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BY NELL GAWOR PAGE 16

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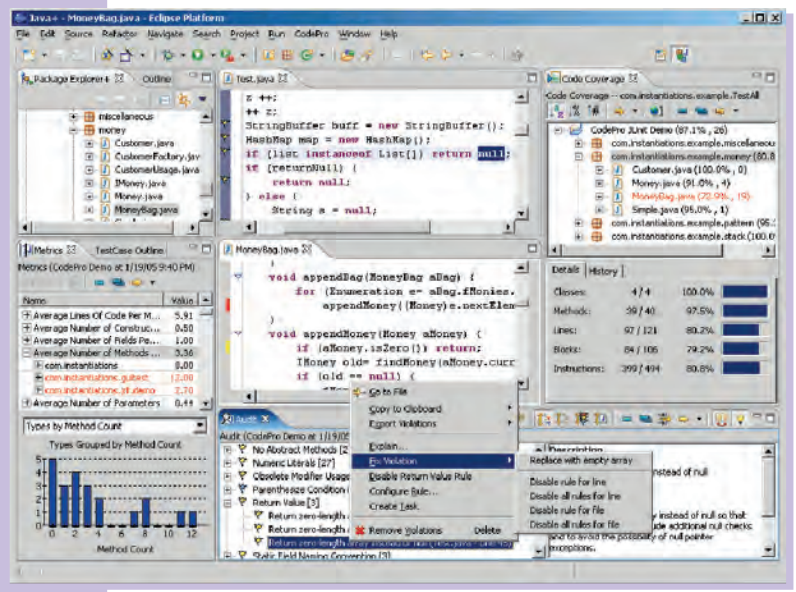

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More About SOA

BY ROGER STRUKHOFF

This issue has an emphasis on SOA, an area of application development that has gotten a life of its own over the past year. Service-oriented architectures are not only the rage of the age, but represent an approach sure to be on the front burner of enterprise IT managers and developers for many years to come.

An essential idea behind SOA is the idea that applications should support the requirements of users. This may look blindingly obvious, but is actually a subtle point that relates to still-burgeoning web usage by users as well as the ubiquity of distributed computing networks within organizations of all sizes.

The web services involved in creating a SOA—such as those offered by WebSphere—are loosely coupled and (in theory) highly interoperable. They reflect the idea that users are in control and need their data and interactivity now, and that usage may not be always predictable for every app within the enterprise.

Yet these loosely coupled applications need to be far more than simply interoperable. They need to present as unified a meta-interface as possible to users, whatever latency there is in the system needs to be consistently latent, and moving away from point-to-poiont application development should not mean even a slightly degraded user experience with any particular application.Since SOA is not a product, but rather a methodology, framework, or approach, it's easy for companies to jump on the SOA bandwagon and tout why one particular app development environment is superior to another. Many apples-to-oranges and apples-to-banquets comparisons occur.

Whether you are coming at things from, say, the XML or SOAP angle, from a higher-level workflow and business process angle, or from the very-high-level view of IT in the enterprise and its impact on revenue, growth, productivity, etc., the "TAO of SOA" must never stray from age-old concerns such as reliability, availability, and scalability.

Add in the severe compliance requirements of the age, plus increasing concerns about any manner of data integrity and security problems, and it is clear that development of a SOA strategy is in many ways no different than application development strategy has been over the past 40 years.

IBM has seized and maintained industry leadership in the web services application development space, and proudly notes this every time a new report from Gartner is published. Yet it faces challenges that will not abate. One of its prime competitors is touting a "blended" strategy that differentiates app development requirements by specific application rather than enterprise size. The company's blend is between open-source and what it calls "commercial" technology, as it distances itself from the dreaded word "proprietary." Another says it gradates its framework to accommodate needs throughout any size organization.

And speaking of open source, the threat from open source developers cannot be trivialized. Although it seems that organizations of a certain size, or applications of a certain criticality, seemingly need to be based on a relatively massive environment such as WebSphere, it behooves the market leaders to continue to point out exactly where their technology is most valued, and not only why they think it is valued.

Even though everyone likes to hear about streamlining, efficiency, even simplicity, SOA is not something that necessarily makes things simpler for developers or IT organizations. To dig down into the guts of the thing is to face new learning curves, new required skillsets, and to always remember that the end-user doesn't care if it's a SOA or a boa.

The system simply needs to work—quickly, consistently, and effectively. We hope this issue of WebSphere Journal enables WebSphere developers at least a little in their quests.

ABOUT THE AUTHOR

Roger Strukhoff, editor-in-chief of *WebSphere Journal*, is West Coast Bureau Chief for the SYS-CON News Desk, and President of www.wdva.com. He spent 15 years with Miller Freeman Publications and The International Data Group (IDG), then co-founded CoverOne Media, a custom publishing agency that he sold in 2004. His work has won awards from the American Business Media, Western Press Association, Illinois Press Association, and the Magazine Publishers' Association. Read his blog at http://www.rssblog.linuxworld.com.
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135 Chestnut Ridge Road, Montvale, NJ 07645
Telephone: 201 802-3000 Fax: 201 782-9637
SUBSCRIBE@SYS-CON.COM
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New Insights from a New IBM Press Book

SOA Project Planning Aspects

BY NORBERT BIEBERSTEIN, SANJAY BOSE, MARC FIAMMANTE, KEITH JONES, RAWN SHAH

"This article is excerpted from Chapter 4 of the book, Service-Oriented Architecture Compass: Business Value, Planning and Enterprise Roadmap, authored by Norbert Bieberstein, Sanjay Bose, Marc Fiammante, Keith Jones, and Rawn Shah, ISBN 0-13-187002-5, published by IBM Press in November, 2005. To learn more about this book, please visit: www.ibmpressbooks.com.

"Adventure is just bad planning."
– Roald Amundsen

ABOUT THE AUTHORS

Norbert Bieberstein, solution architect for IBM's Enterprise Integration team, has extensive first-hand experience with customers migrating to SOA-based On-Demand solutions.

Sanjay Bose, Design Center Leader for IBM's Enterprise Integration team, specializes in SOA, Enterprise Service Bus, Web services, J2EE, and e-business technologies.

Marc Fiammante, IBM Distinguished Engineer, was elected to the IBM Academy of Technology in 2003. He is chief architect of IBM's European, Middle East Africa, and Asia-Pacific Enterprise Integration Solutions team.

Keith Jones, PhD, IT architect at IBM Enterprise Integration Solutions, focuses on helping customers define and implement service-oriented architectures.

Rawn Shah, Community Editor and former SOA and Web services Zone Editor for IBM developerWorks, has written 280+ articles for publications ranging from CNN.com to JavaWorld.

The architectural consideration of SOA in the preceding chapter offers advice on what directions to choose and how to define the strategic goals for an SOA project. This chapter takes the next step toward execution by focusing on how to plan an SOA project. The topics in this chapter constitute the best practices we have uncovered for forming a project office (see Section 4.1), how to define the phases of SOA adoption, the need for and mechanisms of SOA governance, and finally, the various project roles and how they interact with each other.

This is not intended to be a complete template for a project plan, nor do we intend to show the optimal organizational structure for the parties involved in SOA projects. Based on our vigorous experience with different clients in various industries around the world, we are fully aware that there is no one-size-fits-all solution, nor is there a perfect approach to building an SOA for any scenario. An organization's specific circumstances will dictate its individual needs for project structure and plans. This chapter simply proposes ideas that you can adapt based on your scenario.

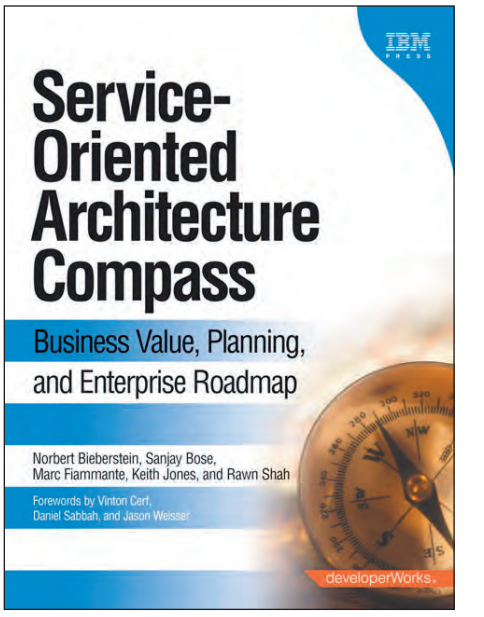
The first step is to establish the project office.

4.1 Organizing Your SOA Project Office

As seen in the preceding chapters, SOA implies a greater focus on business value. Business models are described as modular processes. This is achieved by breaking down the business and respective IT systems into components, providing reusability and modularity. Componentization, in this context, applies not just to software systems, but also to the business units across the enterprise and the organization of the enterprise in question. Implementing an SOA project involves not just a consideration of how the project is implemented in an IT infrastructure setting, but in the end, it also results in a business transformation process across the whole enterprise.

To accomplish your project, you first need a roadmap to guide the strategy for your SOA adoption. To build your SOA adoption roadmap, you need to identify who is involved in the SOA project. These individuals should come from the contributing cross-business-unit teams. The actual teams you involve will depend on the level of SOA adoption you choose (see Section 4.2). Depending on business value analysis and the consequent prioritization of business objectives and services, the team defines "what to do," "how to do it," "who should do it," and "how success is measured." The SOA project team creates the rules, processes, metrics, and organizational structures needed for effective planning, decision-making, steering, and controlling the SOA endeavors. They define the common business service model, the common core processes and business components involved in the SOA project, and the core set of assets that they will use.

Building a suitable team for an SOA proj-



ect requires a careful avoidance of making radical changes to existing team strategies because such changes can unduly disrupt the culture in the workplace. However, at the same time, the teams need to align with the SOA goals, which usually cut across business units. In addition, the SOA project might need to adopt a management structure – especially at larger IT shops with substantial project goals – to manage the development processes for implementing components or to expose existing applications or legacy functions in terms of the appropriate service granularity.

Achieving the right organizational structure is one of the critical challenges in implementing SOA. At organizations new to SOA, one often encounters strong resistance to change that keeps the focus on short-term successes rather than directing appropriate business transformation to align with the business challenges.

Mature SOA organizations, on the other hand, span business lines and the boundaries of roles while achieving interdisciplinary coordination. However, starting small can help to mitigate risk by allowing you to choose a well-scoped and focused services-integration project that has a modest plan for organizational evolution. A cross-unit, organization structure can address all the aspects of the SOA. Based on our experience, this structure should include the following:

- ***SOA business transformation architecture council:*** This team is in charge of gathering the business requirements, performing business domain analysis and process engineering analysis, and identifying the necessary business components, services, and process modules. Instead of following a strict top-down approach, the council should use a mixed approach in blending top-down, bottom-up, and goal-based methods to ensure appropriate services identification. In particular, this team ensures that the exposed granularity of the defined services matches the business requirements and specifications – matching business components to IT components as services. More details on granularity issues and associated services layers are described in Chapter 5, "Aspects of Analysis and Design."
- ***SOA technical architecture board:*** This team ensures the alignment of business and IT, following industry and enterprise standards, and technically ensures that exposed services match the requirements for evolution and reusability as defined in the general guidelines for the enterprise IT development. Its members are well versed in emerging industry trends, state-of-the-art technologies, and standardization efforts. They are responsible for framing the technical enterprise architecture blueprints (the master IT plan for the enterprise), identifying niche architecture patterns, and promoting reusability principles. They work closely with the SOA transformation team.
- ***Component design and development centers:*** These are the usual IT teams. They provide design and development of the components and processes, along with new skills such as business process modeling (see Chapter 5). This team delivers a solution design outline, high- and low-level design abstractions, service-oriented analysis and design (the essential aspects of which are described in Chapter 5), and various test phases such as unit, integration, system, and acceptance tests.
- ***Operations center:*** Finally, there is a production team in charge of the services components operational aspects. These aspects include managing quality of service, enforcing business and service-level agreements, managing the security context, charging back services, and assuring revenue. The team is responsible for rolling out the service, performing regular maintenance, and providing overall system management.

This model for organizing teams is derived and distilled from our experience in projects at midsize to larger enterprises. Often, depending on the maturity level of the IT organization, existing installations can be redefined or transformed to support the SOA projects. After these teams have been identified, you can proceed to creating your adoption roadmap.

Based on their definitions and the associated expert knowledge, each team has a certain scope of decision-making. Depending on the size of the enterprise, the scope, the reach of the project, and the institutionalized IT governance structures, the individuals assigned to the teams can vary. Section 4.3 further explains the need for SOA governance.

4.2 SOA Adoption Roadmap

An SOA strategy should not be a big-bang replacement of an existing IT environment; rather, it should be a progressive and evolutionary roadmap. Often an overall replacement is impossible when the majority of people in the IT organization are busy maintaining the running systems. Therefore, the roadmap should reflect an iterative process.

An enterprise has several options for entry points into a service-oriented architecture. These options identify how much the SOA model penetrates into the business and defines levels of adoption. The options are as follows:

- ***Initial adoption:*** Enterprises that want to reduce risks initially go through a technology validation and a readiness assessment that analyze the technical and business impact in a defined scope. Eventually, the business and technical value realized from this scope can be extrapolated to actual implications for the organization; this usually translates into a deeper commitment to move to SOA. It involves early pilot tests consisting of creating and exposing services from business operations contained in new or existing applications. These tests are used for an early validation of several decision points such as the following:
  - The capability to transform existing legacy systems. This might include technical solutions such as messaging, adapters, and connectors, or it might lead to partnership with vendors that can provide products for a service-oriented integration.
  - The nonfunctional requirements capabilities such as performance, security, manageability, and the availability of tooling.
  - The organizational structure required to support an evolution of the enterprise, especially one that addresses skills gaps and institutes governance structures.

- Line-of-business adoption: At this level,

the enterprise will identify a line of business and prioritize processes where the agility and flexibility that SOA offers will increase business value. Of course, the enterprise might have already defined these priorities or have a critical business issue to resolve. In these cases, you still need to assess the SOA applicability to solve the important issue. This involves a broader initial assessment phase and the identification of key metrics and critical success factors.

- Enterprise adoption: This level of adoption involves the construction of a business view of a service-oriented enterprise, with a complete prioritization of projects based on business value followed by the architecture and implementation phases. You need to categorize enterprise activities into separate business domains and components that constitute the enterprise. This categorization might already exist within an enterprise or an industry model (for example, the telecommunication eTom model from the TeleManagement forum) that has already-established categories. At this stage, you should establish an SOA governance council with the required empowerment to monitor, define, and authorize changes to services within the enterprise.
- Enterprise-and-partner-network adoption: At this level, there is a broad transformation of existing business models or the deployment of new business models involving not only the enterprise, but also its business partners, suppliers, or customers. The enterprise can then select the roles that are appropriate for delivering its value, becoming a service provider, consumer, broker, aggregator, matchmaker, or any combination of those roles.

For each of the prioritized business services and components, the roadmap follows the typical phases of IT project development, with inception, elaboration, implementation, and test and production phases, as typified in the Rational Unified Process[tm]. However, each of these phases includes new activities that relate to the service component identification and realization. Figure 4.1 depicts an overall view of a roadmap, looking at the adoption stages and corresponding activities. This diagram is not exhaustive but gives an indication of potential steps you can follow (see Figure 1).

4.3 The Need for SOA Governance

Enterprises using SOA can adapt to target broader connectivity and increased revenues; on the other hand, doing so requires restructuring applications for greater flexibility and lower costs. This requires the alignment of the business and IT value chain, as described in Chapter 2, "Explaining the Business Value of SOA." With this evolution, the enterprise will also need to adapt the way the business and IT units interlock and define a new way of reflecting business requirements in terms of IT applications. For this reason, organizational governance plays a more prominent role than before. The following sections provide guidance on establishing key governance functions for operating an SOA.

4.3.1 SOA Governance Motivation and Objectives

The business operations and the underlying IT infrastructure in an organization must react very quickly to rapidly respond to new business opportunities. Business units have to prioritize new IT services that have to be designed and managed as part of highly integrated and complex enterprise architecture. To achieve this, we discuss in the following sections a set of key governance functions for a successful SOA roadmap.

Governance provides an overarching structure to prioritize and then support the enterprise business objectives on a strategic, functional, and operational level. The governance model defines "what to do," "how to do it," "who should do it," and "how it should be measured." It defines the rules, processes, metrics, and organizational constructs needed for effective planning, decision-making, steering, and control of the SOA engagement to meet the enterprise business needs and challenging targets. As previously indicated, the SOA project team is responsible for creating this governance model.

The following are key questions that can help define the appropriate governance structure:

- What business change does the enterprise expect from SOA? Is it a better use of its existing infrastructure at lower costs, does it target new business and interaction models, or does it target both?
- Which roles, responsibilities, structures, and procedures exist to allow business prioritization and IT funding, planning, steering, and decision making?
- How can you develop skills and leadership competency?
- Which principles and guidelines are

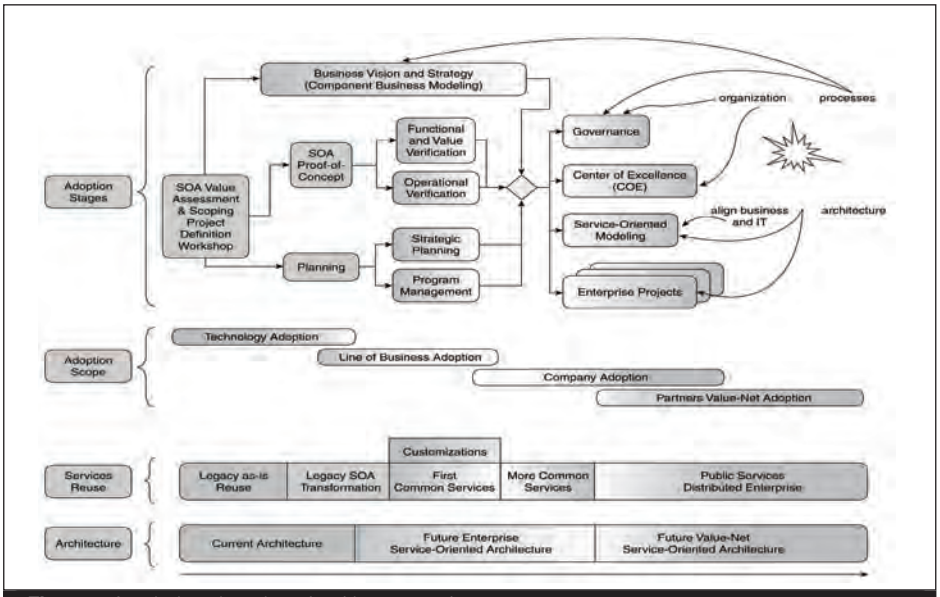
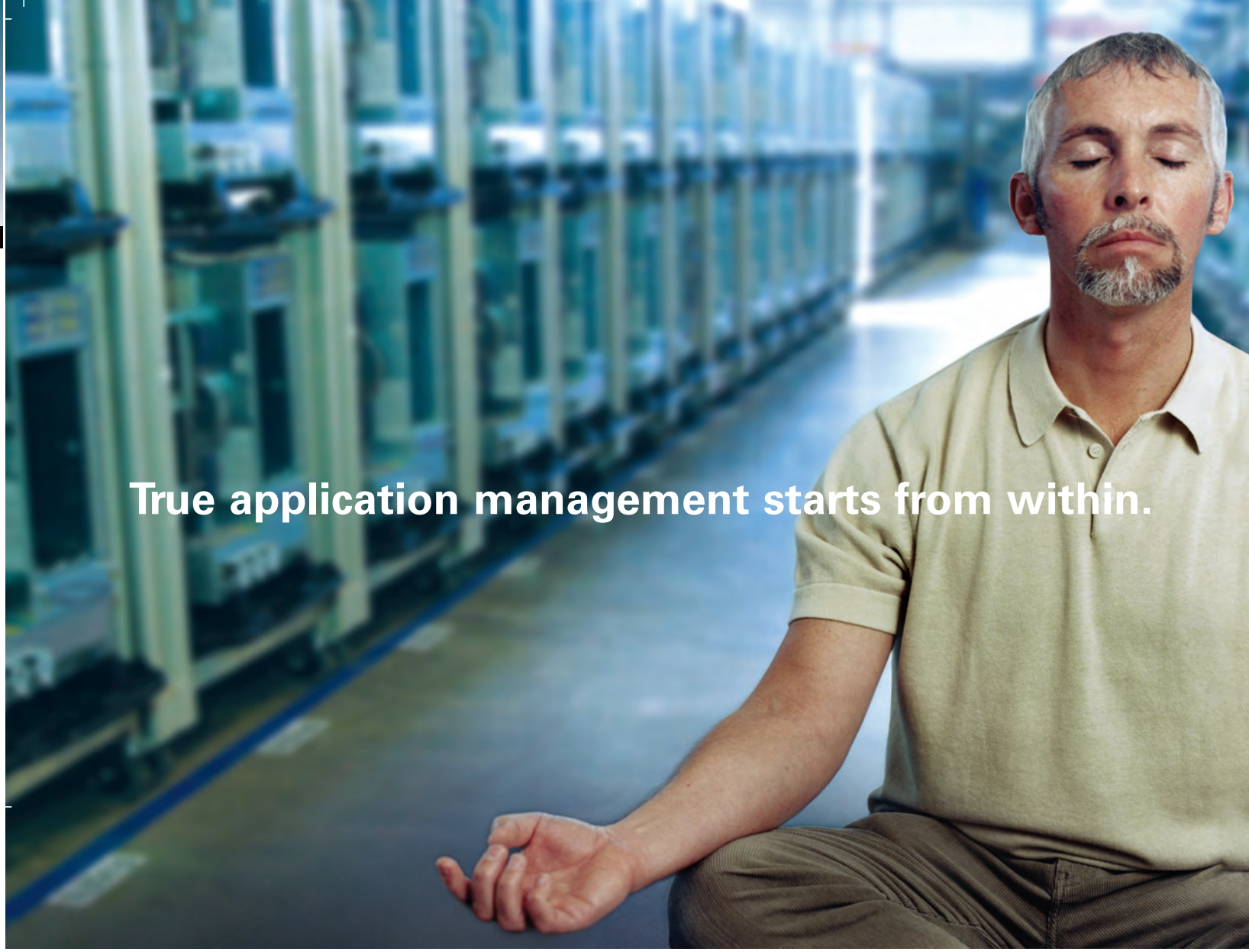


