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WhitePaper

Accelerating Web Services Integration With IONA XMLBUS™ & Altova **xmlspy**™

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Executive Summary

Web services technologies are today providing a simple, standards-based means for solving a variety of enterprise integration problems, specifically:

>> Web services give J2EE, CORBA, and legacy system developers tremendous opportunity to preserve and extend their existing investments in enterprise software infrastructure through an evolutionary approach to reusing existing systems, while concurrently maintaining interoperability with the latest emerging technological stands. This common-sense approach system integration results in substantial cost savings to a corporation.

>> The emergence of Web services as a global industry standard is advancing the adoption of systems based on Services-Oriented Architectures (SOA); an approach to integration that maximizes flexibility and minimizes the need for the costly and brittle point-to-point application connectivity techniques common to proprietary integration technologies.

Organizations are today developing and deploying Web services in a number of integration projects; in general, they typically resemble one of two global usage scenarios.

>> Expose a Web service interface to an existing software application where technology limitations or incompatibilities had previously been a barrier to interoperability.

>> Integrate existing application assets with new applications - typically based on J2EE or Microsoft .NET technologies - without tampering with the stable home grown system or incurring the expense of developing new legacy interface code.

This document examines how Altova's xmlspy Development Environment and IONA Technologies can facilitate rapid development, deployment and migration towards a Web service-based Services-Oriented Architecture. Using this approach, any legacy system can be made to be integration-friendly. The xmlspy Development Environment and IONA's Orbix E2A Web Services Integration Platform XMLBus Edition together provide software developers with a comprehensive and flexible means to convert, model, build, test and deploy Web service applications. Adopters of the joint XMLBus and xmlspy product bundling can realize substantial competitive advantage in terms of cost savings and reduced time-to-market - critical in today's challenging markets.

Web Services Technology Overview

Using XML-based technologies including XML Schema, SOAP, WSDL, UDDI and other related technologies, collectively referred to as Web services, an organization can expose programmatic access to business logic (services) and information over the web, to any device, remote process, desktop application or web-application. Web services are transforming the World Wide Web from simple business-to-consumer applications which require human interaction to a distributed federation of loosely-coupled services.

Web services are the long awaited solution to a problem which has been plaguing software developers for decades, specifically how to enable communication between two or more software components distributed across a network. The past decade has brought about numerous attempts to solve this problem, including Microsoft COM, CORBA, Java RMI, and Enterprise Java Beans - each with their own proprietary protocol and also imposing the constraint that proprietary client libraries be present on the remote client's machine. Web services, unlike any of its predecessors, makes no assumption that the same technology will be at both ends of a connection. This means that a Web service created using C++ and Microsoft's .NET development tools can be consumed by a Java component running in a J2EE container.

This feature of Web services makes it a more appropriate candidate for integration middleware than CORBA. Moving distributed application architectures away from tightly coupled technologies such as CORBA and RMI, the internal J2EE communication protocol, is an essential evolutionary step. Web services provide this step, making possible new types of applications that aggregate a set of services into completely integrated, inter-enterprise distributed systems.

Although Web services were positioned as a vehicle for inter-organization integration, the early successes of Web services implementation have been in intra-organizational integration projects. In the wake of these successes, Web services technology is increasingly regarded as the first standard for integration middleware. IONA and Altova believe that this technology will have a profound impact on re-shaping the industry.

Web services today are being adopted by all major software companies, including IBM, Oracle, Sun, Microsoft, Iona, Altova - and hundreds of others, all implementing products based on Web services technologies. IT services organizations are also embracing Web services, often to address enterprise integration problems.

One of the greatest promises of Web services is in its loosely coupled, service-oriented architecture. Most enterprise middleware today employs a mixture of procedure-oriented and data- or document-oriented approaches to satisfy application integration needs. Web services support both approaches, and developers can describe both procedure-oriented and data- or document-oriented Web services.

