with Eclipse technology, supporting the development of new mobile applications for SOA Web services and Java environments, including Java 2 Enterprise Edition (J2EE), Java 2 Standard Edition (J2SE), and Java 2 Micro Edition (J2ME).
- **Mobile middleware database synchronization components** — includes DB2 Everyplace (DB2e).
- **Mobile middleware for device management** — utilizes technology from Tivoli.
- **Mobile middleware for assured messaging** — includes Message Queuing Everyplace (MQe).

WebSphere Everyplace products complement the WebSphere infrastructure by providing a scaleable, mobile platform for handling transactions and SOA-type requests (in other words, SOAP-based or WSDL-based requests). These mobility products work with IBM WebSphere products (such as Application Server and MQ) to deliver end-to-end functionality, security, and transactional integrity to mobile devices and clients.

With WebSphere Everyplace mobility software products, you can deliver extended services to mobile devices (i.e., laptop systems, desktop systems, PDAs, handheld computers, kiosk systems, smart phones, point-of-sale machines, PC tablets, etc.). These services — for example, database access and message queuing — go beyond basic e-mail and Personal Information Management (PIM) functions. As they are well integrated into the SOA supported by the WebSphere infrastructure, these mobile services enable seamless access to transactional data and applications across networks, even when a connection is intermittent (using data store and forward).

Since WebSphere Everyplace products include a framework for the creation, management and maintenance distribution of device software (applications, middleware, and runtimes) to mobile devices, there is no need to custom-code the middleware for extending applications to mobile devices. Thus, the WebSphere Everyplace mobile platform streamlines the integration of mobile devices into a WebSphere enterprise as viable clients for accessing enterprise middleware.

Conclusion

As a prelude to future articles, this article has provided a foundation for understanding: the types of services most useful for efficiently flowing business information back and forth between your enterprise applications and the people and devices at the mobile edge of your business network; the role of the SOA framework in moving your business to the mobile edge; and the IBM products that provide a platform for building, deploying, and managing those services. Be sure to check the next issue for a deeper exploration of WebSphere Everyplace and SOA.

Jeff Reser has worked in various development, research, strategy, and technical marketing organizations, with an emphasis on Web-enabling technologies and network-computing software. As the WebSphere Application Server product manager, Jeff was instrumental in starting, growing, and evolving the WebSphere portfolio. Jeff has also focused on Web services technologies, IBM Componentization, and IBM's adoption of Open Source development. Currently, Jeff is product manager for the WebSphere Everyplace family of products, dealing with mobile devices and bringing WebSphere technologies to the "edge" of the enterprise.

Angus McIntyre has worked in the IBM Toronto Laboratory for over 20 years, where his mission is to turn technology into products. As product line manager for Workplace Client Technology, his role is to lead the team that delivers IBM's Services Oriented platform to manufacturers of laptop computers, desktop systems, tablet computers, PDAs, smart phones, and other embedded devices. His vision encompasses the transactional integrity and data security that are needed for devices to become part of a network where information flows from where it is created to where it is needed.