Figure 1: A typical service-oriented architecture roadmap



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necessary to optimize the alignment of business and IT?
- What is the appropriate way to structure the business-to-IT relationship while keeping consistency and flexibility to allow the organization to quickly adapt to new changes?
- What is the appropriate level of standardization of services, the service definition, and the description?
- How do you control and measure services and service providers? What key business performance indicators do you need to monitor? Who should monitor, define, and authorize changes to existing services?
- How do you decide on a sourcing strategy for services?

We believe that an accepted and formalized governance model is crucial to successfully achieve business objectives, so we will define important governance functions in the following sections. For fast and high-level acceptance, it is essential to start from the existing enterprise structure and adapt it to the SOA roadmap.

To provide architectural governance, you need an organizational structure to help identify all necessary roles and responsibilities. Based on our experience, it is quite useful to establish an SOA center of excellence (COE) to control the SOA roadmap and to support large and complex projects. The COE is responsible for keeping the SOA-based implementation aligned with the business requirements on a strategic, tactical, and operational level. It requires authority over technical artifacts such as architecture blueprints, enterprise templates, and design assets.

4.3.2 An SOA Governance Model

In her IBM developerWorks article, Yvonne Balzer describes an SOA governance model on which we based our considerations. SOA governance is an evolution of the ideas of IT governance, introducing a greater business involvement in supporting IT service components. There are different definitions of IT governance, but the IT Governance Institute's definition gives a good general overview:

The IT Governance Institute's Definition of IT Governance

IT governance is the responsibility of the board of directors and executive management. It is an integral part of enterprise governance and consists of the leadership and organizational structures and processes to ensure that the organization's IT sustains and extends its strategies and objectives.

The purpose of IT governance is to direct IT endeavors to ensure that IT performance meets the business objectives so that the following occurs:
- IT alignment with the enterprise results in the promised benefits being realized.
- IT enables the enterprise so that opportunities are exploited and benefits are maximized.
- IT resources are used responsibly.
- IT-related risks are managed appropriately.

SOA governance incorporates the control of the enterprise model as a set of standardized modular business components and processes, and the prioritization of those based on business value. In summary, the SOA governance model is a combination of organizational structure, joint processes, and relationships that are based on accepted ground rules called governance principles and the strategic direction.

4.3.3 Strategic Direction and SOA Governance Principles

To sustain the focus on business needs, it is essential to define the strategic direction for developing an SOA. Both business and IT units need a common understanding of the business strategy and objectives. Governance principles and guidelines form the fundamental basis for any decisions. They shape the solution area and define how business and IT units collaborate. Everyone involved should carefully understand and agree upon these principles, from executive management to individual project personnel.

According to E.G. Nadhan in his EDS Solutions Consulting position paper of April 2003, "SOA Implementation Challenges," there are two main governance approaches:
- Central governance is optimized for the enterprise. The governance council has representation from each business domain and from technology subject matter experts. The central governance council reviews the addition or removal of services, as well as changes to existing services, before authorizing their implementations.
- Distributed governance is optimized for the distributed teams. Each business unit has control over how it provides the services within its own organization. This requires a functional service domain approach. A central committee can provide guidelines and standards.

Each guiding principle should be defined with a rationale explaining the business reasons and implications. The specific principles for architecture design or service definition, for example, can be derived from these guiding principles. In addition, a common understanding of a structured approach from business to IT is fundamental for defining the architecture. You will find different methodic approaches such as process orientation, business functions, or even component modeling like IBM's Component Business Model approach.

4.3.4 Empowerment and Funding

The move to SOA is a paradigm shift driven by the need for more flexible business models, greater integration, and a stronger business and IT alignment. This evolution might face resistance within an organization, which can turn it into just a simpler result of implementing Web services on a small scale rather than a move toward the benefits of a true SOA. In truth, a successful SOA project can happen only with the strong support of senior executives, identified funding, and proper empowerment of the SOA governance body.

One of the pitfalls is the institution of a rubber-stamp governance body or one that has a mere consultative role and cannot enforce its recommendations. At the end of the day, the governance body needs to have proper practical control of project funding.

Rule of Thumb:

The governance body needs to have proper practical control of project funding.

4.3.5 Managing the Risk of an SOA Roadmap

When embarking on an SOA roadmap, the first action of the governance body should be to develop an initial readiness

and risk assessment. The governance body should then periodically update this assessment during the development lifecycle. Figure 4.2, an example of this assessment, shows important aspects and criteria that need to be taken into account. The scale values and the specific criteria can be chosen based on the situation of the individual project. The goal of this assessment is to identify the business, organizational, and technical gaps and roadblocks between the current state of the enterprise and a future service-oriented business model. (See Figure 2)

This kind of assessment should balance the vision of the SOA-based solutions with the delivery capabilities of the IT department and should help establish a specific business case for the SOA for the organization. It includes both an evaluation of business readiness and one of IT readiness. It requires customer and partner understanding and determines if changes to the client's or partner's needs can be mapped to existing products or applications in a service-oriented fashion.

The assessment then suggests possible action plans, with focus on improving the less mature aspects of the enterprise relative to the SOA. As before, these improvements to develop the SOA should be executed in well-planned, incremental projects.

4.3.6 SOA Governance Processes

Governance processes are those needed for strategic business and IT planning and steering – for example, strategy development, IT technical planning, portfolio management, sourcing, innovation management, and architecture management. Any IT organization also needs processes that provide control. Depending on the size of the organization, these processes should be implemented at the appropriate level matching the size, from individuals to teams to departments or even larger. The following types of processes are essential for successful SOA adoption.

A business component identification and prioritization process:

- Defines a structured approach to model, identify, and prioritize business processes and services components
- Provides formal definition of the business goals and key performance indicators that can be delivered by the architecture and implementation

A business exception fallback process:

- Business process models can rarely be exhaustive. No one can preview each and every possibility that can happen in an enterprise. Therefore, there must be rules for exception handling that are set up and agreed to.
- This ensures that the concrete SOA solution architecture has to incorporate entry points that enable certain users or processes to bypass the normal, formalized processes and process exceptions. In a way, this gives another degree of flexibility for ad-hoc business process changes.

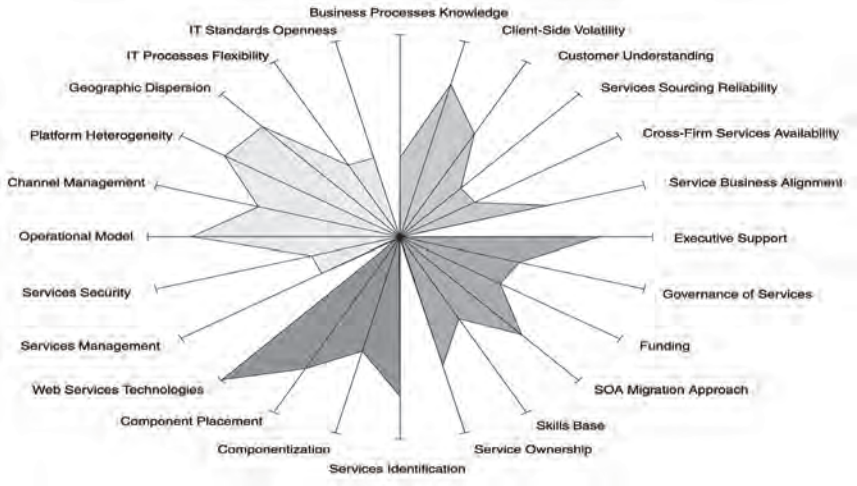

Figure 2: An SOA readiness and risk factor assessment1

An architecture review and approval process:

- Defines a structured approach to review and approve changes to the existing SOA and to make decisions in accordance with the governance guidelines.
- Formal design and service evaluation reviews are key control points of SOA development for the installed governance units.

An architecture exception and appeals process:

- Provides means to appeal architectural decisions
- Allows exceptions to the SOA architecture to meet unique business needs

An architecture vitality process:

- Ensures that the SOA is maintained and communicated as new services are incorporated into the architecture.
- Variances to the architecture are documented and communicated.

An architecture communication process:

- Ensures that the SOA is available to all who need access
- Promotes the understanding of the importance of the SOA

Having outlined the process we now describe how to launch a governance model in practice.

4.3.7 Launching the Governance Model

The process we use to develop a governance model is a three-phased approach (see Figure 4.3). This governance launch model was adopted from Yvonne Balzer's developerWorks article "Improve your SOA project plans" and enhanced by the authors. The approach is based on time-constrained SOA engagements. The key to success is to begin to establish the governance functions from day one. To speed up this operation, you can launch the governance model in the following three steps:

Step 1: Operationalize

- Set the governance core functions in place, integrated with the enterprise's business operations.
- Perform the initial SOA assessment.
- Learn and adjust by doing by experiences and available assets, delivering quick results.

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- This phase will need experienced practitioners.
- Define the next steps.

Step 2: Professionalize (Automate)

- Build up the necessary structures, processes, methods, and tools.
- Adapt experiences from the operational step.
- Initialize the service-oriented modeling and architecture practice.
- Gather experienced architects and method practitioners.

Step 3: Stabilize

- Teach and train the personnel to run the operation.
- Change from operations mode to coaching mode.
- Need to nurture coaching expertise. (See Figure 3)

4.3.8 Hints and Tips for Success

Even with strong governance, in the real world there are many roadblocks that prevent this type of evolution; thus, it is essential to build on solid ground. The following are some practical lessons we have learned from engagements:

- Set up rules and roles (discussed in Section 4.5) to organize and project-manage the SOA endeavor.
- Communicate regularly. SOA also involves corporate cultural change; therefore, to hurdle barriers, communication is critical, especially between lines of business and technology teams.
- Document each decision, constraint, and assumption to ensure transparency in decision-making and departmental buy-in.
- Define key deliverables and necessary toolsets or templates. These deliverables need to be readable by a variety of parties in the enterprise.
- Set up pragmatic tools for lifecycle management and versioning. Particularly see the discussion on long-lived business processes in Section 4.4.
- Assign a weight factor to each decision and then document and communicate those decisions and their weights.
- Continue to keep a strong sponsorship by all stakeholders and the buy-in of decision-makers.

4.4 SOA Technical Governance

With SOA, you can expect that business process cycles will be different from vendor product cycles. As a result, it is inevitable that, in the case of long-running or long-lived processes, you will need to support scenarios in which different versions of a business process exist concurrently on a changing infrastructure. Managing this challenge has implications throughout the project development lifecycle, not just for the runtime but also for the tools and methods used to define business processes within an enterprise.

You can manage the challenge of the dichotomy between business process cycles and product cycle by doing the following:

- Reducing the impact of changes by modularization
- Achieving middleware independence by defining the explicit process state
- Monitoring and handling business exceptions

Each of these topics is discussed in the following sections.

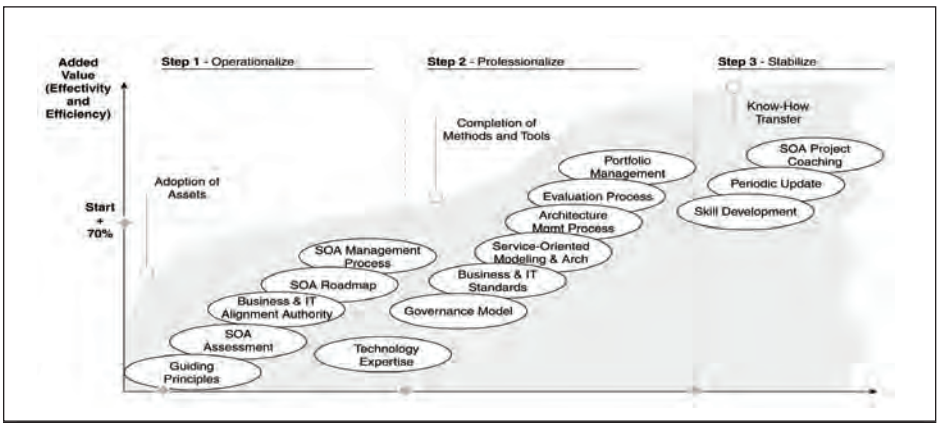


Figure 3: Launching the governance model (adapted from " " Yvonne Balzer)

4.4.1 Reducing Impact by Modularization

Just as services can have different levels of granularity and permutations in the enterprise, processes also can have such granularity. This granularity appears when processes are designed as a composition of individual process modules. Each module offers a service interface and manages its own particular state internally. It then becomes much easier to change parts of the processes by developing new process modules that are selected from existing services using policies.

4.4.2 Achieving Middleware Independence with Explicit Process State

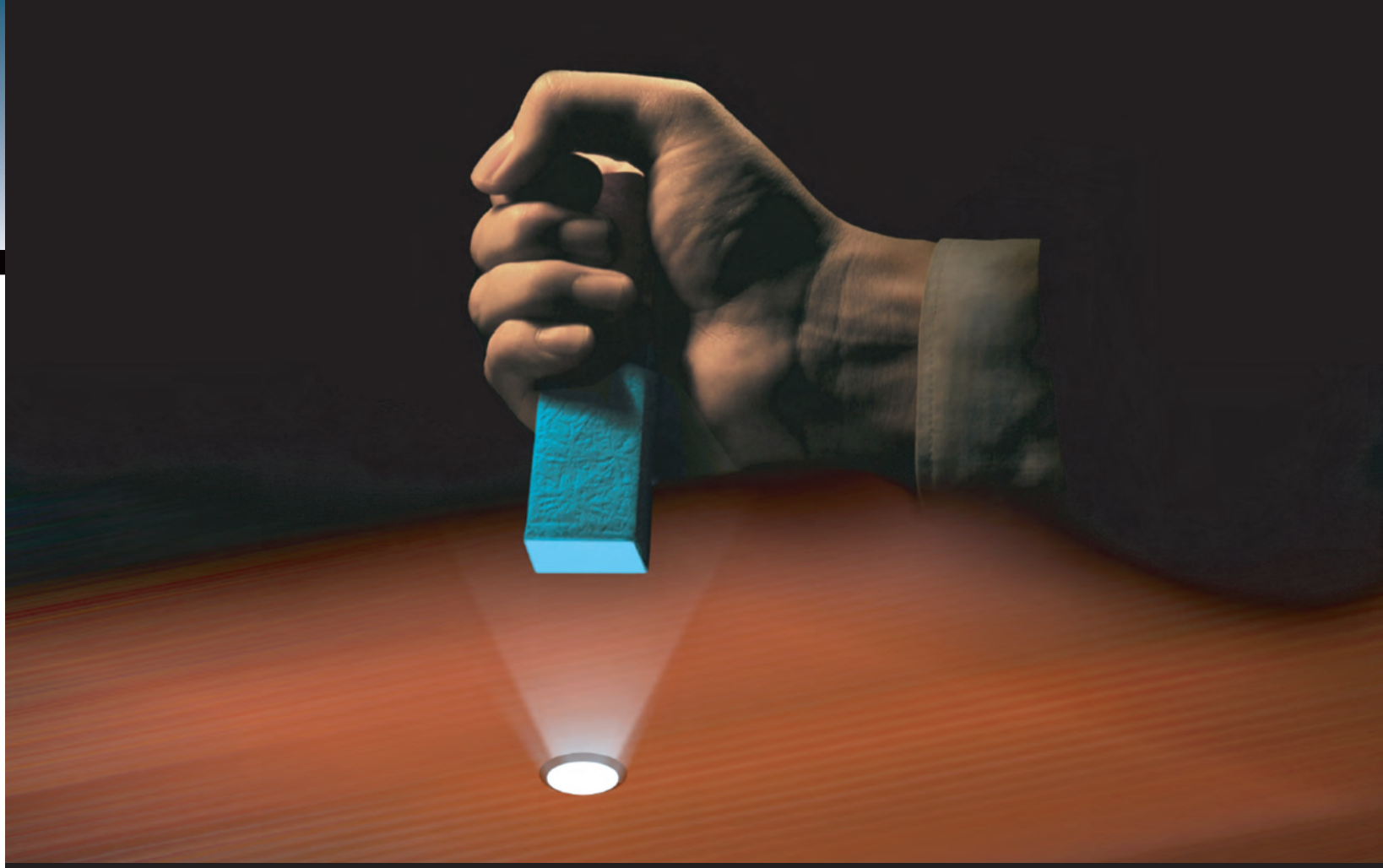
Current business process middleware engines maintain their process state internally. This dependency ties the process instances to the particular middleware engine, sometimes even to a particular version of the middleware. To avoid this, business process designers should elevate the explicit state beyond the engine level at each process step that leads to a waiting state until an external event arrives.

Thus, there is a need to be able to maintain and communicate state as distributed across the SOA. One particular programming model support for capturing these state descriptions is the set of specifications included in the WS-Resource Framework (as published on IBM developerWorks).These specifications allow the programmer to declare and implement the association between a Web service (a process module) and one or more identified, data-typed state components called WS-Resources.

• • •

Please refer to this recently-published IBM Systems Journal article titled: "Impact of service-oriented architecture on enterprise systems, organizational structures, and individuals."

The paper is available here: www.research.ibm.com/journal/sj/444/bieberstein.html



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Migrate Applications from WAS Community Edition to Other WAS Products

How to Migrate to Other WebSphere Application Server Products

Part One

Walk through the process of migrating a complex sample application from IBM WebSphere Application Server Community Edition to IBM WebSphere Application Server Base using IBM Rational Application Developer. Involving JSPs, servlets, EJBs, messaging, and database access, this exercise will help you migrate your own applications, and address issues that can often cause problems during application migrations.

