



White Paper

Best Practices and a Must Have Toolset for SOA Migration Projects

Six Ways to Leverage Embarcadero All-Access

Ron Lewis, CDO Technologies

February 2010

Corporate Headquarters
100 California Street, 12th Floor
San Francisco, California 94111

EMEA Headquarters
York House
18 York Road
Maidenhead, Berkshire
SL6 1SF, United Kingdom

Asia-Pacific Headquarters
L7. 313 La Trobe Street
Melbourne VIC 3000
Australia

INTRODUCTION

It's amazing how many different interpretations three little words like "Service Oriented Architecture" (SOA) can conjure. Ask a manager, software developer, or business owner to provide a definition and you are very likely get three completely different and often unrelated answers—although all three interpretations are likely to have a certain degree of correctness. While this article seeks to avoid the great SOA debate (e.g., "What is a SOA?"), it seeks to provide a set of technologies and a process for overcoming several of the major obstacles which slow down, increase the cost and likelihood of failure for SOA adoption efforts. This whitepaper looks at SOA from three distinct technical perspectives for legacy systems migration and focuses on how to leverage the Embarcadero database and application developer tools to optimize your SOA migration.

This paper looks at SOA from three distinct technical perspectives for legacy systems migration and focuses on how to leverage Embarcadero All-Access as a comprehensive, flexible tool set that can optimize your SOA migration. The All-Access SOA 'toolbox' is a set of tools that can enable teams to manage their SOA projects throughout the lifecycle, from discovery through delivery. The flexible licensing saves money by being able to share tools across teams and access various versions with ease. And because nearly every organization has a heterogeneous environment, its ideal to have one set of tools that supports all major platforms. The six activities Embarcadero tools facilitate are:

1. Automating SOA discovery
2. Providing data integration automation
3. Providing Business Process Modeling (BPM) support
4. Capturing Key Performance Parameters (KPPs) for the existing databases
5. Helping design, build, and register web services
6. Monitoring the data services tier

The underlying premise of SOA is to essentially decouple business data from business processes in order to allow data to be exposed through web services. As such there are several key SOA components that must be present. Each solution must be comprised of at least:

- Web Service Definition Language (WSDLs) that provide the basic specifications for interacting with web services.
- Universal Data Definition Interface (UDDI) that enables users to discovery of the WSDLs, which describe the business process execution language (BPEL).
- Business Process Execution Language for Web Service (BPEL4WS) that describe critical business processes in a web service context. The interdependency of these pieces can make defining the construction process fairly difficult.
- Web Service Components (WS-Transaction, WS-Security) that provides the communication channels and backend services between and for SOA parts.
- Messaging Components (SOAP messages) that provide a common SOA protocol for exchanging data between components.

The service oriented philosophy assumes that organizations migrating to SOA have an in-depth understanding of the existing environments, solutions, business processes, business data, and consumption/transformation rules for data—which is often not true. As a result, this understanding must be derived from production systems; because this is an expensive endeavor it is often downplayed or skipped. Warning!!! Failure to do adequate discovery is a common denominator for unexpected cost overruns, schedule slips, and project failure for SOA migration efforts.

The underlying premise of this paper is based on two assumptions—automated, data-centric systems are being employed to facilitate the business needs and that the environment is under some degree of control by the organization seeking to migrate to SOA. It does not assume system or business process documentation exists. Lack of current, relevant, and accurate documentation is a problem plaguing most software development projects.

1. AUTOMATING SOA DISCOVERY

DATA DISCOVERY—Goal: Build a Common Data Model

One of the problems SOA adopters encounter is a lack of information about the data within the organization; the larger the organization, the greater the likelihood that data has become sprawled throughout the organization. Large organizations often have numerous copies of data, stored using disparate methods. These data silos can make building a common data picture or data model very difficult. There's an entire data integration lifecycle that is used to define the process of unifying the data picture and we'll touch on it here.

The data integration lifecycle starts with accessing all of the organizational data. This assumes you are beginning the lifecycle with a fundamental understanding of where all of the organizational data assets reside. Once you have gained access to the organization data resources, you need to profile the data and extract the metadata. Regardless of whether you are based in a legacy mainframe environment, using VSAM, ISAM, or relational databases—it is critical to extract the pertinent metadata and that the extracted metadata is managed. The pertinent metadata is the metadata that defines the particular data residing there. This piece of the SOA migration process is best facilitated by a repository enabled tool such as ER/Studio® Data Architect. The collected metadata should be managed in a repository and accessible via the web to facilitate cross-organizational collaboration. ER/Studio® Enterprise provides very powerful data integration support. It can be used to collect metadata from disparate data sources and quickly build a consolidated view of the common data elements—a huge step towards establishing a common data model.

