Training: Capstone Courseware
561 Developing SOAP Web Services in Java

TRAINING GOALS:

A comprehensive look at the state of the art in developing interoperable web services on the Java EE 6 platform. Students learn the key standards -- SOAP, WSDL, and the WS-I Basic Profile -- and the Java architecture that has evolved to build interoperable services and clients. We begin with an introductory module that covers both SOAP-based and RESTful services, and therefore both JAX-WS and JAX-RS.

But JAX-WS is central to the course, and we cover both WSDL-driven and Java-driven development paths, as well as message handlers and attachment support. With the new Provider and Dispatch APIs, it's now much easier to integrate SAAJ, JAXB, and JAXP code into services and clients, and we explore these strategies in depth as well.

(For training within the J2EE 1.4 environment, and a concentration on JAX-RPC and SAAJ, please see version 1.5.3 of this course. We also continue to offer versions of the course that support Java EE 5 application servers and JAX-WS 2.1: see the version 2.1 outline.)

CONSPECT:

- Chapter 1. Overview of Web Services
  - Why Web Services?
  - Service-Oriented Architecture
  - HTTP and XML
  - SOAP
  - WSDL
  - The SOAP Vision
  - The REST Vision
  - UDDI
  - The WS-I Basic Profile
  - Security
- Chapter 2. Web Services for Java EE
  - Hosting Web Services: Scenarios
  - Web Services for Java EE
  - JAX-WS and JAXB

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- Web-Services Metadata
- WSDL-to-Java and Java-to-WSDL Paths
- Provider and Dispatch APIs
- SAAJ and JAXP
- JAX-RS for RESTful Services
- JAXR

- Chapter 3. The Java API for XML Binding
  - The Need for Data Binding
  - XML Schema
  - Two Paths
  - JAXB Compilation
  - Mapping Schema Types to Java
  - Java-to-XML Mapping Using Annotations
  - Marshaling and Unmarshaling
  - Working with JAXB Object Models
- Chapter 4. The Simple Object Access Protocol
  - Messaging Model
  - Namespaces
  - SOAP over HTTP
  - The SOAP Envelope
  - The Message Header
  - The Message Body
  - SOAP Faults
  - Attachments
- Chapter 5. Web Services Description Language
  - Web Services as Component-Based Software
  - The Need for an IDL
  - Web Services Description Language
  - WSDL Information Model
  - The Abstract Model -- Service Semantics
  - Message Description
  - Messaging Styles
  - The Concrete Model -- Ports, Services, Locations
  - Extending WSDL -- Bindings
  - Service Description
- Chapter 6. The Java API for XML-Based Web Services

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- Two Paths
- How It Works: Build Time and Runtime
- The Service Endpoint Interface
- Working from WSDL
- Working from Java
- RPC and Document Styles
- One-Way Messaging
- Binary Protocols

- Chapter 7. WSDL-to-Java Development
  - The @WebService Annotation
  - Generated Code
  - Scope of Code Generation
  - Parameter Order
  - More JAXB: Mapping Collections
  - More JAXB: Mapping Enumerations
  - Applying JAXB Customizations
- Chapter 8. Client-Side Development
  - Stubs and Proxies
  - Generated Code
  - Locating a Service
  - Invoking a Service
  - The @WebServiceRef Annotation
- Chapter 9. Java-to-WSDL Development
  - Generating the WSDL and Schema
  - The @WebMethod, @XmlParam, and Related Annotations
  - More JAXB: Mapping Inheritance
  - Controlling the XML Model
  - Controlling the WSDL Description
  - JAXB Customizations with @XmlJavaTypeAdapter
- Chapter 10. Exception Handling
  - SOAP Faults vs. Java Exceptions
  - Mapping Faults from WSDL
  - Mapping Exceptions from Java
  - JAX-WS Exception API and Handling
  - Client Exception Handling
- Chapter 11. JAX-WS Best Practices

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- Which Way to Go?
- Interoperability Impact
- Portability Impact
- Polymorphism in Web Services
- Web Services as Java EE Components
- Lifecycle Annotations
- Context Interfaces

- Chapter 12. Metadata
  - Abstract and Concrete Model Metadata
  - Defaults
  - Annotations
  - webservices.xml and web.xml
  - Best Practices and Pitfalls
- Chapter 13. Provider and Dispatch APIs
  - Stepping Down
  - The @WebServiceProvider Annotation
  - The ProviderInterface
  - Implementing a Provider
  - The @ServiceMode Annotation
  - JAXB Without WSDL
  - Integrating JAXP
  - The DispatchInterface
  - Building Clients
- Chapter 14. The SOAP with Attachments API for Java
  - The SAAJ Object Model
  - Parsing a SOAP Message
  - Reading Message Content
  - Working with Namespaces
  - Creating a Message
  - Setting Message Content
  - Relationship to the DOM
- Chapter 15. Message Handlers
  - Handling SOAP Headers
  - Handlers and Handler Chains
  - Configuration by XML or Annotation
  - MessageContext and SOAPMessageContext

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- Processing Model and Patterns
- Logical and Protocol Handlers
- Client-Side Handlers

- Chapter 16. Handling Binary Content
  - The WS-I Attachments Profile
  - Using base64Binary
  - MTOM and XOP
  - JAX-WS Support
  - Configuration by XML or Annotation
  - Client-Side Support
  - SAAJ Support

Appendix A. Course Tools and Utilities

Appendix B. Handy Guide to Web-Services Acronyms

REQUIREMENTS:

- Strong **Java programming** skills are essential - Course 103 is excellent preparation.
- Students must be able to read **XML** documents and to write well-formed XML by hand - consider Course 501.
- Knowledge of **XML Schema** will be helpful, too, but is not a strict prerequisite - consider Course 517.
- Experience with other **Java EE** standards, especially servlets and JSP, will be very helpful in class, but is not strictly required.

Difficulty level

CERTIFICATE:

The participants will obtain certificates signed by Capstone Courseware.

TRAINER:

Authorized Capstone Courseware Trainer.

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