BY NELL GAWOR

This article was first published on developerWorks WebSphere at www.ibm.com/developerWorks/websphere.

As business objectives and application complexity grow, users of IBM's WebSphere Application Server Community Edition may wish to take advantage of the advanced features and operational benefits available in other WebSphere Application Server products by migrating their J2EE™ applications to either:

- WebSphere Application Server (Base product)
- WebSphere Application Server - Express
- WebSphere Application Server Network Deployment

Principles and plans for migrating from WebSphere Application Server Community Edition to other WebSphere Application Server products are discussed in Shyam Nagarajan's migration article, as well as an abundance of information you need to know about migrating any applications before you begin to do so. This article takes several steps further by walking you through the process of migrating a sample application from WebSphere Application Server Community Edition to WebSphere Application Server Base, detailing each step so you can apply the process to the migration of your own applications.

The Sample Application

The application we will refer to in this article is the **DayTrader** application, a sample application that was contributed to the Apache Geronimo project by IBM to be used for functional and performance testing. The application is also part of the set of samples available for WebSphere Application Server Community Edition, and is included in the product download files.

DayTrader focuses on stock portfolio management. Before logging in, the user can view general state-of-the-market information. After logging in, more information is available about the user's specific stock portfolio. The user can buy and sell stocks, get additional quotes, and so on. Information on buy/sell order status and changes to stock prices is transmitted using the Java™ Messaging Service (JMS). User and portfolio information is stored in a database and retrieved either via JDBC or Enterprise

ABOUT THE AUTHOR

Nell Gawor is an advisory software engineer for IBM in Research Triangle Park, North Carolina, in the Software Group System House Advanced Technology Group. She received a Masters Degree in Computer Science from the University of Illinois at Urbana-Champaign. She can be reached at ngawor@us.ibm.com.

JavaBeans (EJB). Because DayTrader was designed primarily as a performance testing application, the configuration page provides flexibility by enabling you to change parameters that affect how the application runs, such as how data is retrieved from the database, whether JMS calls should be synchronous or asynchronous, and so on.

DayTrader is ideal for the purpose of our migration walkthrough since it exercises most areas of J2EE functionality: Java ServerPages (JSP), servlets, and EJB components, as well as messaging via the JMS, and database access with JDBC. The focus of this article is on the migration of the DayTrader sample to WebSphere Application Server Base. If you need more information about the sample application, the README file included with the application will help you get started deploying DayTrader on WebSphere Application Server Community Edition.

Migration overviewThe process of migrating the DayTrader application consists of the following steps:

1. Install prerequisite software
2. Migrate the database
3. Import the application into the IDE
4. Fix application dependencies
5. Fix JMS message destination links
6. Create needed resources
7. Create meet-in-the-middle mappings (optional)
8. Deploy the application
9. Run the application

This article assumes you are familiar with WebSphere Application Server Community Edition and how the DayTrader application operates on it. For the remainder of this article, *Community Edition* will be used to refer to WebSphere Application Server Community Edition, and *WebSphere Application Server* will be used to refer to WebSphere Application Server Base.

1. Install prerequisite software

To migrate the DayTrader application, you must install the following software:

- IBM Rational Application Developer for WebSphere Software v6, with the WebSphere Application Server v6 Test Environment
- IBM DB2 Universal Database 8.2Documentation to help you install these products is available in the appropriate Information Center (see Resources).

2. Migrate the Database

The DayTrader application running on Community Edition uses an Apache Derby database. Although WebSphere Application Server also works with Derby, DayTrader uses a Derby database that runs within Community Edition itself. Therefore, this is a good time to not only migrate the application to WebSphere Application Server, but also to move the database onto DB2. Since detailed coverage of database migration is beyond the scope of this article -- and since we do not really need the contents of the database (DayTrader's data is repopulated dynamically) -- we will simply recreate the database on DB2 rather than migrating it from Derby:

1. Download the Table.ddl from the download ZIP file included with this article.
2. Open a DB2 command shell (db2cmd) and navigate to the directory that contains Table.ddl.
3. Run the commands in Listing 1 to create the database.

Listing 1: Commands to create the trade database

```
db2 create db tradedb
db2 connect to tradedb
db2 -tvf Table.ddl
db2 disconnect all
```

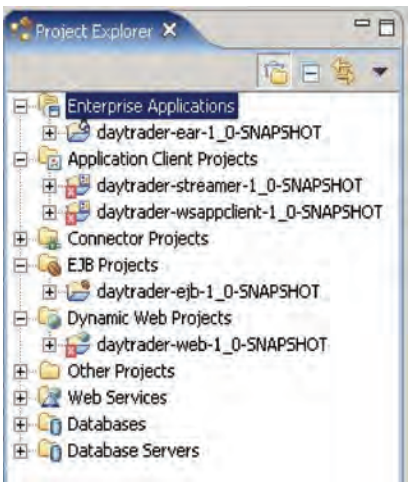

Figure 1: The Project Explorer showing the imported project

3. Import the Application into the IDE

We will work with the application using IBM Rational Application Developer, an Eclipse-based integrated development environment (IDE):

1. To obtain the DayTrader application, download the wasce10_samples.zip file from the WebSphere Application Server Community Edition product files, then unzip it to a known location. The daytrader-ear-1.0-SNAPSHOT.ear file is located in samples/daytrader/bin/ directory.
2. Open Rational Application Developer and select File => Import... => EAR file, then Next. If you are asked whether to enable Base J2EE Support, answer Yes.
3. For EAR file, enter the path to daytrader-ear-1.0-SNAPSHOT.ear, then selectFinish.
4. Switch to the J2EE Perspective.
5. When the application has finished building, expand the Application Client Projects, EJB Projects, and Dynamic Web Projects folders in the Project Explorer (Figure 1) to see the four modules that make up the application:
   - Two application clients: daytrader-streamer-1_0-SNAPSHOT, daytrader-wsappclient-1_0-SNAPSHOT
   - One EJB project: daytrader-ejb-1_0-SNAPSHOT
   - One dynamic Web project: daytrader-web-1_0-SNAPSHOT.

These are the modules that appear in the application.xml descriptor of the DayTrader application. (For our demonstration purposes, we will migrate one application client, the streamer client, since the process will be similar for both.)

Next, we will need to address the errors that appear under the **Problems** tab.

4. Application Dependencies

Many of the errors listed under the Problems tab are due to classes not being found by the daytrader-web-1_0-SNAPSHOT Web module. This is because the Web module depends on classes from the daytrader-ejb-1_0-SNAPSHOT EJB module, but it neither includes those classes nor has a manifest classpath dependency on them. To fix these errors, we need

to add a dependency on the EJB module from the Web module:

1. Under Dynamic Web Projects in the Project Explorer (Figure 1), expand the daytrader-web-1_0-SNAPSHOT project.
2. Right-click on the deployment descriptor, TradeWeb, and select Open With => JAR Dependency Editor.
3. In the Dependencies section, check the box next to daytrader-ejb-1.0-SNAPSHOT.jar and then save the file.

Many of the errors should now be eliminated since the Web module can now find the classes it requires. The DayTrader application is now properly structured to run on WebSphere Application Server.

5. Fix JMS message destination links The next error you should see in **Problems** is:

```
Message destination link 'TradeStreamerTopic' for
message destination ref 'jms/TradeStreamerTopic'
is unresolvable in module 'daytrader-streamer-1_0-
SNAPSHOT.jar' and EAR 'dayTrader'
```

To address this error:

1. Right-click on the daytrader-streamer-1_0-SNAPSHOT.jar deployment descriptor and select Open With => Deployment Descriptor Editor.
2. On the References tab, and click Message-DestRef jms/TradeStreamerTopic.
3. Notice that the Link field on the right points to TradeStreamerTopic. The problem is that TradeStreamerTopic is actually a message destination within the daytrader-ejb-1_0-SNAPSHOT module, not the daytrader-streamer-1_0-SNAPSHOT. While Community Edition is happy to let you use the same name for the destination throughout the DayTrader application, WebSphere Application Server expects links to the destination from within the application -- but that are outside of the module -- to be in the form <modulename.jar>#<destinationname>. Since the Link field cannot be edited from this tab, switch to the Source tab.
4. In the message destination that has message-destination-ref-name set to jms/TradeStreamerTopic, change the value of the message-destination-link element to daytrader-ejb-1.0-SNAPSHOT.jar#TradeStreamerTopic (Listing 2).
5. Save the file.

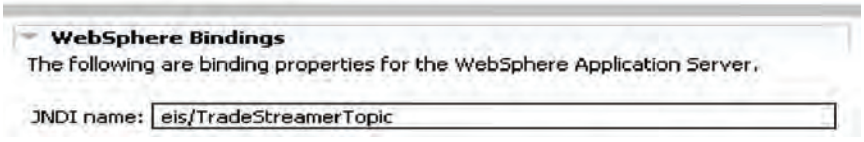

Figure 2: Adding a binding for jms/TradeStreamerTopic

Figure 3: Create a new WebSphere Application Server V6 instance

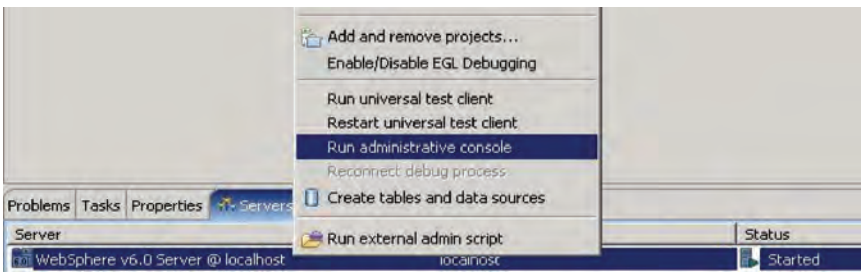

Figure 4: Run the admin console

Listing 2. Corrected message-destination-ref element

```
<message-destination-ref>
        <message-destination-ref-name>jms/
TradeStreamerTopic</message-destination-ref-name>
        <message-destination-type>javax.jms.
Topic</message-destination-type>
        <message-destination-usage>Produces</mes-
sage-destination-usage>
        <message-destination-link>daytrader-ejb-
1.0-SNAPSHOT.jar#TradeStreamerTopic</message-des-
tination-link>
      </message-destination-ref>
```

The error should now disappear since the link is now in the expected format.

A few XML errors and serialization warnings may remain, but these can be safely ignored.

However, since we want to use the WebSphere Application Server option to generate default bindings when we deploy the application, we still have a few more steps. Having the server generate default bindings from EJB and resource references to actual objects is a great time saver, since most of the time the default bindings will be exactly what you need. To enable WebSphere Application Server

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Name	Value
Database type	DB2
Provider type	Universal JDBC driver provider
Implementation type	XA data source

Table 1 :

Name	Value
Name	TradeDataSource
JNDI name	jdbc/TradeDataSource
Use this data source in container-managed persistence (CMP)	Yes (make sure the checkbox is selected)
Database name	tradedb
Server name	localhost (or the name of the server where DB2 is installed if different)

Table 2:

Name	Value
Name	QueueConnectionFactory
JNDI name	jms/QueueConnectionFactory
Bus name	tradebus.

Table 3:

Name	Value
Name	TopicConnectionFactory
JNDI name	jms/TopicConnectionFactory
Bus name	tradebus.

Table 4:

Name	Value
Name	TradeBrokerQueue
JNDI name	eis/TradeBrokerQueue
Bus name	tradebus
Queue name	TradeBrokerQueueDest

Table 5:

Name	Value
Name	TradeStreamerTopic
JNDI name	eis/TradeStreamerTopic
Bus name	tradebus
Queue name	TradeStreamerTopicDest

Table 6:

Name	Value
Name	TradeStreamerMDB
JNDI name	eis/TradeStreamerMDB
Destination type	Topic
Destination JNDI name	eis/TradeStreamerTopic
Bus name	tradebus

Table 7:

Name	Value
Name	TradeBrokerMDB
JNDI name	eis/TradeBrokerMDB
Destination type	Queue
Destination JNDI name	eis/TradeBrokerQueue
Bus name	tradebus

Table 8:

to generate default bindings for message destination links in the form <modulename.jar>#<destinationname>, like those we just defined, we have two options:

- Use Rational Application Developer to assign a binding for the message destination reference before deployment, or
- Remove the message-destination-link element altogether, since it is just a hint and this same binding can be made at deploy time instead.

In this case, we will go ahead and define bindings for these message destination links within Rational Application Developer:

6. In the daytrader-streamer-1_0-SNAPSHOT.jar deployment descriptor, switch to the References tab, then select MessageDestRef jms/TradeStreamerTopic.
7. On the right, under WebSphere Bindings, enter the JNDI name eis/TradeStreamerTopic (Figure 2) and save the deployment descriptor. (If you do not create this binding, WebSphere Application Server with default bindings will bind the reference to the JNDI name eis/daytrader-ejb-1.0-SNAPSHOT.jar#TradeStreamerTopic, which is clearly not correct. In the next section, we will create the topic that has the JNDI name eis/TradeStreamerTopic.)

We have two additional links to fix:

8. Right-click on the daytrader-web-1_0-SNAPSHOT deployment descriptor and select Open With => Deployment Descriptor Editor.
9. Switch to the References tab and click on MessageDestRef jms/TradeBrokerQueue.
10. Enter the JNDI name eis/TradeBrokerQueue in the WebSphere Bindings section.
11. Click on the MessageDestRef jms/TradeStreamerTopic and enter the JNDI name eis/TradeStreamerTopic.
12. Save the deployment descriptor.

6. Create Needed Resources

Next, we need to define the JMS and JDBC resources that are required by the DayTrader application. The resources we will define map to the <ext-module> sec-

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tions of the dayTrader-plan.xml file. We will point out the specific applicable sections as we go along.

Start Administrative Console

We will first start an instance of WebSphere Application Server so we can access the administrative console. (We will use the admin console in this article, but WebSphere Application Server also offers extensive scripting capabilities that can help you automate many steps for a faster and more repeatable deployment.) We will use the WebSphere Application Server test environment included with Rational Application Developer. To create a new application server in Rational Application Developer:

1. Select File => New => Other... , then select Server from the Server category. Click Next.
2. Confirm the hostname is correct and select WebSphere v6.0 Server as the server type (Figure 3), then Finish.
3. Your newly-defined server will show up in the Servers tab. Right-click on it and select Start.
4. Once the server is started, right-click again and select Run administrative console (Figure 4). Since security is not enabled, you can login with any name.

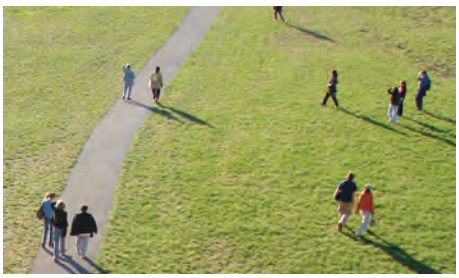
Create data sourceThe first resource we will configure is the data source. This data source corresponds to the <ext-module> with the connector named **TradeDataSource**, shown in Listing 3. While in Server Community Edition you configured a resource adapter, in WebSphere Application Server, you will create the data source directly, which will then use the WebSphere Relational Resource Adapter under the covers.

Listing 3: Portion of the DayTrader-plan.xml that defines TradeDataSource

```
<ext-module>
   <connector>TradeDataSource</connector>
   <external-path>tranql/rars/tranql-connector-derby-embed-xa-1.0.rar</external-path>
   <connector
            xmlns="http://geronimo.apache.org/xml/ns/j2ee/connector"
            configId="TradeDataSource"
            parentId="org/apache/geronimo/Server">
            ...
</ext-module>
```

Since we are using DB2 now instead of Derby, much of the information will be different:

1. To create a data source, we must create a JDBC provider, which contains the JDBC driver information. Navigate to Resources => JDBC Providers, then select New.
2. Create a new JDBC Provider with the following properties.(See table 1)
3. When finished, click Next.
4. Note that the class path for the provider is defined in terms of a variable, DB2UNIVERSAL_JDBC_DRIVER_PATH. You will need to provide a value for this variable later. Select the newly-created provider, then Additional properties => Data Sources.
5. Create a new data source with the following properties (do not modify any other properties). (See table 2)



6. When finished, click OK.
7. The provider and data source have now been created, but the DB2UNIVERSAL_JDBC_DRIVER_PATH variable still needs to be defined. Navigate to Environment => WebSphere variables and select DB2UNIVERSAL_JDBC_DRIVER_PATH. In the value box enter the path to the DB2 Universal JDBC Driver. This is typically <DB2 install root>/Java; for example: C:/Progra~1/IBM/SQLLIB/Java). Click OK.
8. When prompted to "Click Save to apply changes to the master configuration", click Save, then click Save again.
9. WebSphere Application Server enables you to test whether the data source you have just defined can successfully connect to the database. Make sure DB2 is running and navigate back to Resources => JDBC Providers.
10. Select the Universal Driver Provider you defined earlier, then select Data Sources on the right.
11. Check TradeDataSource and click on Test Connection. If all goes well, you should receive a message indicating that the test was successful.

Create JMS resourcesNext, we will define the JMS resources corresponding to the <ext-module> with the connector named TradeJMS, shown in Listing 4.

Listing 4: Portion of the DayTrader-plan.xml that defines TradeJMS

```
<ext-module>
   <connector>TradeJMS</connector>
   <external-path>activemq/rars/activemq-ra-3.2-M1.ibm.rar</external-path>
   <connector
            xmlns="http://geronimo.apache.org/xml/ns/j2ee/connector"
            xmlns:naming="http://geronimo.apache.org/xml/ns/naming"
            configId="TradeJMS"
            parentId="TradeDataSource">

            ...
</ext-module>
```

Defining these JMS resources in WebSphere Application Server is very different than in Community Edition. WebSphere Application Server V6 uses a Service Integration Bus (SIBus, an ESB-like approach) as the backend for its default messaging support. This means that in addition to the JMS resources from the Community Edition deployment plan, you will need to define a bus to support messaging, a bus member (the application server), and a bus destination for each of the JMS destinations:

1. In the administrative console, navigate to Service Integration => Buses => New to create a new bus.
2. Name the bus tradebus, then click OK.3. Select the newly-created bus, then select Bus Members from Additional Properties.
4. Click Add, then Next (you do not need to enter any values), then Finish.
5. Click the link at the top of the page to return to the tradebus page, then select Destinations.
6. We need to create a destination for

each of our two JMS destinations: TradeStreamerTopic and TradeBrokerQueue. Select New, choose Topic Space, and enter the identifier TradeStreamerTopicDest. Select Next, then Finish.

7. Click on New again and repeat the previous step, this time selecting Queue and entering the identifier TradeBrokerQueueDest. For the queue value, accept the default bus member assigned to the queue. (The destination names we have specified are arbitrary; we will map JMS destination names to these names later.)
8. Save your work to the master configuration again, then navigate to Resources => JMS Providers => Default Messaging.
9. We will now create the QueueConnectionFactory and TopicConnectionFactory defined in daytrader-plan.xml's <connection-factory> portion of the TradeJMS <ext-module> (Listing 5).

Listing 5: Portion of the DayTrader-plan.xml that defines the connection factories

```
<connection-definition>
   <connectionfactory-interface>javax.jms.
ConnectionFactory</connectionfactory-interface>
   <connectiondefinition-instance>
            <name>jms/QueueConnectionFactory</name>
            <implemented-interface>javax.jms.
QueueConnectionFactory</implemented-interface>
      ...
</connection-definition>
<connection-definition>
   <connectionfactory-interface>javax.jms.
ConnectionFactory</connectionfactory-interface>
   <connectiondefinition-instance>
            <name>jms/TopicConnectionFactory</name>
<implemented-interface<javax.jms.
TopicConnectionFactory</implemented-interface>
   ...
</connection-definition>
```

10. Create a new JMS Queue Connection Factory with the following properties. (See table 3)
11. When finished, select OK.
12. Use the link at the top of the page to return to the Default Messaging Provider page.
13. Create a new JMS Topic Connection Factory with the following properties. (See table 4)
14. When finished, select OK.
15. Save your work to the master configuration.
16. Next, we need to define TradeStreamerTopic and TradeBrokerQueue, which are admin objects in the daytrader-plan.xml file(Listing 6).