INFORMATION YOU NEED TO GATHER

In the process of mapping out the data, there is information that should be gathered at the same time you're profiling your data. You should also identify the:

- Data owner
- Data maintainers
- Applications or systems use this data
- Application users

2. PROVIDING DATA INTEGRATION AUTOMATION

Building a common data model is not necessarily overly complex but it is a huge undertaking. A data modeling tool like ER/Studio works well to interrogate all of the data sources and to reverse engineer the physical and logical data models. ER/Studio can take the metadata collected from the schemas and build a rudimentary data dictionary. It can publish the data dictionary in various formats such as Microsoft® Excel, Comma Separated Values file (CSV), and Hyper Text Markup Language (html). Putting together this data dictionary is a critical preliminary step towards building the common data model. Once the data dictionary is published, it should be put in the hands of the data owners, maintainers, and application developers so they can help refine the data dictionary by annotating data transformation and consumption rules which is useful when attempting to identify duplicative data elements.

DERIVING DATA USE RULES FOR STANDARDIZATION FROM DATA SOURCES

In order to standardize data use, you must have a solid understanding of the transformation rules and “consumption rules”. Transformation rules are the rules applied to data when it is being moved between data sources. Consumption rules, conversely, are the rules applied to data by the application to present data within the appropriate business context. Understanding these rules is paramount to building the data services layer for SOA adoption. Identifying transformation rules is usually fairly simple because the transformations have to happen at easily defined places in the architecture. Almost all transformation rules are stored in Extract Transform and Load (ETL) scripts.

DERIVING DATA USE RULES FOR STANDARDIZATION FROM SOURCE CODE

Consumption rules, on the other hand, are much more complicated to identify and derive. Embarcadero provides several tools that are well suited for gathering consumption rules in a production environment. Consumption rules can be implemented within various pieces of the architecture but are typically found as either stored procedures/functions within the database server or as application logic embedded in the application. JBuilder® is a powerful integrated development environment that can be used to identify and extract data manipulation language (DML) embedded in java-based applications. For consumption rules residing in stored procedures or database function calls, both DB Optimizer and Performance Center can be used to profile data use by monitoring and exposing the backend server calls. Both tools provide a wealth of data—DB Optimizer provides the best ability to evaluate the ways data are manipulated to derive consumption rules.

RECORDING DATA USE RULES USING CUSTOM METADATA TAGS

Once these rules are derived, they need to be recorded and associated with the data elements in the physical and logical models. ER/Studio Data Architect provides an ability to create custom tags that store the consumption rules. It also provides native data lineage support for tracking transformation rules. Once the tags have been implemented in the models, ER/Studio can quickly identify deviations from the usage standards. Since all of this can be natively exported to XML, the primary method of communicating within SOA components, this establishes the basics of a data services layer.

3. PROVIDING BUSINESS PROCESS MODELING (BPM) SUPPORT

Business Process Modeling, while not necessarily specifically a SOA task, provides great value when used to streamline SOA migration activities. Business Process Modeling usually takes a top-down approach for defining and describing the key business processes that power an organization. This top-down approach is key for identifying which business processes rely on which data elements and what operations are allowed on the data. These operations are sometimes referred to as a “create, read, update, delete” (CRUD) matrix. Business Process Modeling can help determine the right migration path, for example helping SOA adopters understand which business processes are good candidates for migration to SOA.

Business process modeling using Embarcadero’s ER/Studio® Business Architect helps SOA designers and developers streamline the alignment of technology with business needs and increase the effectiveness of the service-oriented solutions being built as part of the SOA migration. Business Architect can store its models in the ER/Studio Repository which makes it possible to explicitly map the business processes within the models to the data elements within the logical data models created in ER/Studio Data Architect. Business Architect facilitates collaboration across the organization, is based on BPM Notation standards, and allows business architects to import business models created in myriad other formats and tools—such as Visio—into the Business Architect tool. All of this makes the ER/Studio Business Architect invaluable to SOA migration efforts.

4. CAPTURING KEY PERFORMANCE PARAMETERS FOR THE EXISTING SYSTEMS

The two most common complaints about SOA solutions, once the migration has been completed, are the lack of adequate performance and the web-service based applications inability to scale. In order to properly construct a SOA solution that meets the performance requirements, the key performance parameters must be properly captured. This should include backend database performance as well; capturing database performance metrics are critical. This is perceived as challenging, though, because there are few tools that specifically designed to facilitate this. Embarcadero® Performance Center™, although typically used to monitor the health of database servers, provides detailed historical reports that can be used to derive data use metrics and performance baselines. Key parameters that should be captured include: memory, I/O, bandwidth, database contention and users.