The following points outline the key characteristics and most promising aspects of Web services:

>> Web services are based on XML technologies and hence provide a vendor- and implementation-independent means for integrating systems.
>> Web services mask the differences among underlying systems through a neutral interface definition mechanism (similar to CORBA's Interface Definition Language), however, a Web Service client software does not utilize a binary encoded protocol nor does it require proprietary stubs on the client machine.
>> Web Services support integration via synchronous procedure or method calls - which invoke functionality in remote applications, and via asynchronous document passing, where remote applications retrieve and act on business documents posted to message queues.
>> Web services, are highly extensible and open to integration with any number of legacy systems, thanks to their complete decoupling from any particular platform or programming language.

As previously mentioned, Web services technologies are all XML-based; the following is an overview of core XML infrastructure technologies which enable Web services:

SOAP

The Simple Object Access Protocol (SOAP) provides an independent, abstract transport protocol enabling communication between two or more remote business systems that use any combination of Internet-enabled hardware and software. SOAP and XML provide the means to agree on common data exchange for exposing services on behalf of existing systems. SOAP is completely neutral with respect to operating system, programming language, or distributed computing platform.

WSDL

The Web Services Description Language (WSDL) is the language for specifying the interface to a Web service. It defines Web Services in terms of endpoints that operate on XML messages. The WSDL syntax allows both the messages and the operations on the messages to be defined in an abstract, modular fashion, so they can be mapped to virtually any imaginable concrete implementations. A Web Service can be mapped to multiple operations (or services) and be bound to one or more transport protocols.

XML Schema

XML Schema is the World Wide Web Consortium's (W3C) official XML data definition language. XML Schemas define the structure and allowable permutations that an XML document can take on, to be considered a member of common family of XML documents. Industry consortiums are joining together to develop XML Schemas that define common
file formats for describing everything from mathematical formulas, research documents, news articles, credit card transactions, accounting audits, medical prescriptions, and much more, with the ultimate goal to enhance software application interoperability through the use of common XML-based file formats expressing both data and content. XML Schema is essentially meta-data (i.e. data which describes data); this self-describing characteristic makes XML Schema ideal for describing data-types for use in Web services applications. For example, a Web service client might not know ahead of time what data constructs are required to interact with a particular service; the client could simply access the XML Schema types as specified by the service's WSDL document.

UDDI

UDDI is a public repository for storing references to Web Services so that clients can find them. The interface to UDDI is defined in XML. These Web services standards have been embraced by a wide set of software vendors. With this wide vendor support, users can anticipate the corresponding promise of ubiquity.

Developing Web Services

Altova's xmlspy® 5 enables creation, testing and debugging of a wide variety of XML documents (XML Schema, XSLT stylesheets, WSDL, UDDI, XML data, etc) which can then be deployed to the IONA Orbix E2A XMLBus 5.4 runtime environment.

The figure below illustrates the different ways in which XMLBus 5.4 and xmlspy 5 can facilitate rapid prototyping, development and integration of applications within the enterprise.

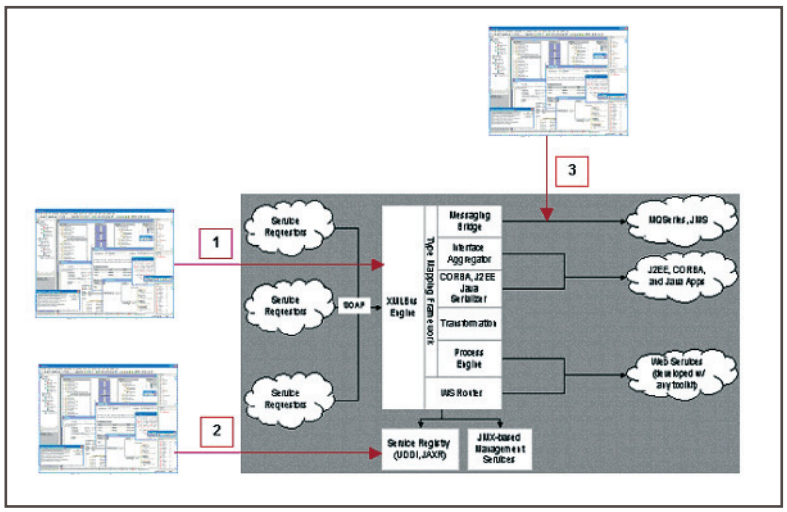

Figure 1: Common XMLBus and xmlspy 5 usage scenarios.