Listing 6: From daytrader-plan.xml which defines TradeStreamerTopic and TradeBrokerQueue

```
<adminobject>
   <adminobject-interface>javax.jms.Topic</adminob-
ject-interface>
   <adminobject-class>org.codehaus.activemq.mes-
sage.ActiveMQTopic</adminobject-class>
   ...
</adminobject>
<adminobject>
   <adminobject-interface>javax.jms.Queue</adminob-
ject-interface>
   <adminobject-class>org.codehaus.activemq.mes-
sage.ActiveMQQueue</adminobject-class>
   ...
</adminobject<
```

Return to the Default Messaging Provider page and click on JMS Queue under Destinations. Create a new queue with these properties. (See table 5) When finished, click OK.

17. Return to the Default Messaging Provider page and select JMS Topic under Destinations.
18. Create a new topic with the following properties. (See table 6)
19. Click OK and save your work to the master configuration
20. Finally, we will define activation specifications for each of the MDBs in the DayTrader application. Activation specifications define the information found in the <activation-config> element of each message-driven bean in daytrader-plan.xml (see one example in Listing 7).

Listing 7: From daytrader-plan.xml, defining one of the activation specifications

```
<activation-config>
   <activation-config-property>
            <activation-config-property-
name>destinationType</activation-config-property-
name>
            <activation-config-property-value>javax.
jms.Queue</activation-config-property-value>
   </activation-config-property>
   <activation-config-property>
            <activation-config-property-
name>destination</activation-config-property-name>
            <activation-config-property-value>TradeS
treamerQueue</activation-config-property-value>
   </activation-config-property>
   ...
</activation-config>
```

Return to the Default Messaging Provider page and select JMS Activation Specification.

21. Create a new activation specification with the following properties. (See table 7)
22. The WebSphere defaults of auto-acknowledge and nondurable subscription type match those that were specified in daytrader-plan.xml so you can leave those as they are. When finished, click OK.
23. Create another new activation specification with these properties. (See table 8)
24. When finished, click OK, and save your work to the master configuration.

We have now defined all the resources the application will need. Next month, we will address the final three aspects of this process!

Resource Naming

The JNDI names for the resources created in this section have not been assigned arbitrarily. Rather, they are based on the names WebSphere Application Server will expect if you use the Generate default bindings option when deploying the application. With this option, WebSphere Application Server will map any references that have not been bound to actual artifacts (enterprise beans or resources) based on a set of rules. Of course, if the default bindings are not used, the mapping can be done manually from any EJB or resource reference to any JNDI name. The rules which define the default bindings are explained in the WebSphere Application Server V6 Information Center.

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Securing Service-Oriented Applications

SOA Programming Model for Implementing Web Services

BY ANTHONY NADALIN, NATARAJ NAGARATNAM, MARYANN HONDO

Securing access to information is basic to any application. Security becomes even more critical for implementations structured according to SOA principles due to their loose coupling of services and applications and their operation across organizational boundaries. Such an environment often exposes the delicacy or limitations of existing security implementations.

ABOUT THE AUTHORS

Anthony Nadalin is the Chief Security Architect for IBM Software Group. As a Distinguished Engineer, he is responsible for security infrastructure design and development. He serves as the primary security liaison to Sun Microsystems JavaSoft Division for Java security design and development collaboration.
drsecure@us.ibm.com

Dr. Nataraj Nagaratnam is the Chief Architect for Identity Management and Lead Security Architect for On Demand Security Infrastructure and Technical Strategy. As a Senior Technical Staff Member, he drives security architecture and design activities across IBM products and platforms.
natarajn@us.ibm.com

Maryann Hondo is the Web Services Security Standards Lead in Emerging Technology for IBM Software Group. She is a coauthor of the WS-Security, Policy, Trust, and Secure Conversation specifications announced by IBM and other business partners in 2002-2004.
mhondo@us.ibm.com

Irrespective of the efficiencies brought by model-driven development and SOA-based service management, business applications must continue to secure information. Merely securing the perimeter (such as firewalls and routers) is insufficient, because an On Demand Business needs to be able to set up and tear down dynamic trust relationships as relationships among its partners, customers, and employees evolve. Thus, a secure On Demand Business needs a flexible, customizable infrastructure so it can adapt to new requirements and regulations. To provide such flexibility, it should not hardwire policie into the infrastructure; it should implement the requirements of the security model through a policy-driven infrastructure – no simple task.

This article explains how business applications can leverage the security capabilities of an on demand security infrastructure and the design principles that give rise to a programming model for securing service-oriented applications.
Business applications and security infrastructureSecure integration and access to business applications and information is typically achieved through authentication, authorization, and accountability. How a business approaches the management of authentication, authorization, and accountability is dictated largely by its view of the trust relationships that exist among customers, employees, and partners; the effects these relationships have on the security of business applications; and the relative importance and security of these applications.

When sensitive information is exchanged between business partners, it must be secured. It may also need to be persisted in a secure manner. The integrity of the message origin needs to be guaranteed (for example, through notary services) to enable validation, auditing, and nonrepudiation when necessary. Sensitive information may need to be encrypted for confidentiality or digitally signed for integrity. (Digital signatures also play a role in nonrepudiation.) A complete SOA security design must address not only message- and transport-level security, but the need to secure persisted content to comply with government regulations and industry best practices.

Fundamentally, the trust relationships among a business and its employees, customers, and partners govern the definition and enforcement of security policies and the level of security that is enforced. Relevant technologies, such as certificates and cryptographic keys, can be used to reflect and manage these trust relationships. Tools can be used to model and specify trust relationships between business partners, between consumers and the business, and so on, and can translate trust definitions into technologies that are appropriate for the IT environment.
SOA security modelThe SOA security model is based on a process in which a Web service can require an incoming message to prove a set of claims. Examples of claims include name, key, permission, and capability. Based on the proof provided, the appropriate trust models are applied between the requester, the service endpoint, and a set of possible intermediaries.

A message may traverse several intermediaries between a requester and a target

(This article was first published on developerWorks at http://www.ibm.com/developerWorks/webservices. It is the seventh article in a series. This article, resources linked to it, and related articles can be found at the developerWorks URL listed here.)Securing applications in a service-oriented architecture (SOA) is challenging, because the loose coupling that characterizes an SOA can expose existing security implementations' weaknesses. The following solution includes well-defined trust models based on acceptable forms of proof as well as reliance on policies, Web services security, and security engineering best practices.)

service. The management of end-to-end security must take into account the trust models between the requester, the intermediary, and the ultimate endpoint service (provider), as illustrated in Figure 1.

The OASIS Web Services Security (WSS) specification provides protection for Simple Object Access Protocol (SOAP) messages in transit. You can use WSS to protect the authenticity, integrity, and confidentiality of messages from untrusted network and transport intermediaries.

Not all intermediaries are untrusted. A Web services gateway and an enterprise service bus mediation service are examples of message transformation intermediaries whose function in the SOA involves inspection and, in some cases, modification of message payloads [see Part 4 in this series, "An introduction to the IBM Enterprise Service Bus" (developerworks, 2005)]. When designing your SOA security infrastructure, consider planning to allow certain trusted intermediaries.

Another trusted intermediary might be a message broker that handles trust relationships between requesters and an application service host. In this design, security responsibilities are divided between the broker and the service endpoint. As shown in Figure 2, the message intermediary would be responsible for message-level security, federation of identities between requester and provider environments, and managing the trust relationship between the requester and service provider. The service would retain responsibility only for meeting service-specific security requirements, such as establishing (mapped, federated by the intermediary) identity to access the service, integrity, and confidentiality of application-specific data in the message payloads. By factoring fragile or complex infrastructure code out of the business application and delegating it to the container, an SOA-based approach to security can improve flexibility and reduce the possibility of mishaps.

Message security

The WSS specification also provides a set of basic message-level mechanisms for integrity, confidentiality, and authentication that can help Web service developers secure SOAP exchanges. These mechanisms can be combined in various ways to build a wide variety of security models using a variety of encryption technologies.

WSS also provides an extensible mechanism for associating security tokens with messages that accommodates a variety of authentication and authorization formats and mechanisms. For example, a client might provide proof of identity and a signed claim that they have a particular business certification. A Web service receiving such a message could then determine if it trusts the claim and to what extent.

Security token claims can be endorsed by an authority or left unendorsed. A set of endorsed claims is usually represented as a security token that is digitally signed or cryptographically protected by the authority. A familiar example of a signed security token is an X.509 certificate; it asserts a binding between one's identity and a public key. Security tokens can be "pushed," or carried, in a message, or expressed by a reference so the receiver can "pull" the claim from the authority.

Because a security token is useful within a trust domain, there needs to be a way to articulate the scope of a trust domain. It can be articulated manually, by an agreement, or by implementing a set of rules enforcing the trust policy. An unendorsed claim can thus be trusted if there is any established trust relationship between the sender and the receiver. For example, the unendorsed claim that the sender is Bob is sufficient for a certain receiver to believe that the sender is, in fact, Bob if the sender and the receiver use a trusted connection, which they have set up through an out-of-band trust relationship. In this example, the existence of this trusted connection might be sufficient proof.

Protecting message content from illegal access (confidentiality) or illegal modification (integrity) are primary security concerns. The WSS specification provides a means to protect a message by encrypting and/or digitally signing a body, a header, an attachment, or any combination (or parts) of these.

Authenticating requests is based on a combination of optional network and transport-provided security and information (claims) proven in the message, a technique better known as message origin authentication. Requesters can authenticate recipients using network and transport-provided security, claims proven in messages, and encryption of the request using a key known to the recipient.

Trust modelOne way to demonstrate authorized use of a security token is to include a digital signature using the associated secret key (from a proof-of-possession token).

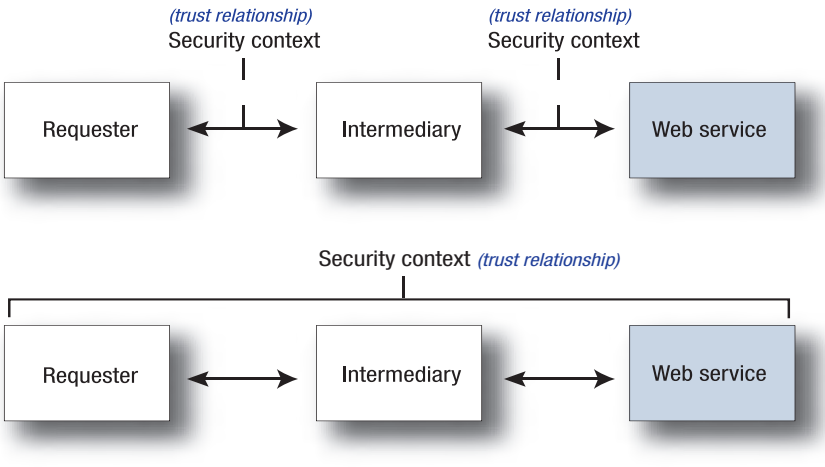

Figure 1: Trust models from requester to provider through intermediaries Network and transport intermediaries (for example, firewalls, routers, and proxy servers) are generally not trusted with respect to message processing. All messages in transit should be protected from tampering by untrusted intermediaries.

This allows a requester to prove a required set of claims by associating security tokens -- such as Public Key Infrastructure for X.509 Certificates (PKIX) or X.509 certificates -- with the messages.

If the requester does not have the necessary token(s) to prove required claims to a service, it can contact appropriate authorities (which we refer to as security token services) and request the needed tokens with the proper claims. Security token services form the basis of trust by issuing a range of security tokens that can be used to broker trust relationships between different trust domains.

One mechanism would be the use of a challenge-response protocol as defined in WS-Trust (see Resources for more information about the WS-Trust spec). This is used by a Web service for additional challenges to a requester to ensure message freshness and verification that the use of a security token is authorized. This model is illustrated in Figure 3, showing that any requester may also be a service, and that the requester and target service may have a trusted third-party security token service that helps validate the security tokens required per the target service's policy.

This SOA security model – claims, policies, and security tokens – subsumes and supports several more specific models, such as identity-based authorization, access control lists, and capabilities-based authorization. It allows use of existing technologies, such as X.509 public key certificates, XML-based tokens, Kerberos shared-secret tickets, and even password digests.

The SOA security model, in combination with the Web Services Secure Conversation Language (WSSC) and Web Services Policy Framework primitives, is sufficient to construct higher-level key exchange, authentication, policy-based access control, auditing, and complex trust relationships.

A Web service has a policy applied to it, receives a message from a requester that possibly includes security tokens, and may have some protection applied to it using WSSC mechanisms. The following main steps are performed by the trust engine of a Web service:

- Verify that the claims in the token are sufficient to comply with the policy and that the message conforms to the policy.
- Verify that the attributes of the claimant are proven by the signatures. In brokered trust models, the signature may not verify the identity of the claimant; it may verify the identity of the intermediary who may simply assert the identity of the claimant. The claims are either proven or not based on policy.
- Verify that the issuers of the security tokens (including all related and issuing security tokens) are trusted to issue the claims they have made. The trust engine may need to externally verify or broker tokens (that is, send tokens to a security token service in order to exchange them for other security tokens that it can use directly in its evaluation).

If these conditions are met and the requester is authorized to perform the operation, then the service can process the service request.

Network and transport protection mechanisms, such as IP Security (IPSec) or Transport Layer Security/Secure Sockets Layer (TLS/SSL), can be used in conjunction with this SOA security model to support different security requirements and scenarios. As an added level of security, requesters should consider using a network or transport security mechanism, if available, to pre-authenticate the recipient when issuing, validating, or renewing security tokens.

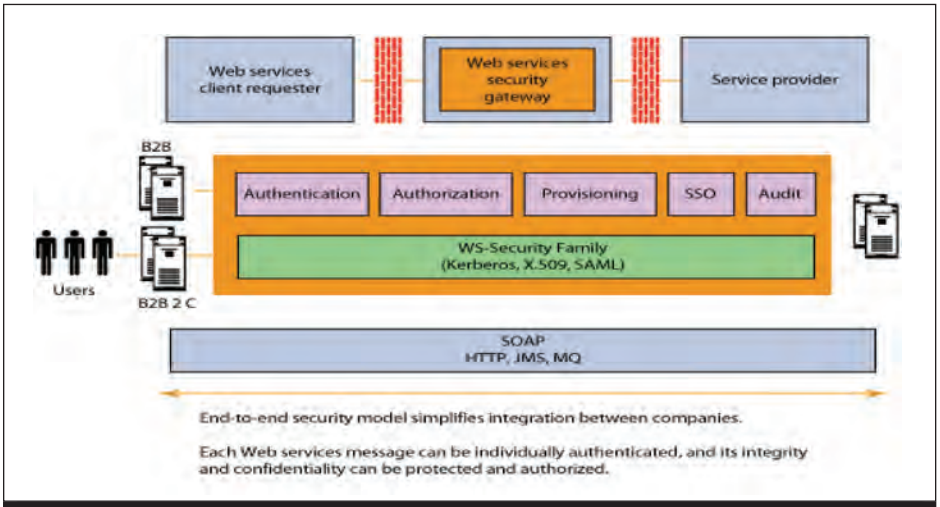

Figure 2: Message intermediary brokers trust relationship and federation

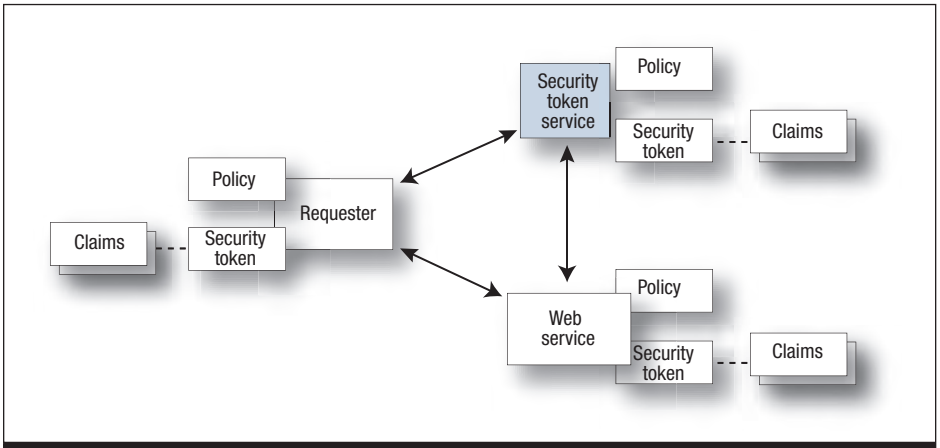

Figure 3: Security token service

Programming model design principles

From a security perspective, the programming model includes decisions to be made about who is responsible for enforcing security policies (such as infrastructure or application) and what of this information needs to be made available to requesters. In addition to the operational aspects, some of the design-time policy (for example, captured in J2EE deployment descriptors) can help manage the application. One of the key implementation decisions is whether the business needs will best be met by enabling the infrastructure to implement the security model or by codifying security enforcement into each application. Another dimension to consider is how variable the service invocation is. Are service consumers given flexibility through choices they can customize during subscription? Lastly, when implementing any secure solutions, one should consider security engineering – an engineering methodology to build secure applications.

Infrastructure-Managed vs Application-Managed Security

Each organization typically gives certain people the responsibility for identifying and enforcing its security policies. In many cases this process is manual, causing the organization to devote significant resources to coordinating access across different entities and applications.

We recommend that complex organizations centralize, in the infrastructure, the enforcement of the security policies associated with a solution – that is, validating the user challenge (for example, user ID/password), controlling access to applications (such as reserve() method on travelService), and delegating identity (for example, run-as travelAgency id) to ensure a consistent approach. Initial application security policies can be defined in some deployment artifacts (e.g., deployment descriptors for J2EE applications). After development, when the application logic is largely known, the policy information can be made available to the deployment environment. Policy declarations can be abstracted into high-level policy requirements for later refinement as implementation constraints are considered during the deployment phase.

The application design introduces decisions to be made about infrastructure- versus application-managed security. The security constraints and conditions are attached to the implementation artifacts. The time for deciding whether to let the infrastructure handle security, or codify security in the application, is during the implementation phase when information about the application platform – such as Java 2 Platform, Enterprise Edition (J2EE) and Microsoft .NET – is usually available.

We recommend that applications focus on business logic and defer securing the service access and the messages to the infrastructure (the runtime container hosting the application). In this infrastructure-managed approach, security policies attached to design artifacts are transformed into platform-specific policies [for example, requirements expressed through a Unified Modeling

Language (UML) model are transformed into J2EE deployment descriptors).

In the application-managed approach, security enforcement is done in the application, and the appropriate security callouts must be implemented. Even application-managed security has to translate its security callouts (such as authenticate()) into appropriate platform-specific functions [such as loginContext.login() using Java Authentication and Authorization Service (JAAS)].

Authorization and access control can vary from coarse- to fine-grained. The choice of coarse-grained access (to the solution itself) versus fine-grained access (to one of its operations) is usually governed by business and technical considerations. Granularity is also influenced by factors, including the instance of the information entity (for example, credit account profile for a given traveler), contextual information, such as user attributes (for example, travel agent), temporal constraints (for example, 9-5 p.m.), purpose of access (such as for the purpose of making a travel reservation), access path (for example, Authorization-related policy can be abstracted by defining application roles, where a role is a collection of permissions that allow certain actions on given application resources. For example, a travel application can declare that the view() or change() reservations methods on ReservationBean can be accessed by TravelAgent role. In other words, TravelAgent is an implementation-defined role that identifies what can be done by a "travel agent" in terms of a set of permissions to invoke specific methods on the respective Enterprise JavaBeans (EJBs). What is not likely defined during the implementation phase is who has the privileges of a TravelAgent. User-to-role assignments are typically initialized at deployment and managed thereafter throughout the application's lifetime. Listing 1 shows an example of code defining some role-based method permissions.