5. DESIGN, BUILD, AND REGISTER WEB SERVICES

One of the significant challenges of SOA adoption is refactoring business functionality as fully encapsulated web services. Before a SOA developer can design a web service, he must often perform a full architectural analysis of the existing systems, map out the key business processes associated with each function, and determine the best means of decoupling the business functionality from the data service. This is no easy task. Additionally, there are several components that must interact in order to facilitate the discovery and use of a web service.

Here are a few of the basics:

- A Web Services Definition Language (WSDL) that describes the services must be built
- The web service must be registered with the Universal Description Discovery and Integration (UDDI)
- The security constraints associated with the web service must be annotated in the appropriate WS-Policy language

Embarcadero's JBuilder Web Services Workbench (JBWSW) provides an amazing amount of capability for designing, constructing, testing, and publishing web services. For example, it can convert Java beans and classes to web services, auto-generate the WSDL, be used to construct the test clients for validating a web service discovered through a UDDI registry. JBWSW can also be used to dynamically generate and deploy web service components during the build process. It provides an Integrated Developer Environment (IDE) with tons of functionality to simplify the process of designing, building, and deploying Axis-based web service-enabled applications.

6. MONITORING THE DATA SERVICES TIER

Maintaining the operational data environment is a large part of ensuring that the SOA applications continue to run smoothly. There are two key activities for monitoring the data services tier:

- Ensuring that the availability and performance of key database components within the data services tier
- Maintaining Change Management over the database environment

One of the challenges of maintaining a SOA environment is ensuring that the database servers are running at their peak performance, despite the disparate work load. It's also important that potential bottlenecks can be identified quickly, and that resource performance is continuously monitored. Embarcadero's Performance Center provides an easy-to-understand, easy-to-navigate interface with an overall health indicator index that allows database administrators to identify and diagnose problems in near real-time. This, in addition to the historical reporting, can help database administrators responsible for maintaining the SOA production environments continuously monitor the health of various components comprising the data services tier, and respond to problems quickly and effectively.

Consistency is a mantra for SOA migration. From a change management perspective, it's important that only expected and authorized changes to the database environment are allowed. Maintaining the overall posture of the data services tier manually can be very difficult. Embarcadero's tool, Change Manager provides compare, synchronization, and auditing capabilities that help quickly identify changes to data, schema, and configurations. This is also useful for capturing configurations and creating templates, or for rolling out changes that have been tested successfully in a staging environment and are ready to be pushed to production. Additionally, this can be used to quickly identify and rollback changes that prove disruptive to the production environment. The capabilities provided by Change Manager are a huge plus when the enterprise is relying on the availability of the data services tier.

SUMMARY

It takes a lot of work to migrate legacy apps to a SOA environment. There are lots of moving parts, and plenty of places where SOA adopters can get caught in common SOA migration pitfalls. In this we we discussed how to leverage several of the Embarcadero tools to streamline the migration activities and to reduce the complexity of many tasks. We discussed how to automate data discovery and support data integration goals using ER/Studio Data Architect along with how to leverage Business Architect's features to perform business process modeling and provide collaboration to support organizational business process improvement. This paper also touched on the importance of capturing key performance parameters and monitoring the health of the data services tier using Performance Center and also the use JBuilder Web Services Workbench to quickly design, build, register, and test web services. We successfully avoided the SOA debate – and as promised, we set forth a set of technologies, focusing on how to leverage the Embarcadero database and developer tools to optimize your SOA migration.

ABOUT THE AUTHOR

Ron Lewis is an analyst who specializes in application security for CDO Technologies, a systems integrator that delivers technology-based solutions to government agencies and customers in the private sector. He has worked in the government and commercial security arena for more than 15 years identifying and providing guidance for remediating application vulnerabilities. Ron is considered an industry authority, having authored numerous articles on hardening applications and the hacker mindset. He is also actively involved in industry organizations and efforts such as the Open Web Application Security Project (OWASP) and the Oracle Development Tools User Group (ODTUG).



Embarcadero Technologies, Inc. is a leading provider of award-winning tools for application developers and database professionals so they can design systems right, build them faster and run them better, regardless of their platform or programming language. Ninety of the Fortune 100 and an active community of more than three million users worldwide rely on Embarcadero products to increase productivity, reduce costs, simplify change management and compliance and accelerate innovation. The company's flagship tools include: Embarcadero® Change Manager™, CodeGear™ RAD Studio, DBArtisan®, Delphi®, ER/Studio®, JBuilder® and Rapid SQL®. Founded in 1993, Embarcadero is headquartered in San Francisco, with offices located around the world. Embarcadero is online at www.embarcadero.com