>> xmlspy 5 can be used to develop and structure complex WSDL mappings that could then be deployed to the XMLBus Runtime Environment. The runtime environment then allows incoming service requests to be handled in accordance with the WSDL rules defined in xmlspy.

>> xmlspy 5 generated XML artifacts can be stored in the XMLBus Service Registry which supports UDDI and JAXM. The XML artifacts could be WSDL, XSLT stylesheets or XML schemas to be used as a mapping template for marshalling data from one endpoint (J2EE, CORBA, .Net, MQ Series etc) to another.

>> XML artifacts (WSDL, XSLT stylesheets, XML schemas, XML data etc) can be defined between the XMLBus Runtime elements (CORBA Components, EJB's, Java programs, J2ME/WAP clients) and their legacy endpoints. These endpoints can also be manipulated to create end-to-end XML based connectivity using Web Services or proprietary messaging models.

Iona Orbix E2A XMLBus Edition

IONA's deep CORBA and J2EE based integration roots have made the company one of the industry's Web services leaders. IONA was one of the very first vendors to appreciate the value of Web services as an integration technology. At a time when other vendors - even major platform vendors - were demonstrating Web services that provided stock quotes and currency conversion and other such trivial uses of the technology, IONA was demonstrating the application integration capabilities of Web services with XMLBus.

XMLBus is a tool that fosters the use of Web services for integration. It allows developers to turn existing logic into Web services without writing code. In figure 2 which follows, the XMLBus Web Service Builder is auto-generating a Web Service by introspection of an existing Java class file. XMLBus generates a WSDL representation of the underlying software class file, and generates a SOAP client that can make requests to the service.

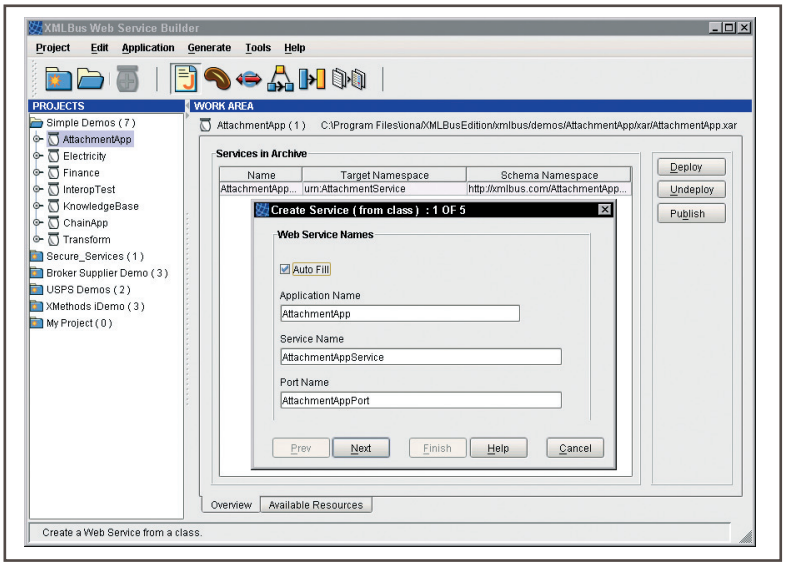

Figure 2: The XMLBus Web Service Builder - Generating a Web Service from a Java Class File.

XMLBus benefits from IONA's long experience with service-based architectures implemented using CORBA, J2EE and Messaging paradigms by bringing this experience to the world of Web services integration. It provides a Web services platform that manages the special processing requirements of Web services. It works in cooperation with application servers, application-integration servers, portal servers, and process collaboration servers. And it is appropriate for loosely coupled applications.

XMLBus allows IONA's customers to expose J2EE and CORBA applications as Web services, either internally, for intra-organizational integration purposes, as well as across the Internet, to a variety of client applications in the offices of customers and partners.

IONA Orbix E2A XMLBus 5.4 Edition is the latest release of IONA's Web services development and deployment product. Among the many enhancements in version 5.4 is considerably stronger support for the wide range of systems and applications that CORBA users have built with that technology. The benefit to the customer is an ability to realize all of the compelling and lucrative usage scenarios described earlier in this paper, and more.

XMLBus makes it easy for CORBA developers to:

>> Web Expose CORBA applications as XML-based Web services.