Listing 1: Code defining some role-based method permissions<method-permission>

```
<role-name>TravelAgent</role-name>
<method>
   <ejb-name>ReservationBean</ejb-name>
<method-permission>
<role-name>TravelAgent</role-name>
<method>
   <ejb-name>ReservationBean</ejb-name>
   <method-name> view</method-name>
   <method-name> change</method-name>
</method>
</method-permission>
```

Applications that require authenticated identity information before performing some business logic must obtain that information from the infrastructure. For instance, in a J2EE environment, the run time establishes the user's identity after authentication; the application can retrieve this information with an API, such as getCallerPrincipal().

Flexibility of choiceSometimes certain requirements or constraints on the access to the service itself -- including authentication, integrity, and confidentiality requirements – are needed by a client run time. And it may be desirable to support a wide variety of client run times (such as browser clients, nonbrowser clients, and PDA thin clients). To achieve this, you publish policies asserting that the client runtime must ensure message confidentiality and must provide evidence of the user's identity (user ID/password or a certificate). The policy abstraction for authentication can list alternatives, such as the types of credentials that are acceptable or which credential-issuing authorities are trusted.

For instance, a TravelService Web service can declare its intent to require certain security token types and confidentiality requirements. The implementation may support the declaration of intent through descriptors. Tools can, in turn, generate necessary machine-level details (such as a WS-SecurityPolicy expression), as illustrated in Listing 2.

Listing 2: Example of WS-Security Policy description<wsp:Policy>

```
<sp:SymmetricBinding>
  <wsp:Policy>
    <sp:ProtectionToken>
      <wsp:Policy>
        <sp:KerberosV5APREQToken
            sp:IncludeToken=".../IncludeToken/
Once" />
      </wsp:Policy>
    </sp:ProtectionToken>
    <sp:SignBeforeEncrypting />
    <sp:EncryptSignature />
  </wsp:Policy>
</sp:SymmetricBinding>
<sp:SignedParts>
  <sp:Body/>
  <sp:Header
     Namespace="http://schemas.xmlsoap.org/
ws/2004/08/addressing"
  />
</sp:SignedParts>
<sp:EncryptedParts>
  <sp:Body/>
</sp:EncryptedParts>
</wsp:Policy>
```

Security engineeringIn developing secure solutions, one of the best practices is security engineering -- following well-defined patterns so that your application, service, or component will do exactly what its designers and users expect. You should assess the risk inherent in each implementation artifact, designing and implementing it to avoid opening it up to vulnerabilities (for example, efficient memory management and avoiding covert channels) Tools support and code reviews can also help minimize (or eliminate) harm to the environment in which your solution is deployed.

SummaryAn SOA programming model must ensure that each service invocation adheres to security policies that are valid for both the requester and service endpoint. The security infrastructure -- including the ability to authenticate requesters and authorize their access to services, propagate security context across Web service requests based on an underlying trust model, audit significant events, and effectively protect data and content -- forms a fabric of the SOA environment that helps secure components and services. At the core of all SOA security is a policy-based infrastructure and management of the policies. In the ideal case, the SOA application is centered on business logic, delegating the enforcement of security policies, and handling trust relationships for the infrastructure. The Web services security model and approaches based on the Web services security specifications help meet the challenges of securing service-oriented applications.

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How to Use Rational Application Developer 6

Developing J2EE and Web services Applications on Rational Application Developer V6

BY ROLAND BARCIA

In this article, WebSphere consultant Roland Barcia answers questions on developing J2EE and Web services applications on IBM Rational Application Developer V6 and deploying and testing those applications on WebSphere Application Server V6. Topics include using the various wizards, perspectives, and tools in Rational Application Developer to develop different types of J2EE applications, using the new Service Integration Bus Messaging Platform in WebSphere Application Server V6, differences from V5 of WebSphere Studio or WebSphere Application Server, using the default WebSphere Application Server V6 in Rational Application Developer, and deploying to full WebSphere Application Server V6 Network Deployment.

ABOUT THE AUTHOR

Roland Barcia is a Consulting I/T Specialist for IBM Software Services for WebSphere in the New York/New Jersey Metro area. Roland specializes in moving applications out of development and into various testing environments. He is the author of one of the most popular article series on the developerWorks WebSphere site, IBM WebSphere Developer Technical Journal: Developing JSF Applications using WebSphere Studio V5.1.1. He is also a co-author of IBM WebSphere: Deployment and Advanced Configuration.

Question: We have the WebSphere 5.0 server only. I started to move our IDE from WebSphere Studio Application Developer 5.1.2 (hereafter called Application Developer) to Rational Application Developer (RAD) V6 to take advantage of some new features in RAD 6. I set the J2EE level to 1.3 and worked out a few issues: the EAR file generated from RAD 6 works fine in WebSphere Application Server 5 (hereafter called Application Server). But, we still have problems in RAD 6. For example, some error messages show up in the JSP fragment files. It seems the JSP compiler or validator in RAD 6 tries to compile those fragment files like a standalone files. I just wonder if it is a right choice to use RAD 6 to develop J2EE application running on a V5 server? Is it possible to make the JSP compiler in RAD 6 work the same way as in Application Developer 5.1.2 since we are targeting the V5 server?

Answer: WebSphere Studio Application Developer V 5.1.2 had the same issue, but the validation was probably off by default. I always tell people that validation should be off by default and executed on demand when needed. This improves the speed of your builds dramatically. You can turn off JSP validation at the Project level by right clicking the project and selecting properties.

Or, you can turn it off at the workspace level by selecting Windows -> Preferences.

For more tips on performance, see Rational Application Developer Performance Tips.

Question: How do we specify in WebSphere annotations if we want composers to be used for custom mappings of user types in CMP 2.x beans?

Answer: Currently, there are no annotations for composers in the current version.

Question: How to handle top down WSDL to Java round tripping? Now using iRAD so when modifying WSDL, I don't want to lose code in the service endpoint skeleton (where first level user code goes in Java). Don't want to use java2WSDL so as to maintain interoperable WSDL, given top down WSDL to Java is recommended.
What are the options? Modifying/enhancing WSDL should be supported as a basic service lifecycle requirement. Have large number of teams requiring standards/guidance on how to manage changing service interfaces.

Can iRAD provide support? Past initial Java service class generation?

Are there any tools available? Should be able to track and not lose non-generated code.

Answer: Currently, there are no annotations or tools that you can use to avoid changes from not being overridden. You can use certain strategies:

- After the initial generation, use the bottom-up approach after that. Changes on an interface are usually driven by changes needed in the implementation.
- If you want to use top-down, make sure your generated skeleton code is just a pass through to another class. This way, all you have are minimal changes that are made through re-generation. You could

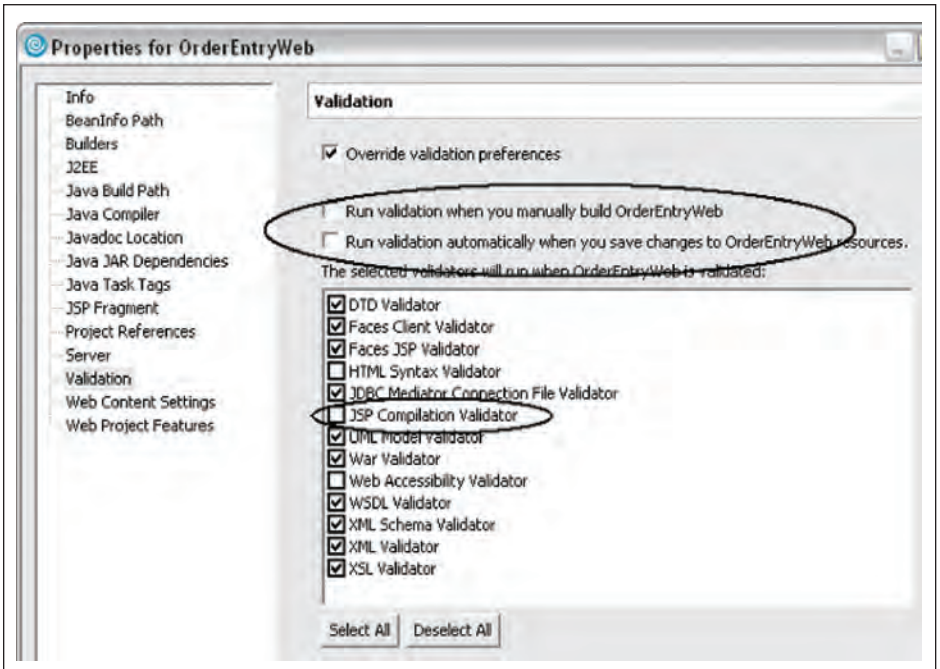

Figure 1: JSP validation

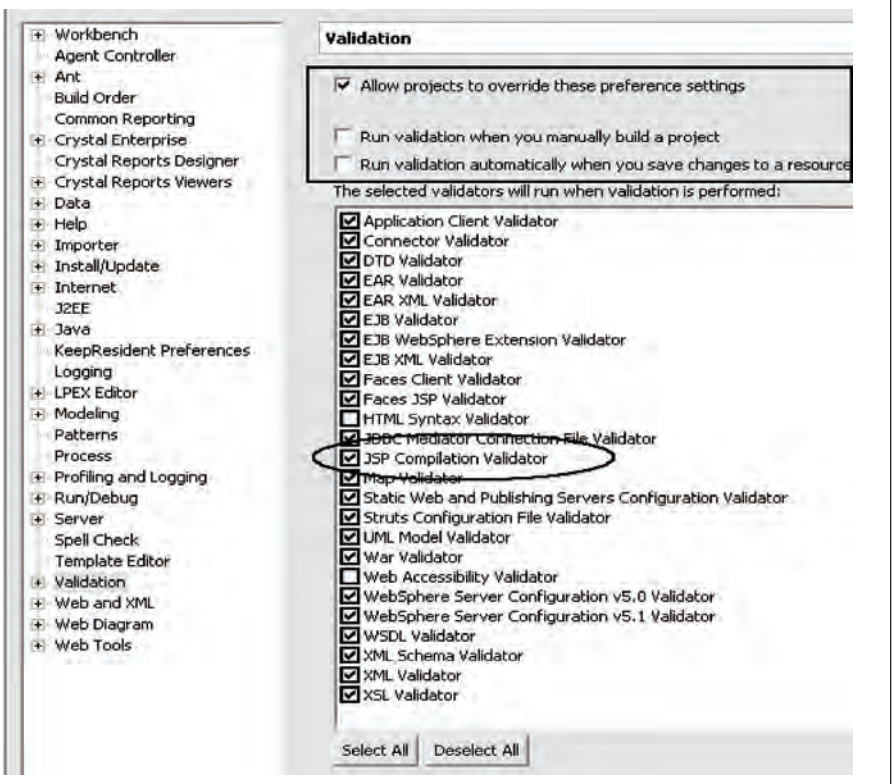

Figure 2: Preferences

probably write an ANT task or use the Design Pattern Toolkit to generate the call to the class.

- If you use the Service Integration Bus, you can use Inbound Services to expose destinations as Web services and have Mediations service the request. The Mediation Code will not be re-generated because they interact with Service Data Objects (SDO). For more information, see Service Integration Bus article series and Deploying JMS Applications and MDBs into the Service Integration Bus.

Question: Is it possible to apply WebSphere Application Server Refreshment Pack onto WebSphere Application Server 6 test enviromnent within RAD6? I've applied RAD6 6.0.0.1 interim fix 3 to RAD6, but the test environment seems to stay at the original level (6.0.0.0), according to the \Rational\SDP\6.0\runtimes\base_v6\profiles\default\bin\versioninfo command.

Answer: Yes, going forward, you need to apply WAS fixpacks and refresh packs to the WebSphere Application Server Test Environment separately, as documented in Technote: Upgrading the WebSphere Test Environment V6 in Rational Application or Web Developer.
The test environment in RAD is a full WebSphere Application Server Base edition. When installing WebSphere updates, WebSphere Application Server's root will be C:/<RAD_INSTALL_ROOT>/runtimes/base_v6.

Question: I am now looking into the features of RAD 6 and trying to test EJBs using the EJB component Test. But til now, I am not successful and getting into lot of issues. Do you have any document that explains how to test EJBs?

Answer: You can check the following resources:

- Component testing with IBM Rational Application Developer for WebSphere Software describes using the Test Component Feature.
- Essentials of IBM Rational Application Developer: Component Testing Features is a Web-based course.

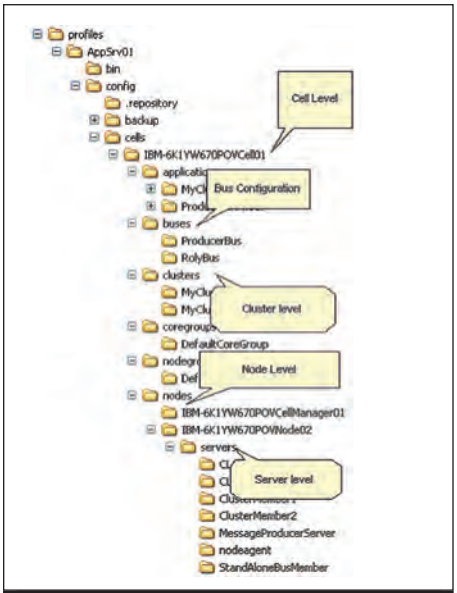

Figure 3: Directory structure

- The Rational Software Development Platform Information Center has additional information.

Question: Is there a mechanism to maintain data/record locking in the backend database when the end-user is working on the data accessed through a JSF/SDO (Service Data Objects) based Web client? If not, is there a mechanism to at least inform the client that the data he/she has accessed has changed while he/she was working on it.

Answer: Yes, you can supply an optimistic concurrency control (OCC) integer column to a given table, and specify that this column is to be used for OCC in the metadata. The defined OCC collision column is reserved for the exclusive use of the mediator. For more details, see JDBC mediator transactions.

Question:

1. Is it possible to use Crystal Reports with WebSphere Portal 5.0? If not, what other reporting software would be suggested?
2. Is it possible to use MySQL to develop CMP EJBs in RAD v6?
3. Is it possible to use Crystal Reports with Cloudscape?

Answer:

1. Business Objects provides solutions for IBM WebSphere Portal by providing various portlets. For more information, see Business Objectives Enterprise Portlets.
2. As long as you have a compliant JDBC driver, it could work. However, IBM provides support for the JDBC drivers listed in the Information Center. If your DB is not listed, you may want to talk to your IBM Representative.
3. You need to check with Business Objects who makes Crystal Reports, for their official supported list of databases. For more information, see Crystal Report Features.

Question: Can we use Rational Software Architect 6.0 in place of RAD V6 for all the requirements, right from developing UML designs to other J2EE-based solutions?

Answer: Rational Software Architect (RSA) is a superset of Rational Application Developer. So yes, you can use it in place of RAD. RSA is the next generation of modeling tools. You can import Rational XDE and Rose models and do full design to implementation development.

A product like Rational Rose has years of maturity, so not all functionality in Rose will be immediately part of RSA. However, over time RSA is the strategic direction for design and modeling. In addition, RSA contains support for UML 2 and transformations (some specific for J2EE) that do not exist in any of its predecessors.

Question: Agent.jar and apc.jar are specified for the BOOTCLASSPATH system property. What role do these jar files perform while the server is getting initialized?

Answer: I'm not exactly sure what product you are referring to. These jars are not part of WebSphere Application Server or Rational Application Developer. It is possible this is a jar that is part of an older version of the IBM Agent Controller used for profiling. It could possibly be something to do with a third party product that integrates with WebSphere Application Server, such as Site Minder. Use caution when adding and removing jars from your classpath without knowledge of their use.

Question: How is it possible for RAD in WebSphere 6.0? What is FFDC? FFDC works for Windows.

Answer: I'm not exactly sure what you mean by the first part of the question. RAD is an acronym for Rational Application Developer, which is the main IDE to support development for Rational Application Developer V6. RAD is also an acronym for rapidly developing applications. It is possible to support several styles of development with WebSphere Application Server. You can support automated development with a combination of ANT and build scripts. You can use any J2EE IDE. We also have WebSphere Rapid Deploy, which is a hot deployment tool and annotation processor. See the question on hot deployment for more issues.

FFDC stands for First Failure Data Capture. It preserves the information that is generated from a processing failure and returns control to the affected engines. The captured data is saved in a log file for analyzing the problem. FFDC is intended primarily for use by IBM Service. FFDC instantly collects events and errors that occur during the WebSphere Application Server runtime. The information is captured as it occurs and is written to a log file that is analyzed by an IBM Service representative. For more information, see the Information Center.

Question: As I am new to WebSphere, I want to know the following:

1. What is the file structure of WebSphere?
2. How will I deploy EJBs in WebSphere?
3. Can I directly copy *.ejb to WebSphere, or do I need to make *.war for that?

Answer: I suggest you pick up our book, IBM WebSphere: Deployment and Advanced Configurations, which answers all these questions directly.

1. WebSphere Application Server is designed to try to shield developer and administrators. The Admin Console and scripting language give you a full range of coverage. There are several underlying files and directories that get updated for various actions. In addition, if you use WebSphere Application Server Network Deployment, multiple sets of directory structures get replicated.

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Figure 3 illustrates some of the important elements to keep in mind.

Probably the most interesting portion of the WebSphere Application Server directory structure is the config directory under a specific profile. WebSphere Application Server supports various scopes of configuration visibility relative to where the application is deployed. The configuration for the scope is defined within several XML files under the directory of the scope. Update the configuration through one of the WebSphere Application Server administrative tools and not by hand editing XML files. XML file editing should only happen if there is some configuration that has caused severe errors. If anyone makes any changes, that person should have a deep understanding of WebSphere Application Server. WebSphere also has a backup and restore capability of configuration that allows you to restore configurations. Use these features religiously instead of hand editing.

2.The J2EE specification requires that you package EJB applications in an EJB jar file and follow the EJB directory structure. In addition, J2EE applications are packaged into EAR files that can contain several EJB Jar files. You can deploy EJB applications as EAR files or as standalone EJB jar files, although the EAR approach is recommended for portability. WebSphere Application Server supports several tools for deploying applications:

- WebSphere Application Server admin console
- Wsadmin scripting language
- Specialized ANT tasks
- Rational Web Developer, Rational Application Developer, Rational Software Architect, or the Application Server Toolkit
- WebSphere Rapid Deploy (allows the deployment of unpackaged annotated java classes directly into WAS)

3. I am not sure what you mean by *.ejb. EJB applications are made up of several Java files and XML deployment descriptors that are packaged into an EJB jar file and deployed as a module.

Question: I have installed WebSphere Application Server 6 and now I want to change the hostname (and IP address) for deployment. How do I do that?

Answer: There are several places where the hostname and IP need to be updated. We provide scripts that enable you to do this. You can download the sample scripts.

Question: How is it possible for hot deployment in WebSphere 6.0? Is there any ANT task that supports hot deployment for WebSphere 6.0?

Answer: Yes, we provide a new feature in version 6 of WebSphere Application Server called WebSphere Rapid Deploy (WRD). WebSphere Rapid Deploy enables you to setup a special directory for automatic deployment of J2EE modules or loose annotated Java classes. There are two modes supported:

- AuotAppInstall: Deployment of J2EE modules
- Free Form: Deployment of annotated Java files

AutoAppInstall: You can use WRD to create a style that automates the installation, modification, and de-installation of J2EE compliant applications or modules. Instead of taking an EAR file and using wsadmin or the Web Admin UI to install that application through a multi-step wizard, you can use WRD to create a monitored directory in which you can simply place the EAR. Upon placing the EAR in the directory, WRD detects the addition of the new file and builds of the project Of course, WRD would, in addition to handling EAR files, consume individual J2EE modules (WARs, EJB jars, RARs) and construct EARs as part of its execution.

There is also the option of enhancing the EAR file. This enhanced EAR file contains information to allow WRD to automatically create the resources. Here is an example of using AutoAppInstall:

- Configure the WRD workspace
  1. export WORKSPACE= C:\WRDAutoInstall
  2. $WAS_HOME/bin//wrd-config -project DeployProject -style AutoAppInstall -runtime “was60” -runtimePath “D:/WebSphere_60/AppServer” -monitor
- Start the WRD daemon: $WAS_HOME/bin/wrd -monitor
- Copy EAR into directory

Free form: You can also use WRD to reduce the complexity of application construction. In this scenario, instead of providing a fully-constructed J2EE application, you place in a directory the individual parts of the application, such as Java Source files that represent Servlets or EJBs, static resources, XML files, and so on. You then configure WRD to construct a J2EE compliant application and deploy that application on a target server. Free form is ideal for initial prototyping of applications or development of library code. However, use caution when using free form development for enterprise applications. Developers can quickly lose control of their build and deployment process. Here is an example of using free form:

- Configure the WRD workspace:
  1. export WORKSPACE=D:/WRDWorkSpace
  2. $WAS_HOME/bin//wrd-config -project “MyProject” -style “freeform” -runtime “was60” -runtimePath “D:/Web-

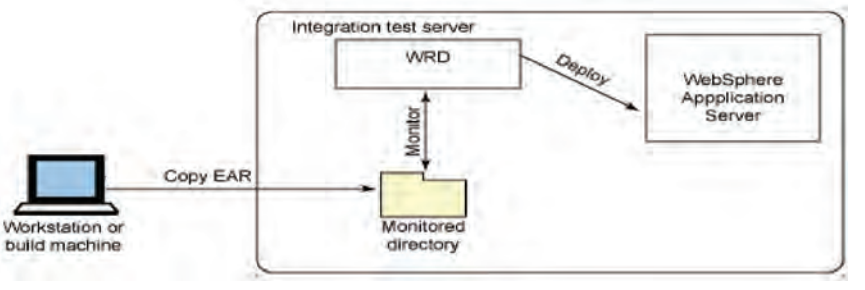

Figure 4: WebSphere Rapid Deploy

Sphere_60/AppServer" -monitor

- Start the WRD daemon: $WAS_HOME/bin/wrd -monitor
- Create a Java Servlet or EJB class in the directory using any editor.

For more information on WRD, see the WebSphere V6 Information Center.

Here is an example of the code. These were the only artifacts developed.

HelloServlet.java

```
package com.wrdtest;

import java.io.*;

import javax.naming.InitialContext;

import javax.servlet.http.*;
import javax.servlet.*;

public class HelloServlet extends HttpServlet {

  public void doGet (HttpServletRequest req,
HttpServletResponse res) throws ServletException,
IOException {

    PrintWriter out = res.getWriter();
    try {
          InitialContext ctx = new InitialContext();
   HelloHome helloHome = (HelloHome)ctx.lookup("ejb/
Hello");
   HelloRemote hello = helloHome.create();
    out.println("Hello, world!");
    out.println(hello.getMessage());
    out.close();

    } catch (Exception e) {
          // TODO Auto-generated catch block
          e.printStackTrace(out);
          out.close();
   }

  }
```

MyService.java

```
package com.wrdtest;

/**
 * @author Admin
 *
 *@ejb.session name="Hello" type="Stateless"
 *jndi-name="ejb/Hello"
 *               local-jndi-name="ejb/Hello"
 */
public class MyService {

   /**
     *
     * @param symbol
     * @return
     * @throws StockException
     *
     * @ejb.interface-method view-type="both"
     * @ejb.transaction type="Required"
     *
     *
     *
     */
    public String getMessage()
    {
          return "Hello EJB";
    }

}
```

Question: I am working with RAD and WebSphere 6.0. I want to deploy an EAR file with log4j, but an error appears during deployment. What is wrong? The log4j.xml is in the ear file.

```
[7/25/05 17:39:54:269 CEST] 00000062 ResourceMgrIm I
WSVR0049I: Binding ENT13000 as jdbc/ENT13000
[7/25/05 17:39:54:284 CEST] 00000062 EJBContainerI I
WSVR0207I: Preparing to start EJB jar:
TDSLRechercheEJB.jar
[7/25/05 17:39:54:312 CEST] 00000062 EJBContainerI I
WSVR0037I: Starting EJB jar: TDSLRechercheEJB.jar
[7/25/05 17:39:54:904 CEST] 00000062 MDBListenerIm I
WMSG0058I: Listener Port ListenerPortNI will attempt
to restart in 60 seconds
[7/25/05 17:39:54:937 CEST] 00000062 ApplicationMg E
WSVR0101W: An error occurred starting,
TDSLRechercheJ2EE
[7/25/05 17:39:54:945 CEST] 00000062 ApplicationMg A
WSVR0217I: Stopping application: TDSLRechercheJ2EE
[7/25/05 17:39:54:988 CEST] 00000062 EJBContainerI I
WSVR0041I: Stopping EJB jar: TDSLRechercheEJB.jar
[7/25/05 17:39:55:034 CEST] 00000062 ApplicationMg A
WSVR0220I: Application stopped: TDSLRechercheJ2EE
[7/25/05 17:39:54:770 CEST] 00000062 SystemErr
R log4j:ERROR Could not open [./log4j.xml].
[7/25/05 17:39:54:773 CEST] 00000062 SystemErr
R java.io.FileNotFoundException: ./log4j.xml (No
such file or directory)
at java.io.FileInputStream.open(Native Method)
at java.io.FileInputStream.<init>(FileInputStream.
java:106)
at java.io.FileInputStream.<init>(FileInputStream.
java:66)
at org.apache.log4j.xml.DOMConfigurator.doConfigure
(DOMConfigurator.java:583)
at org.apache.log4j.xml.DOMConfigurator.configure
(DOMConfigurator.java:687)
at com.tsystems.blt.j2ee.log.TDSLRechercheLogger.<c
linit>
(TDSLRechercheLogger.java:17)
at com.tsystems.blt.j2ee.jms.MP_MessageListenerBean
.<clinit>
(MP_MessageListenerBean.java:34)
at sun.reflect.NativeConstructorAccessorImpl.newIn-
stance0
(Native Method)
at sun.reflect.NativeConstructorAccessorImpl.newIn-
stance
(NativeConstructorAccessorImpl.java:39)
at sun.reflect.DelegatingConstructorAccessorImpl.
newInstance
(DelegatingConstructorAccessorImpl.java:27)
at java.lang.reflect.Constructor.newInstance
(Constructor.java:274)
at java.lang.Class.newInstance0(Class.java:308)
at java.lang.Class.newInstance(Class.java:261)
at com.ibm.ejs.container.EJSContainer.loadBeanMeta-
Data
(EJSContainer.java:1596)
at com.ibm.ejs.container.HomeOfHomes.loadBeanMetaData
(HomeOfHomes.java:659)
```

Answer: I assume you are packaging the log4j.jar at the EAR level. It seems you are trying to load your logging configuration directly from the file system. I usually tell people to load the log4j configuration file as a classpath resource. This way, you can put it in a WebSphere Application Server shared library or package it in the EAR. You can use something like:

```
ClassLoader.getSystemResourceAsStream()
```

Or, you can load a system property with the location of the configuration file.

Acknowledgements

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NEWS ROUND-UP

Wily Technology Announces 43 Percent Worldwide Growth in Q3

Wily Tetchnology, the leader in Enterprise Application Management, announced it achieved worldwide sales growth of 43 percent in Q3 2005 compared to the same period in 2004. Demand for Wily's application performance management solutions continued to surge in Q3 as the company released Wily 6, the latest version of its flagship Introscope product, closed on its acquisition of Timestock, , expanded its partnerships with the worlds leading application vendors and maintained a steady pace of international expansion. Year-to-date, Wily has grown worldwide sales by 69 percent compared to the same period in 2004.

"This was another strong quarter for Wily. We continue to grow faster than the market because we offer the most effective solutions for enterprises to ensure the performance and availability of their revenue generating applications," said Dick Williams, president and CEO of Wily Technology, "Companies trust Wily for their application management needs because we provide all the real-time information required for end-to-end application management, and we continue to release innovative new solutions that meet their evolving needs such as Customer Experience Manager, MQ monitoring and the first production error detection solution."

Many leading enterprises across all industries selected Wily in the quarter to meet their application management needs. Key new or extended customer relationships in the third quarter of 2005 included: Caterpillar, Citizens Property Insurance, City of Chicago, Discovery Communications, Honda Canada Manufacturing, Kohls, Motricity, San Diego Data Processing Corporation, UNICCO Service Company, U.S. Bureau of Engraving and Printing, VNU eMedia, World Wide Technology, AIB, AWD GmbH, maufmannische Krankenkasse, MKK, Sekerbank, American International Assurance and SMG Co. Ltd.

Between Q3 2004 and Q3 2005 outside the U.S., Wily achieved 125 percent growth in Europe and 306 percent growth in Asia Pacific. Year-to-date, Wily has grown its combined sales for Europe and Asia by 129 percent compared to the same period in 2004.

In Q3 2005 Wily closed its acquisition of Timestock, and created a new Customer Experience Management business unit to be led by Dave Chapman, former CEO of Timestock. Timestock solutions detect, prioritize and isolatecomplex problems that affect the ability of customers to execute successful transactions in any application, whether it was built on Java, .NET, mainframe, or other technology. Timestock technology will be used to extend the deep application visibility and problem diagnosis capabilities already provided by Introscope, Wily's award-winning application performance managemen solution.

Wily expanded its global network of systems integrators, distributors and resellers to 63 in Q3 by establishing new partnerships with Adanta Systems,Kainos Software Ltd., Millennium Software Solutions , SAFE-IT and TSI. Wily introduced Wily 6 in Q3 2005, a new version of the world's most advanced solution for managing the availability and performance of business-critical web applications. Only Wily 6 can provide application management teams with real-time visibility into actual customer transactions as they cross through heterogeneous systems, from the browser to connected back-ends. Wily 6 supports all leading application platforms and enterprise J2EE software packages, innovations in Wily 6 include Introscope ErrorDetector, the first solution for the detection and diagnosis of serious application errors that can prevent users from completing web transactions; expanded capabilities to monitor IBM WebSphere MQ; and significant deployment and usability enhancements.

Wily also shipped Introscope for SAP NetWeaver in Q3 2005 which enables SAP customers to maximize application uptime and performance through end-to-end, real-time visibility into real transactions by ensuring applications built on SAP NetWeaver and SAP Enterprise Portal successfully meet business goals. Introscope for SAP NetWeaver provides SAP customers with the same performance management tools used by SAP's Active Global Support (AGS) centers.

In Q3 2005, Wily expanded its professional services organization and named Melinda Watson, a 20-year technology veteran, to the position of VP and General Manager of Consulting. Watson will be responsible for the ongoing growth of Wily's professional services organization, which has grown over 110 percent in the past year.

Prolifics Gets IBM's Five Star SOA WebSphere Partner Award

Prolifics, a provider of WebSphere, Portal, SOA and Business Integration solutions, has announced that it was the recipient of IBM's Five Star Value Advantage Plus Certification Award.

The IBM Five Star Certification Award is awarded to Business Partners who are certified sellers for IBM's five software brands - Information Management, WebSphere, Lotus, Tivoli and Rational. To achieve the Five Star Certification Award, IBM Business Partners must be an active participant in the IBM Value Advantage Program, which is designed to award Business Partners who successfully integrate IBM middleware into their software solutions.

"Prolifics is honored to receive the Five Star Certification Award," said Frank Vafier, Prolifics' CEO. "Prolifics is proud of its dedicated WebSphere consulting team, and this award is a direct result of their hard work and achievements."

As a Premier-Level IBM Business Partner, Prolifics was selected as one of three worldwide WebSphere Service Providers retained by IBM to service IBM customers. Prolifics brings highly specialized skills to all aspects of the full project lifecycle, including architectural advisement, development through deployment, administration and training. In addition

to IBM's Five Star Value Advantage Plus Certification Award, Prolifics also received the IBM Business Partner Leadership Award in 2004 and awards for many of its WebSphere and Portal custom solutions.

IBM and SOA Software Partner with Merrill Lynch To Scale Out SOA and Web Services

IBM and SOA Software will work with Merrill Lynch to standardize on SOA Software Service Manager to secure and manage Web services. This large scale engagement, which leverages SOA Software's scalable Web service management software, was entered into jointly with SOA Software's services partner, IBM Global Services.

"The partnership of IBM Global Services and SOA Software will allow us to scale out use of SOA and Web services--technologies that are a strategic cornerstone of our process re-engineering initiatives," said Andy Brown, chief technology architect of Merrill Lynch. "We decided to standardize on SOA Software because of the feature richness, scalability and high performance."

SOA Software's Service Manager provides comprehensive security, monitoring, management and governance of Web services and Service-Oriented Architecture, the company says. "This is a great validation of our technology and thought leadership," said Eric Pulier (pictured), founder and chairman of SOA Software. "I am very proud of what our team has been able to accomplish working with Merrill Lynch to set a course for leadership in SOA management and find the solutions that will take them there. SOA Software is now consistently winning the larger engagements worldwide where scalability is a factor."

Dassault and IBM Launch Product Lifecycle Management Portfolio

Dassault Systemes and IBM has announced the release of Version 5 of their Product Lifecycle Management (PLM) portfolio, comprised of CATIA for collaborative product development, and ENOVIA and SMARTEAM for product data and life- cycle management, collaboration, and decision support. Concurrently, Dassault Systemes announced DELMIA V5R16 for the digital development of factory and production processes.

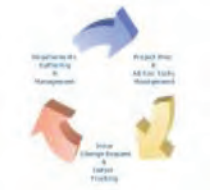
"V5R16 helps our customers create more innovative products and leverage the talents of their global supply chains," noted Dominique Florack, Executive Vice President, R&D, Dassault Systemes. "The new release increases the power of the V5 PLM platform in three ways: by delivering unified PLM solutions for unrivalled gains in productivity; by extending the reach of 3D XML within the enterprise for ease of communication; and by accelerating performance with Microsoft Windows 64-bit support."

Florack outlined several new benefits:

Optimizes Business Processes - V5R16 extends the coverage of the large portfolio of V5 process-centric applications. It delivers significant new PLM capabilities for all industries in the modeling, simulation and electrical domains. New Product Simulation Management capabilities in ENOVIA fully integrate product simulation with design and lifecycle management processes - improving productivity for all companies that perform and manage product simulations.

Empowers Value Chain Innovation - V5R16 delivers powerful new collaboration capabilities within ENOVIA V5 VPM Navigator and SMARTEAM TeamPDM, enabling extended networks of partners to work together in globally distributed 3D environments. Entire engineering packages can now be shared and managed bi-directionally while protecting intellectual property, enabling true concurrent engineering across the value chain.

Streamlines Engineering-to-Manufacturing Cycles - V5R16 delivers on Dassault Systemes' Product-Process-Resource model. Major new extensions in the ENOVIA Engineering and Manufacturing hubs enable companies to obtain unique competitive advantages from the CATIA, DELMIA, ENOVIA and SMARTEAM PLM applications. V5R16 improves the integration of engineering and manufacturing environments: engineering specifications captured within the 3D environment are automatically made available and accounted for during manufacturing process planning, thereby ensuring a lean process flow from design intent to production set-up.



Continuously Grows Intellectual Capital - V5R16 captures and re-uses business processes and intellectual property, both at the enterprise level with Enterprise Process Management, leveraging IBM Websphere technology, and at the Engineering or Manufacturing level, with the V5 Business Process Knowledge templates.

Maximizes Standard Adoption - V5R16 has been designed to deliver a comprehensive 64-bit PLM architecture, and continues to leverage the proven openness of the V5 platform by providing major XML enhancements through its combined 3DXML and web services strategy. Adoption of the V5 architecture continues to grow, with two new industry-leading CAA partners and 360 V5 applications already available. New integration of the 3D XML Player with Lotus Notes enhances collaboration and joint decision-making by sharing 3D product and business information.

"V5R16 is a key enabler of the processes we are deploying on the 787 program," said Kevin Fowler, Vice President, Systems Integration Processes & Tools, The Boeing Company. "Most notable is the integration of Product Lifecycle Management using 3D-only design data across engineering definition, manufacturing and product support. This demonstrates the continuous innovation and breakthroughs we are realizing working with Dassault Systemes on the 787 program."

At Fissler, a developer of innovative cookware and kitchen accessories, Dr. Andreas Hillenmeier, Manager of Product Development, noted, "Our Intensa cooking systems are renowned worldwide. They are synonymous with quality and innovation. CATIA V5 and SMARTEAM have been instrumental in helping us constantly exceed our customers' expectations. We are all excited about the potential for CATIA V5 and SMARTEAM to further improve our products and efficiency."

"Helping customers increase their competitiveness is always foremost on our minds. Our ability to help our customers respond to their critical challenges in a changing and highly competitive environment is certainly strengthened with this release. Leveraging the support of IBM's open and scalable PLM infrastructure, we can offer even more value to customers engaged in continuous innovation," says Walter Donaldson, General Manager, Product Lifecycle management, IBM. CATIA for collaborative product development - V5R16 accelerates collaborative product design with 64-bit support of the full CATIA portfolio on Microsoft Windows. It strengthens virtual product design and simulation by significantly improving the CATIA solutions in the simulation, electrical, shipbuilding, and modeling domains. It expands the usefulness of the open and extremely lightweight 3D XML format by embedding additional PLM product information, such as annotations and animations. The new release enables 3D-only paperless design-to-manufacturing, while VPM Navigator and TeamPDM streamline product development, by enabling teams to seamlessly manage advanced design process information from within a single engineering desktop.

Gartner: Technical Aptitude No Longer Enough for IT Professionals

Gartner has warned IT professionals that technical aptitude will no longer be sufficient to secure their future in IT organisations. Scepticism toward the effectiveness of IT, the rise of IT automation, worldwide geographic labour shifts and multi-sourcing will lead to the emergence of a new breed of IT professional, the 'versatilist', who will have technical aptitude, local knowledge, knowledge of industry processes and leadership ability.

Successful IT professionals will identify themselves not just by occupation-"I work in IT"-but by the industry, process and change programs in which they participate-"I spent two years helping design an Internet selling process that boosted revenue by 20 per cent". IT professionals must also prove that they understand the realities of the business, such as industry, core processes, customer bases, regulatory environment, culture and constraints. Gartner predicts that by 2010, six out of ten IT professionals will assume business-facing roles.

Regardless of whether the IT professional works in a corporate IT organisation, in an outsourcing team, in product development or in business units, their areas of expertise, knowledge and skills will change. "Some will be bolstered, some will be carved up, some will be redistributed and some will be displaced," said Diane Morello, vice president of research at Gartner. By 2010, Gartner predicts that IT departments in midsize and large companies will be 30 percent smaller than they are in 2005.

"If the last decade represented the era of specialists, this decade will mark the era of the versatilist," said Ms. Morello. "Versalitists are people whose numerous roles, assignments and experiences are enabling them to synthesize knowledge and context to fuel business value. Versatilists are applying their depth of skills and experiences to a rich scope of situations and challenges and implementing their cross-organisational insight to flesh out teams and fill competency gaps."

With versatilists on staff, business and service providers can stretch their personnel budgets further than they could with specialists. IT professionals with broad insight, deep process knowledge and industry orientated competencies will help companies incorporate innovation and multiple perspectives into IT-based processes, products, services and technologies.