>> Web Map low-level CORBA objects into high-level, business process oriented Web services.

>> Web Manage and control those Web services.

>> Web Utilize Web services by invoking them from a variety of client applications.

XMLBus is also better able to manage the increased complexity that invariably comes with bigger and more ambitious Web services integration projects. In particular, IONA's Operation Flow mapping technology makes easy work of aggregating existing low-level CORBA services into higher-level Web services interfaces. This is of critical importance, as Web services and CORBA normally operate at different levels of granularity. XMLBus allows each technology to operate at its respective optimum capacity, and fosters efficient interoperability between SOA layers.

xmlspy 5 Enterprise Edition

xmlspy 5 is the industry standard XML Development Environment for designing, editing, and debugging enterprise-class applications involving XML, XML Schema, XSL/XSLT, SOAP, WSDL, and Web Service technologies. XMLSPY 5 simplfies Web services through several key features, including a WSDL Editor, Code Generator, and SOAP Debugger.

WSDL Editor

The xmlspy WSDL Editor provides a sensible top-down approach to accelerate Web services development, allowing developers to model a Web service's interface in a language and platform independent manner, prior to writing any code. It supports visual modeling, editing and validation of WSDL files through an easy-to-use interface. Additionally use xmlspy's XML Schema Editor for defining WSDL types.

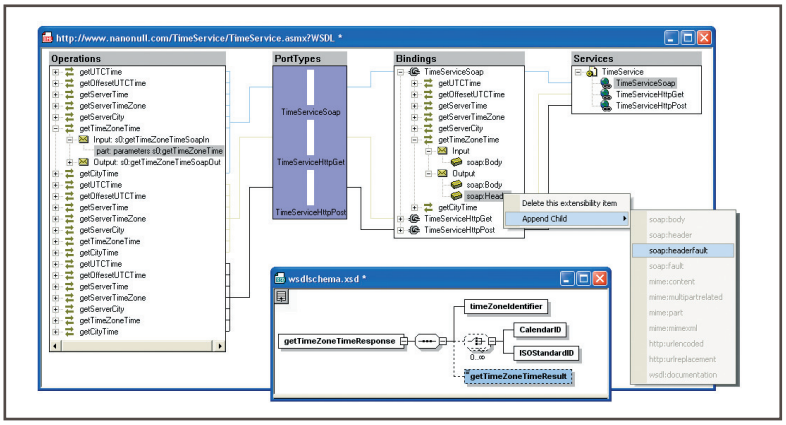

Figure 3: The xmlspy 5 WSDL Editor

Code Generator

xmlspy 5 Enterprise Edition includes an XML Schema driven code generator. Graphically model data elements in XML Schema, then xmlspy generates the corresponding class files. Output code is completely customizable and uses industry-standard API's for programmatically accessing XML documents. Supported programming languages including C# (.NET XML), Java (JAXP) and C++(MSXML). The xmlspy 5 Code Generator is ideal for binding of XML data elements to software objects for use in Web service applications. The code generation process is illustrated in figure 4.

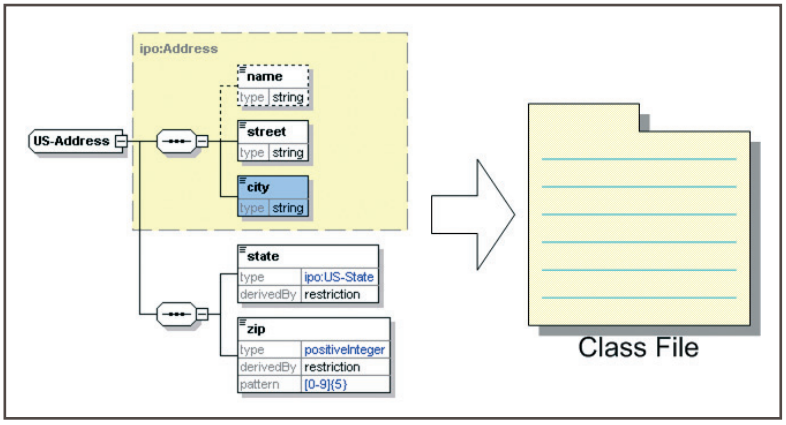

Figure 4: The **xmlspy 5** code generation process.