According to Gartner, the landscape for IT professionals will radically change by 2010 as a result of four major global forces. "Enabled by high-speed global networks and driven by companies looking for highly competitive IT skills, knowledge bases and services, global sourcing will become a standard part of companies' sourcing portfolio and will put many IT professionals in competition against their peers in other geographical markets," said Ms Morello.

Secondly, IT automation will also transform the IT organisation and the IT profession; most notably software development, testing, remote system monitoring, operation centers, technical support, storage and networking. Third, the consumerisation of IT-personal devices, online services, mobile phones-will demystify IT, reduce tolerance not only for complicated systems and applications, but also for the departments and people required to run them. Finally, business restructuring-mergers, acquisitions, divestitures, consolidations, layoffs, outsourcing, financial rebuilding, bankruptcies-will challenge IT professional positioning and weaken employee commitment.

"Faced with the primary forces that are challenging the profession, many IT professionals are taking a long, deliberate look at the occupation to decide whether it represents opportunities or dead ends," said Ms. Morello. "IT professionals should decide now if they wish to remain in the realm of 'pure technology' or redirect themselves to new domains of expertise and develop practical experiences in industries, market segments and core business processes that would help them in that domain."

By 2010, Gartner foresees the traditional IT field splintering into four distinct domains of expertise: Technology infrastructure and services. Opportunities in technology infrastructure and services, the foundation of the IT profession, will grow in service, hardware and software vendors-many in developing economies-and wane in user companies.

Network design will remain strong everywhere. Information design and management. Business intelligence, online consumer services, work enhancement initiatives, search-and-retrieval practices and collaboration all will grow in user companies, systems integrators and consulting companies. Linguistics, language skills, business and cultural knowledge, and knowledge management will be fertile ground.

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MQSoftware Schedules New and Updated WebSphere Training Courses

MQSoftware, Inc., a provider of business transaction assurance and middleware management solutions, training and services, has scheduled three new training courses: MQS1148: Web Services in WebSphere, MQS1182: WebSphere Application Server: Default Messaging Provider and JMS Programming, and MQS1172: WebSphere Process Server Workshop. Several WebSphere training courses have been updated to address the features and content of IBM WebSphere Message Broker Version 6. These courses will be offered in Minneapolis and Wayne, New Jersey.

MQS1126: WebSphere MQ V6 and WebSphere Message Broker V6 for Administrators
January 30 – February 3, 2006, Minneapolis
February 27 – March 3, 2006, Wayne
April 3 – 7, 2006, Minneapolis

MQS1141: WebSphere Message Broker V6 Developers Workshop
December 5 – 9, 2005, Wayne
January 9 – 13, 2006, Minneapolis
March 6 – 10, 2006, Wayne
April 10 – 14, 2006, Minneapolis

MQS1142: WebSphere Message Broker V6 Advanced Topics
February 6 – 10, 2006, Minneapolis
April 24 – 28, 2006, Wayne

MQS1143: WebSphere Message Broker V6 for Administrators
February 1 – 3, 2006, Minneapolis
March 1 – 3, 2006, Wayne
April 5 – 7, 2006, Minneapolis

MQS1148: Web Services in WebSphere
January 17 – 20, 2006, Minneapolis
March 13 – 16, 2006, Wayne

MQS1172: WebSphere Process Server Workshop
January 30 – February 3, 2006, Minneapolis
April 17 – 21, 2006, Wayne

MQS1182: WebSphere Application Server Default Messaging Provider and JMS Programming
November 28 – December 2, 2005, Minneapolis
February 13 – 17, 2006, Minneapolis
April 3 – 7, 2006, Wayne

The above courses, and other MQSoftware courses, are also available as private or customized classes, delivered on-site at the customer's facilities. For more information about private or customized courses, contact MQSoftware University (800-998-2858), or email to training2@mqsoftware.com. For more information on WebSphere Message Broker V6, replay Eric Olson's Web Seminar "What's New in Message Broker Version 6?," available from the MQSoftware Website: www.mqsoftware.com.

IBM's Viper Beta Testing Program Announced at XML 2005 Conference

In a keynote address at the XML 2005 Conference, Bob Picciano, vice president of database servers for IBM, outlined the company's plans for DB2 Viper--the industry's first database designed with both native XML data management and relational data capability. Picciano also announced that Viper is entering open testing and evaluation by qualified customers, developers and partners.

Scheduled for release in 2006, DB2 Viper is expected to lead the way to a new era in data management by creating unparalleled opportunities for users to extract value from their business information.

"DB2 Viper will fundamentally change the rules of the database game," said Picciano. "With Viper at the heart of their information infrastructure, customers will rapidly transition from conventional data management practices to unprecedented information management techniques that enable them to leverage information as a service."

Viper is expected to be the only database product able to seamlessly manage both conventional relational data and XML data without requiring the XML data to be reformatted or placed into a large object within the database.

This breakthrough will enable customers to increase the availability, speed and versatility of their information, while dramatically reducing administrative costs associated with existing data management techniques. It also will significantly reduce the complexity and time a typical developer spends creating applications able to access both relational data and XML repositories. Viper's native XML capability also will greatly benefit service oriented architecture (SOA) implementations, which rely upon the ability to access a myriad of data stored across multiple formats. By freeing data from the static form it has been forced into by relational-only database products, Viper can deliver information as a service that is readily accessed in SOA environments.

"Our development time using Viper's native XML store is a radical improvement over existing XML 'shred' technology," said Thore Thomassen, senior enterprise architect for Storebrand, a major supplier of insurance and financial services. "We are now able to make schema changes in minutes rather than days and will dramatically improve our customer response time."

In addition breaking new ground with its native XML capability, DB2 Viper also will be the first database to support all three common methods of database partitioning at the same time - a major innovation in improving data management and information availability. By simultaneously handling range partitioning, multi-dimensional clustering and hashing, Viper will enable organizations to arrange and order their information in the way that best suits their individual business requirements and demands.

Intermec Embeds IBM WebSphere RFID Software into IF5 RFID Reader

Intermec has embedded IBM's WebSphere RFID Device Infrastructure (WRDI) into the Intermec IF5 RFID reader, creating an "intelligent" RFID reader that automates the process of routing and man-

aging incoming data from RFID tags, even from remote locations.

The new WRDI capabilities, available immediately, give IF5 readers edge-server capabilities including the ability to perform on-board decision-making, reducing network traffic by filtering incoming data from external RFID tags and sending only the most pertinent information upstream to a company's application server. WRDI also provides the readers with a platform that can easily integrate and reconcile RFID information with data used in other parts of the business.

"As the proliferation of RFID deployments continue, the amount of data that flows between RFID tags and readers expands exponentially," said Intermec Vice President Mike Wills. "Yet the benefits of RFID are only as good as the data that streams into the system. The combination of the IF5 and IBM's powerful middleware provides companies with an intuitive solution that turns the flow of data into business-critical information."

IBM's WRDI was developed for RFID device manufacturers who need an embedded open-standards based software platform to provide automatic RFID data collection and reporting from remote locations where on-site IT services are not available. Embedded into the IF5 reader, the platform allows the reader to route data to an IBM RFID WebSphere Premises Server, as well as control RFID printers, such as the Intermec PM4i.

Also integrated into the WRDI framework is IBM's WebSphere Everyplace Device Manager, which provides connectivity to the IBM Tivoli Systems Management suite to enable centralized device management and the ability to download new RFID applications or device software updates to readers installed in remote locations. IBM's software makes radio tagging a strategic business function, helping RFID go beyond simply exchanging or managing the flow of data. WRDI extracts value from the captured information and can potentially convert that information into an electronic service that can help perform strategic functions.

For example, the software can move product or operational information into systems that analyze trends in the supply chain that shed light on a company's efficiency or sales trends. As a result, RFID network administrators possess the ability to gain instant and enhanced visibility into RFID-tagged pallets and products.

IBM, Oracle, BEA, JBoss, Microsoft, and Sun Come Out Gunning in SYS-CON's Application Sever Shoot-Out

SYS-CON Media's Group Publisher Jeremy Geelan and Java Developer Journal's Enterprise Editor Yakov Fain led the discussion at SYS-CON's second annual Application Server Shoot-Out - webcast live around the world from the famous 4th floor Reuters television studio in New York City's Times Square on Friday.

Executives from IBM, BEA, JBoss, Microsoft, Oracle, and Sun debated diverse aspects of their application server offerings. A discussion of price points, from the JBoss open-source model which emphasizes service revenues, to the more traditional business models from most of the other vendors was followed by a discussion of the technical merits of each platform and how each company is uniquely striving to serve what it perceives as its customers' needs.

The six industry experts involved in the Shoot-Out this year were Mark Heid (IBM), Gary McBride (BEA), Shaun Connolly (JBoss), Dino Chiesa (Microsoft), Mike Lehmann (Oracle), and Rich Sharples (Sun). The panel predictably discussed open source, but in ways that might have been unexpected. One of the more interesting discussion points, posed by Yakov Fain, for example, involved platform modifications (with J2SE, for example) and risk mitigation.

Chiesa said Microsoft's customers always have concerns that companies might disappear, in the manner of "Wang or SGI," so derive confidence in Redmond's approach to provide the features they demand while mitigating their risk by assuring customers that the company is here to stay. "I agree, risk mitigation is what this is really all about," echoed Mike Lehmann. "Oracle layers in the features that our customers find to be the most useful and help them drive and maintain competitive advantage."

"(And there is) risk around vendor lock-in," noted IBM's Heid. "But IBM has been a leader...for a very long time." He also noted that the company and its customers "can't be hogtied by the standards-setting process in cases where our customers want fo move faster."

BEA's McBride picked up on Heid's point, saying, "Where there no standards available, BEA will innovate, and where there are (valuable) standards, BEA will adopt. We contribute greatly to the open standards community."

"At JBoss our mantra is open source, open standards," Connolly added. "Simplicity (is) as a key piece of our vision (and) we must remain portable. The benefit is that being an open source company really keeps each group building the application sever innovating at the highest levels."

Sun's Sharples noted that the key is to have software that is "integrated in that the stuff all works...and integratable (in that) when you are trying to replace enterprise middleware, you can't just rip tthings apart, you need standards. Java EE is one of them, for example." He added that this discussion is ongoing at Sun, among Sun's customers, and in the broader community, noting, "one important thing to think about is that the software ecosystem is bigger than Java (Enterprise). How would people like to see (it) grow? Should it grow up the stack, for example?"

Geelan commented that there seems to be "an embarrassment of riches" among customer offerings by these companies today, and asked them to focus on a single key aspect of what they offer to customers. The answers ranged from "simplicity" to "independence" to "completeness" to "flexibility" to "productivity," reflecting the diverse views held by the panel members and the companies they represent.

The hour allotted for this event passed quickly, with each panel member given a fair chance to answer several penetrating questions posed by Fain and Geelan. The entire webcast is available at www.sys-con.com.

Extending JAAS

Advanced Authentication in WAS PART 2

BY KEYS BOTZUM, BILL HINES, PAUL ILECHKO, MESSAOUD BENANTAR

The advanced authentication features in IBM WebSphere Application Server V6 support a more flexible authentication model with a new highly customizable authentication framework that's based on – and extends – Java Authentication and Authorization Service (JAAS).

ABOUT THE AUTHORS

Keys Botzum is a Senior Technical Staff Member with IBM Software Services for WebSphere. He holds a Masters degree in Computer Science from Stanford University and a B.S. in Applied Mathematics/Computer Science from Carnegie Mellon University.

Bill Hines is a Senior Certified Consulting IT Specialist with IBM Software Services for WebSphere. His expertise includes installation, configuration, tuning, dynacache, security, troubleshooting, and design/architecture of enterprise J2EE WebSphere applications.

Paul Ilechko is a Senior Solutions Architect with IBM Software Services for WebSphere. He has been involved with WebSphere and J2EE technology almost since their inception. He has a B.Sc. in Mathematics from the University of London.

Messaoud Benantar is a senior software engineer with IBM Software Services for WebSphere. He spent most of his career as a software developer working in IBM Large Systems Division, Software Group/Tivoli and IBM Global Services. His focus is on middleware and computing security.

The full source code with all details is available in the included download file, but as you can see, we test whether the user wants to be an administrator and then check to see if they are in the admin group. If the user wants to be an administrator and is in the admin group, we leave the group list untouched.
In this case, the user's group list is unaltered, since the user is in the admin group and wants to be in that group. After determining the group list, we create a subject and return it to WebSphere Application Server using TAIResult. The resulting output from the PrintUserInfo servlet is shown in Figure 2.

Figure 10 shows that the user's subject contains the unique group ID customRealm/987, which corresponds to the admin group in our registry. This is essentially the subject as WebSphere Application Server would have created it.

Case 2

Now, let's do this again -- this time customizing the groups -- and see how it is different.

Close the browser to destroy the user's credential, reopen a new browser and log in again with the same user. If we uncheck the administrative privileges box (indicating this user does not wish to log in with admin privileges), the code previously shown is executed. In this case, however, the wantsAdmin variable is set to false. As a result, the admin group will be removed from the group list. This also means that the customGroups Boolean will be set to true.

As a result, we will create a slightly different custom cache key to ensure that the two subjects are distinct.

The output for this case is shown in Figure 3. Notice that the user still has the admin group defined in the user registry, but we have removed it from the custom subject.

You can observe other use cases by reviewing the sample code in the download file, such as the case where a user who does not belong to the admin group asks for admin privileges. The sample also checks the user's password, even though this is something you might not typically do in a real TAI, as its purpose, after all, is to trust (the T in TAI!) the front end authenticator.

Now, let's look at a really interesting situation regarding our last example. Since we are using a subject that contains custom group information in the scenario with the admin group removed, what would happen if our subject has to be recreated later? We discussed this possibility in the cache key section earlier. To show how important this is, we will create a scenario and see what happens if we had not used our custom cache key. Here is the code we use for creating the subject:

Listing: 1

```
private Subject createSubject(String userid, String
uniqueid, List groups,
                    String key) {
   Subject subject = new Subject();
   Hashtable hashtable = new Hashtable();
   hashtable.put(AttributeNameConstants.
WSCREDENTIAL_UNIQUEID, uniqueid);
   hashtable.put(AttributeNameConstants.
WSCREDENTIAL_SECURITYNAME, userid);
   hashtable.put(AttributeNameConstants.
WSCREDENTIAL_GROUPS, groups);
   System.out.println("Subject cache key is " +
key);
   hashtable.put(AttributeNameConstants.
WSCREDENTIAL_CACHE_KEY, key);
   subject.getPublicCredentials().add(hashtable);

   return subject;
}
```

Go ahead and comment out the line of code out that sets the cache key, rebuild it, and then update the TAI JAR file. Once that is done, follow these steps:
1. Start two application servers (non-clus-

tered) in the same cell, with both running our sample application. Server1 is listening on port 9443 and server2 is listening on port 9444.

2. We will run the application's login.jsp from server1 and login with a member of the admin group, leaving the administrative privileges box unchecked. This will execute the section of code that creates the custom subject (by removing the admin group from the user's subject).
3. This will display the page shown in Figure

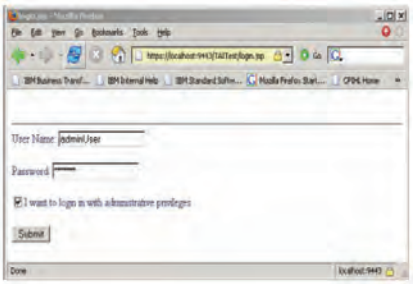


Figure 1: Example login page

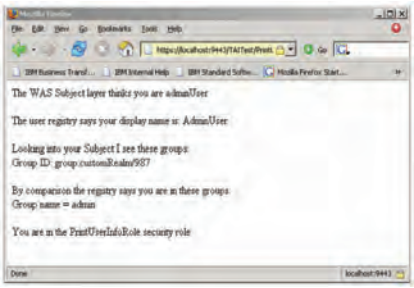


Figure 2: Admin user logged in with admin privileges

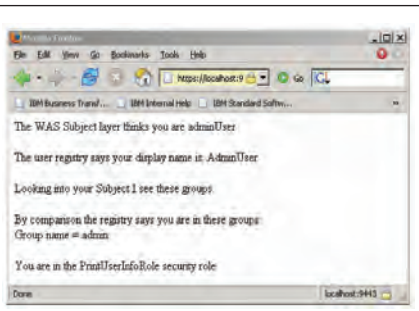


Figure 3: User's custom subject information with admin group move

11: our admin user with the admin group stripped from the custom subject. This custom subject has been cached on server1, and the LTPA token has been created and sent to the user's browser. So far, so good.

4. Now, stop server1 and simply modify the URL in the browser's address window so that the port is changed from server1's 9443 to server2's 9444, then press Enter. This sends the request to the instance of our application that has thus far been idling unused on server2. What we see now is shown in Figure 4. Notice that the admin group has reappeared in the user's subject! In a real-life scenario, this change would likely be much more subtle and difficult to detect.

Let us review what has happened behind the scenes. We ran this scenario with the powerful WebSphere Application Server trace facility on (we used com.ibm.ws.security.* and com.ibm.websphere.security.*), so we will show a few snippets for better understanding.

- When the request came in to server2, WebSphere Application Server realized that the URI was protected:

```
[5/11/05 14:41:12:598 EDT] 0000003a WebCollaborat
3   URI =  /PrintUserInfo.GET is
protected
```

- WebSphere Application Server sees the LTPA cookie in the request header and tries to retrieve the corresponding subject from its own security cache. Since this was in server1, it is not found.
- Next, WebSphere Application Server tries to use DynaCache to retrieve the subject:

```
   [5/11/05 14:41:12:649 EDT] 0000003a AuthCache
<  getSubject(token)
subject=null Exit
   [5/11/05 14:41:12:649 EDT] 0000003a distCon-
textMa >
getOpaqueTokenFromCacheOrOriginatingServer Entry
   [5/11/05 14:41:12:649 EDT] 0000003a distCon-
textMa 3   Getting distributed object
from DynaCache.
```

- The subject is not found in DynaCache, so WebSphere Application Server next attempts to get the subject from the original server via an MBean:

```
   [5/11/05 14:41:12:719 EDT] 0000003a
WSCredentialT <
getDistributedObjectNotShared (null) Exit
   [5/11/05 14:41:12:719 EDT] 0000003a distCon-
textMa 3   Not found in DynaCache,
getting distributed object using MBean.
```

- To determine where the originating server is, WebSphere Application Server decrypts the LTPA token, which has the server name and SOAP admin port:

```
[5/11/05 14:41:12:759 EDT] 0000003a LTPAToken2
3   tokenString after decrypt:
expire:1115844008917$host:billhinest40.hines.ibm.
com$java.naming.provider.url:corb
aloc\:iiop\:billhinest40.hines.ibm.com\:9810/WsnAdm
inNameService$port:8878$process
.serverName:HinesCell01\:Node01\:server1$security.
authMechOID:oid\:1.3.18.0.2.30.2
$type:SOAP$u:user\:customRealm/
456%1115844008947%fwJYbzUveypeYKWrjjzlZqfhfqHyXwoUa
pknRpoV2FfyMoQcU2hHBGBaU4C648tr40vySBdFJ2SXYN0MFkOW
VVS80nywQYiqEE9Bm2JsezPjTDKWWgy
S8vnBpq6YobrNdlf5uTlOFREZHAo8cv4w47fJRNoE9ohZkS26
t4lrGog=
```

- Of course, the attempt fails, as server1 is now down:

```
[5/11/05 14:41:14:782 EDT] 0000003a WSCredentialT 3
Exception occurred getting
 admin client connection.
    com.ibm.websphere.management.exception.
ConnectorException: ADMC0016E: The
system cannot create a SOAP connector to connect
to host
billhinest40.hines.ibm.com at port 8878.
```

- WebSphere Application Server will now try to recreate the user's subject using token information:

```
[5/11/05 14:41:14:822 EDT] 0000003a ltpaLoginModu
3   Using credential token for
authentication
[5/11/05 14:41:14:822 EDT] 0000003a ltpaLoginModu
3   Converting SSO token to
authentication token.
[5/11/05 14:41:14:822 EDT] 0000003a LTPAServerObj
>  validateToken Entry
[5/11/05 14:41:14:822 EDT] 0000003a LTPAServerObj
```

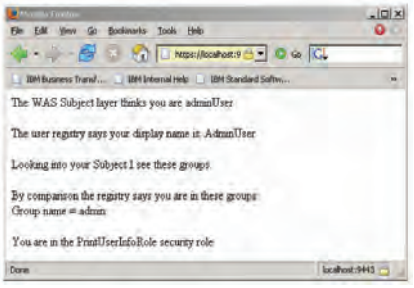


Figure 4: 1. User's custom subject information with admin group rmove

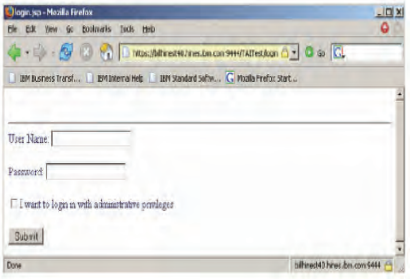


Figure 5: Redirect back to the login JSP with error

```
<  BEGIN VALIDATING TOKEN: some
errors may occur, look for SUCCESS: Exit
```

- Without the presence of the custom cache key, WebSphere Application Server recreates the subject by querying the registry to find the user's ID and group associations. This results in a problem that must be clearly understood: the user's credentials have been changed by accident. The user opted to not have admin privileges when they logged in, and now they have the privileges. This should not be allowed to occur.

This is a trivial example, but as you might imagine there are situations where this kind of behavior could be intolerable. Let's run the same test again (the user again leaves the administrative privileges box unchecked), but this time with the custom cache key code back in place. It is very important to understand what happens next, as the failover scenario can result in very subtle errors. To illustrate the new chain of events, we will again show the WebSphere Application Server trace flow:

- As in our previous scenario without the cache key, the attempt to connect to server1 via an MBean fails. But this time, the runtime sees the custom cache key in the LTPA token from the TAI. Since this indicates to WebSphere Application Server that a custom subject was created, WebSphere Application Server should not create the subject on its own; the TAI will have to be called. We can see this in the trace:

```
  [5/11/05 18:41:05:015 EDT] 00000035 distCon-
textMa 3    Exception getting opaque
token from     originating server.
   com.ibm.websphere.security.auth.
WSLoginFailedException: SSO token uniqueID not
null, but opaque token not found.  Need to re-
challenge the user to login again.
[5/11/05 18:41:05:075 EDT] 00000035 TrustAssociat
3    Check if target interceptor
 [1]: examples.was.login.ExampleTAI ...
   [5/11/05 18:41:05:075 EDT] 00000035 TAIWrapper
>  isTargetInterceptor()
Entry
   [5/11/05 18:41:05:075 EDT] 00000035 SystemOut
O    isTargetInterceptor
called
```

- We now arrive at another very important point: When the TAI is invoked again, we do not have the original context that we had on the initial login, where the user had just filled out the login JSP and its contents were included on the request. Hence, the information (such as the administrative privileges checkbox) is not available. Given that this is essential to our decision tree in building the subject, we must detect this and then inform WebSphere Application Server that we cannot process this request.
- This information causes WebSphere Application Server to continue with normal authentication (our sample application has a defined login page, so that is what it will be called). The code to handle this situation is below:

```
if (fromLoginJSP == null || !fromLoginJSP.
equals("Y")) {
   // The TAI has been invoked, but the hidden
flag that indicates
   // that it is from the login JSP is not in
place. This can happen
   // in scenarios such as the user being failed
over to another
   // application server, and this new server
being
   // unable to retrieve the custom subject via
the cache key.
   System.out.println("Didn't come from login JSP.
Default behavior
will occur.");
   return false;
} else {
   System.out.println("TAI will handle request.");
   return true;
}
```

- Notice that we used a hidden field in the login JSP to facilitate this; the TAI checks for the presence of this field to decide whether it is being called as a result of the login JSP being submitted. It would not have been good enough to simply check for the presence of the administrative privileges checkbox; due to the nature of the HTTP protocol, this variable is not included in the request parameters if the box is not checked. The resulting screen is shown in Figure 5, which displays because the application has defined a login page in web.xml. Our TAI had nothing to do with the display of this page.

In cases where the custom subject is not context-sensitive, the TAI can proceed to recreate the subject. If you are using a front-end proxy authenticator, such as IBM Tivoli Access Manager WebSEAL, this will normally be OK, since all necessary context will have been provided. If the subject is recreated, WebSphere Application Server would then create a new LTPA token with the correct server name and admin port number for the server that re-authenticated the user, in this case server2. You will need to be more cautious about this type of error trapping when using your own TAI if it relies on dynamic or environmental factors to modify the subject.

(If you are wondering why our TAI always creates a subject even when the subject just contains default group information, we do this to work around a problem

Callback	WEB_INBOUND	RMI_INBOUND	RMI_OUTBOUND	DEFAULT
NameCallback	available	available	not available	available
PasswordCallback	available	available	not available	available
WSCredTokenCallbackImpl	available	available	not available	available
WSTokenHolderCallback	available	available	not available	available
WSServletRequestCallback	available	not available	not available	not available
WSServletResponseCallback	available	not available	not available	not available
WSAppContextCallback	available	not available	not available	not available
WSProtocolPolicyCallback	not available	not available	available	not available

Table 1 : Available callbacks

with subject caching. See the cache issues section for more.)

JAAS usageJAAS login configurationsJAAS login modulesAs described in the authentication plug points section, custom JAAS login modules can be added to the WebSphere Application Server login configurations to modify the subject. Typical uses of such user-written login modules are to assert some user identity to WebSphere Application Server, or to perform custom identity mapping.

For a login module to assert user identity information to WebSphere Application Server, it must execute prior to the IBM ltpaLoginModule (which creates the user credentials) and place a hashtable of user information in one of two places in the subject: either in the sharedState or the public credentials areas, both of which are normally used portions of any JAAS login module sequence. This user identity assertion must be performed in the JAAS login() method.

Here is a small code fragment showing where to place this in the subject -- this being the shared subject that all JAAS login modules have access to:

```
subject.getPublicCredentials().add(hashtable);
```

The hashtable shown here is assumed to have been created with the exact same format as was shown earlier in the TAI example. The WebSphere Application Server ltpaLoginModule will see this hashtable when it executes its login() method, but rather than authenticating the user and querying the registry, it will directly create credentials using the information found in the hashtable instead. Note that there can be only one hashtable in the subject, otherwise this will become ambiguous. We therefore prefer to place the hashtable in the sharedState area using a well defined key, as follows:

```
sharedState.put(AttributeNameConstants.
WSCREDENTIAL_PROPERTIES_KEY, hashtable);
```

If you are unfamiliar with how to obtain the sharedState object or the subject in a JAAS login module, refer to the Java documentation for JAAS. Both are provided as part of the initialize() method to the login module.

Callbacks available to login modulesAs mentioned earlier, JAAS login modules can use callbacks to obtain information relevant to the authentication from the environment. WebSphere Application Server supports several callbacks, which are described in detail in the WebSphere Application Server Information Center. This table summarizes the available callbacks, and details when a callback is available depending on the login configuration being executed.

Feature	Login module	TAI
IBM proprietary	No, but requires WebSphere Application Server specific code anyway	Yes
Ease of Use	harder	easier
Multi-phase authentication	No	Yes
Suppress Web login challenge*	No	Yes
Can be used for Web calls	Yes	Yes
Can be used for RMI calls	Yes	No
(Re)called for propagation logins	Yes	No

Table 2: JAAS module vs. TAI

Login typesIt is important to understand that login modules are not only called at initial login time; they are called whenever WebSphere Application Server needs to refresh credentials on an application server. As a result, all callback information will not always be available to the login module. This is because some callbacks provide environmental information that is specific to the particular request invocation. For example, if a login module looks for a particular field in a request object - assuming that the user has just provided it - that same login module might fail in another scenario where the user has not just entered input. There are three distinct login scenarios, described here (and discussed further later):

- Initial login - The true first login and authentication by a user. At this time, all callback information, including any user input, should be available.
- Initial login with SSO token - This will normally never occur with custom login modules that have properly created a custom cache key. In a Web-based environment, this type of login can occur when the client hits a different server that cannot access the user's subject (which has been cached by the WebSphere Application Server security runtime). The default behavior at this time will be to re-authenticate, which means calling the TAI if one exists, or otherwise performing the normal WebSphere Application Server authentication process. This is the ordinary login process. However, there is an option available to enable the login to take place without the subject being available, which means that the JAAS login modules will be called. We will discuss this more later.
- Propagation login - In this scenario, a new server has been accessed and the subject is available, but additional verification is required. More precisely, the tokens that represent the subject are available and the subject is to be recreated from the tokens (we will discuss tokens more shortly). In this case, a typical custom login module will generally do nothing. Only login modules that manipulate cus-

Figure 6: RMI_INBOUND login module proxy being added

tom tokens are likely to require any action be performed. In recognition of that, WebSphere Application Server provides a simple method on the existing WSTokenHolderCallback for determining if this is a propagation login. Custom login modules that do not have any meaningful work to perform can easily check for this case. Here is a brief example:

```
if (callback.requiredLogin()) {
   //initial login or initial login w/ SSO case
} else {
   //propagation login. No work required
   return true.
}
```

JAAS module vs. TAIOne obvious question might be when to use a TAI versus login modules for asserting identity information. In general, you want to use TAIs for Web requests if at all possible, because of their simplicity. The Table 2 shows the differences between the two.

* Before the login modules are even invoked, WebSphere Application Server will have challenged the user for their current authentication information. Obviously, if you are trying to develop a Web-based SSO solution, a TAI is the better approach.

As a basic rule of thumb, it is more appropriate to use TAIs for Web authentication and login modules for other situations. Proxy login modulesBefore you can configure your own login modules, we should explain one potentially confusing item when configuring a custom JAAS login module. JAAS is part of the JRE and by default can only see the JVM lib and ext classpaths. To simplify classloading issues, and to keep your JAAS login modules out of the JVM classpath, IBM provides a proxy login module that uses thread-based classloaders, enabling you to place your own custom login modules in the usual places, such as WebSphere Application Server/lib/ext. Figure 6 shows the configuration of a login module where the proxy login module is specified by checking the box for this option.

Custom JAAS login module exampleExample: Identity assertion login moduleOur second example shows how to assert portions of a user's identity to WebSphere Application Server and modify the user's group associations dynamically by using a JAAS login module. Since login modules are more likely to be used with RMI/IIOP, our example uses a simple Java client that contacts an EJB running in WebSphere Application Server. We will not show the EJB client or server code here, since these are irrelevant to the example. Just know that the EJB server code prints out the user subject information just like our earlier servlet example. The EJB implements a single remote method, reverseString().

Our custom login module is named MyBeforeLTPALoginModule. It is in loginexamples.jar which should be placed in WAS-INSTALL/lib/ext. To assert the user information to WebSphere Application Server before it creates the subject on its own, we will insert our login module before the WebSphere Application Server modules on the RMI_INBOUND JAAS login module stack. Figure 14 shows how to configure the login module using the administrative console. Notice that the proxy checkbox discussed above has been selected.

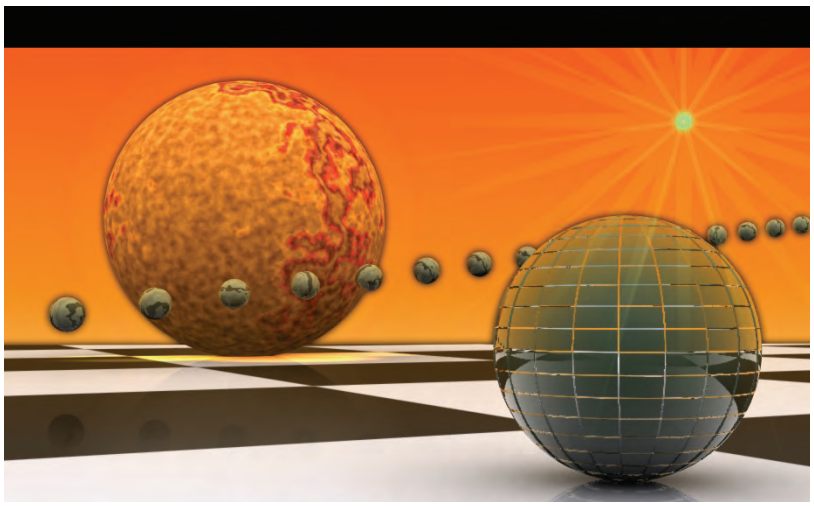
TO BE CONTINUED IN THE NEXT ISSUE

The Five Dimensions of Web Logs

BY ROGER STRUKHOFF

The value of blogging continues to surface as a naval-gazing exercise within the technology community. Does blogging matter? Does anyone care whether or not it matters? Should it matter? These and other meta-questions continue to be posed by those who a.) aren't getting enough hits on their blogs, b.) have too much time on their hands, or c.) are onto one of the seminal transformations in history of humans' communications with one another.

My view has always been that blogging serves two major purposes: it acts as an arbitraging agent within the calcified traditional media world, and it keeps a lot of people off the streets and at their keyboards where they belong.



The first, and obviously more serious, point relates to the self-correcting mechanism that blogging has become, whether in debunking the George W. Bush "sugarcoating memo" story, finding flaws in the latest Xbox, or confirming numerous other reports and thereby turning rumors into stories.

What was that last point? Most people think that 99.9% of blogs are mere intellectual onanism, read by almost nobody, and essentially content-free. This is, of course, true, and it reflects the general output of humans in particular, whether yapping over the fence, on their cell phones, or through their blogs.

Yet there is a certain hive intelligence in the blogosphere that frequently focuses that remaining 0.1 percent onto issues that are important and is able to work as a many-handed reporter in seeking the ultimate truth behind any number of legitimate news stories.

But beyond all that, I think an interesting questions also emerges when people try to define what a blog should be. I recently heard a major technology executive criticized, for example, because he simply turned feedback off to his popular blog, thereby obviating the cumbersome business of having to moderate feedback for obscenity and libel while also distancing himself from the direct flaming criticism that often comes cascading in through user feedback.

Is his blog really a blog, then?

In my opinion, yes it is. To me, there are four essential dimensions to a blog. The first is the intent. Is the blog that of a reporter or an opinion-maker? The second is form. Should it be a collection of hyperlinks punctuated by minimal commentary (a view held fiercely by many who think this is the essence of a blog.) Third, should feedback be enabled? (Is this is one-way march or a two-way street?) Fourth is frequency. Is your blog updated frequently every day, daily, weekly, or whenever the heck you feel like it? And fifth, and far most important to my mind, is RSS.

Without some sort of, well, really simple syndication, a blog just sits there waiting for people to visit (you know, like a website). But through RSS, you are now able to feed it to the two or three people or the many thousands (and maybe millions some day) of people who want to read it.

Without RSS, blogs are simply the latest development on Speaker's Corner, the stemwinding letter-to-the-editor, or the subversive little pamphlet surreptitiously distributed to those who want to join your movement. Not to denigrate even that aspect of the blog, because in this respect, blogs are the latest wrinkle in the honorable tradition of citizen engagement, free speech, and the egalitarian principle that we each have an inalienable right to speak our minds to whomever will listen.

But with RSS, blogs become true publishing for everyone—whether or not anyone has anything valuable to say.

ABOUT THE AUTHOR

Roger Strukhoff, editor-in-chief of *WebSphere Journal*, is West Coast Bureau Chief for the SYS-CON News Desk, and President of www.wdva.com. He spent 15 years with Miller Freeman Publications and The International Data Group (IDG), then co-founded CoverOne Media, a custom publishing agency that he sold in 2004. His work has won awards from the American Business Media, Western Press Association, Illinois Press Association, and the Magazine Publishers' Association. Read his blog at http://www.rssblog.linuxworld.com. roger@sys-con.com

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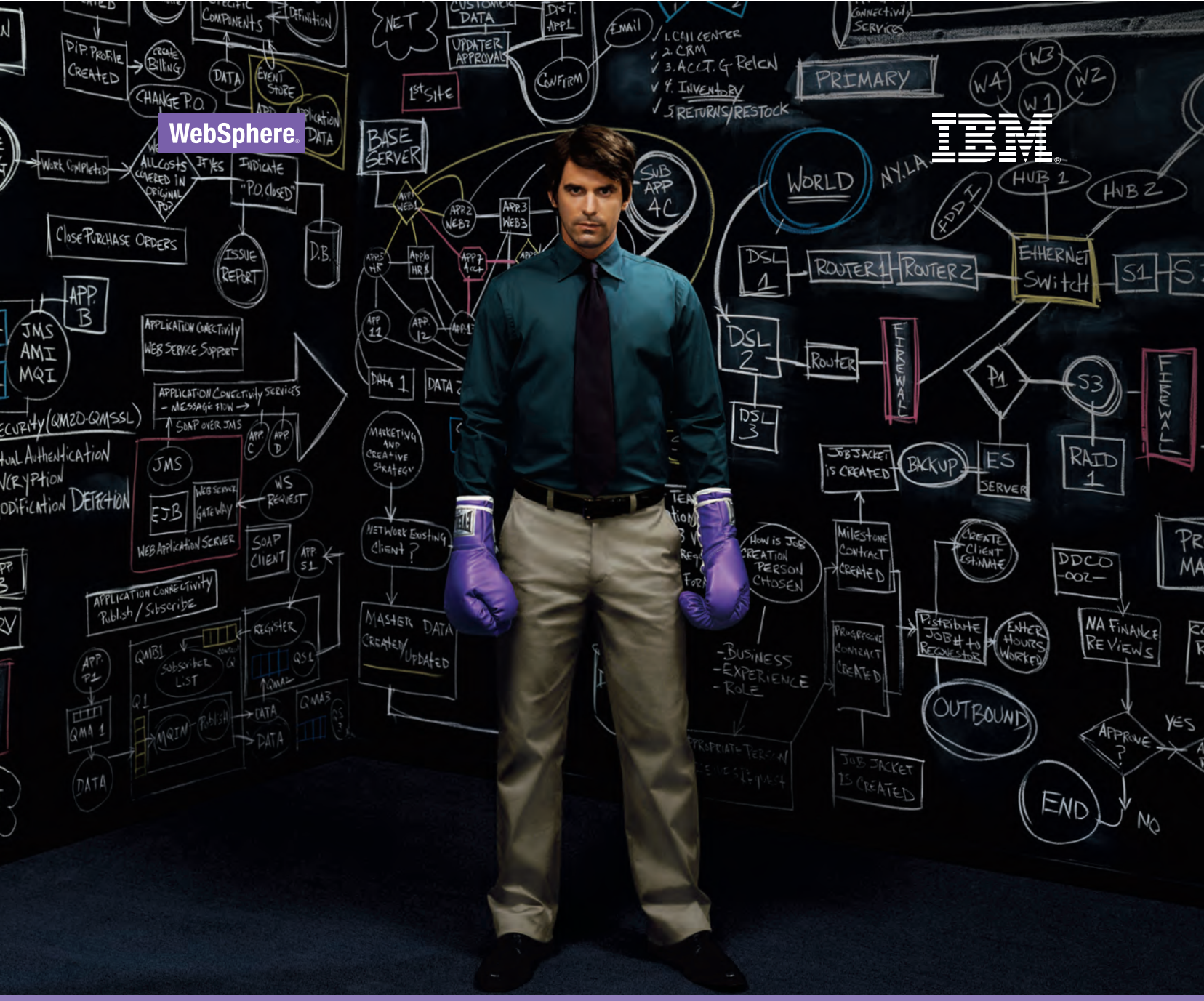

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