SOAP Debugger

The **xmlspy 5** SOAP Debugger acts as a web services proxy between a web services client and server letting you inspect WSDL files, single-step through web services transactions, inspect every request and response XML document, set breakpoints on SOAP functions (either on the request or on the response), and even define conditional breakpoints that trigger if a certain request or response contains selected data that is specified by means of an XPath query. The **xmlspy 5** SOAP debugger is a powerful console for troubleshooting Web services which employ Service Oriented Architectures.

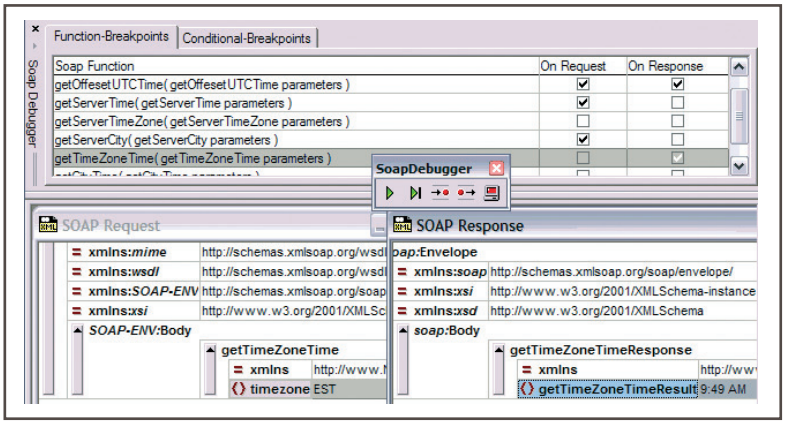

Figure 5: The **xmlspy 5** SOAP Debugger

IONA and Altova - Simplifying Web Services

Web services are an important technology to expose and extend legacy applications to solve a variety of business problems. The combined power of IONA's XMLBus 5.4 and Altova's xmlspy 5 offers immediate benefits:

>> Quick and easy implementation and deployment of Web services for purposes of integration.

>> Implement Web services using any preferred application platform or language.

>> Build and extend upon legacy applications.

>> Powerful Web services container (server)

>> Accelerated XML development through intuitive, powerful tools and utilities.

>> Interoperability with CORBA, Microsoft .NET, J2EE, mainframe and other application platforms.

To enable developers to realize the preceeding benefits, the IONA Orbix E2A XMLBus and Altova xmlspy 5 Enterprise Edition special product bundling is available immediately for direct purchase at the Altova Online Shop. The product bundling includes xmlspy 5 Enterprise Edition and a one-year development license for the Orbix E2A XMLBus for a discounted price of $1399. The Altova xmlspy and IONA XMLBus product bundling provides highly complementary tools and server functionality, creating opportunities for organizations to realize return on resource and technology investment, as well as improved extensibility of new XML-based applications.

About IONA Technologies

IONA is the leading e-Business Platform provider for Web Services Integration with more than 4,500 customers worldwide. IONA Orbix E2A™, which consists of the award-winning Orbix E2A Web Services Integration Platform and Orbix E2A Application Server Platform, enables the flow of information across disparate systems and the liberation of application assets for new business opportunities.

Founded in 1991, IONA® (NASDAQ: IONA) is headquartered in Dublin, Ireland, with U.S. headquarters in Waltham, Massachusetts and offices worldwide. For additional information about IONA, visit http://www.iona.com. For more information about IONA's Orbix E2A Web Services Integration Platform - XMLBus Edition, please visit http://www.xmlbus.com.

About Altova

Altova, Inc. is a leading provider of XML software solutions with offices in Beverly, MA
and Vienna, Austria. The privately held company was founded in 1992 and has been
actively involved in the XML market from the early conception of Extensible Markup
Language. Altova's **xmlspy 5** is the leading choice of Fortune 500 and Global 1000
companies. Altova's **xmlspy 5** product line is the world's best-selling XML tool and has won the leading industry awards including PC Magazine's Editor's Choice Award. Altova is a member of the W3C and WS-I. Visit Altova on the web at http://www.altova.com.