Mastering Web Services SOA for JEE Developers using RAD 7.5

Course Summary

Description

Mastering Core Web Services and SOA for JEE Developers focuses on providing an understanding of the fundamental technologies used in web services. This understanding is critical to being able to diagnose, troubleshoot, tune, and perform other lifecycle activities

Objectives

At the end of this course, students will be able to:

- Understand and apply the basic concepts of SOA to the identification and design of web services
- Understand and intelligently discuss Web Services and the core technologies involved
- Understand and apply the basic concepts of SOA to the identification and design of web services
- Appreciate the concept of layered services including orchestration
- Understand and intelligently discuss Web Services and the core technologies involved
- Design, develop, and deploy real-world JEE Web Services
- Expose existing Java components as XML Web Services
- Write Java components that access remote Web Services hosted by a third party
- Read and understand a WSDL document
- Parse, process, and respond to a SOAP message
- Understand the concepts behind REST and implement a REST-based web service
- Implement handlers to inject cross-cutting solutions for security, logging, auditing, and other needs
- Work with WS-Security to protect content, resources, and other asset

Topics

- JEE and RAD 7.5
- RAD/WAS Best Practices
- Introduction to SOA
- SOA in Depth
- Path to Useful Web Services
- Foundation - XML and Java
- Binding – SOAP/REST
- Description - WSDL
- Web Services in Java – JAX-WS
- Advanced Web Services Topics
- Discovery
- Defending XML Processing

Audience

This is an introductory to intermediate level web services training course, designed for Java developers and architects who need to identify, design, and implement web services. We will explore and apply the terminology, the specification, the processes and technologies specific to web services.

Prerequisites

Students should have 1-2 years of working knowledge with Servlets and JSPs, and should be familiar with XML, Namespaces, and XML Schema.

Duration

Five days

Due to the nature of this material, this document refers to numerous hardware and software products by their trade names. References to other companies and their products are for informational purposes only, and all trademarks are the properties of their respective companies. It is not the intent of ProTech Professional Technical Services, Inc. to use any of these names generically

Mastering Web Services SOA for JEE Developers using RAD 7.5

Course Outline

I. JEE and RAD 7.5

A. Technical Overview of JEE
1. What is JEE?
2. Common Themes In JEE Framework
3. JEE Containers and Components
4. Servlets: Components Running in Web Container
5. Java Server Pages (JSP) are JEE Web Component
6. EJBs and Web Services are Components As Well
7. JEE Containers
8. Compliant JEE Framework Ready for an Application
9. JEE Application Modules
10. The JEE 5 Specification
11. What was New in JEE 5
12. JEE Platform Roles

B. Working with RAD 7.5
1. What is RAD?
2. Workbench and Workspace
3. File and Workspace Locations
4. Workbench: A Closer Look
5. Workbench Details
6. Views
7. Navigator View
8. Outline View
9. Property View
10. Task List View
11. Problems View
12. Editors
13. Perspectives
14. Customizing perspectives
15. Projects
16. Java and JEE Projects

C. Java Code and Debug Tooling
1. Available Through the Java Perspective
2. Various Types of Java Editing Assistance
3. Java Editor: Formatting
4. Java Editor: Code Assist
5. Type Hierarchy
6. Type Hierarchy Toolbar
7. Call Hierarchy: Callees and Callers
8. Dubugging Capabilities are Powerful
9. The Debug Perspective
10. Breakpoints
11. Breakpoints and the Debug View
12. Debug Mode
13. Variables View
14. Keyboard Shortcuts
15. Refactoring Overview
16. JEE Perspective and Tooling
17. Working with WebSphere

D. RAD/WAS Best Practices
1. Enhanced EAR Files
2. Best Practices for Working with RAD
3. RAD and WAS: Process Monitoring
4. Working with WebSphere from Within RAD
5. Working with WebSphere via the Admin Console
6. Upgrading RAD and WAS

II. Introduction to SOA

A. SOA Overview
1. What is a Service?
2. SOA is Defined in Many Ways
3. Let's Focus on One Definition of SOA
4. Architectural Style: Common Framework
5. Loose Coupling: Spectrum of Options
6. Software Agents: Services
7. Interacting: Orchestrated
8. SOA is Not Revolutionary
9. What is the Difference Between Services and SOA?
10. SOA - Business Perspective
11. SOA – Technical Perspective
12. SOA is Not …
13. Myths and Realities

B. SOA: The Business Proposition
1. Dealing with Change - Motivation for SOA
2. Typical Software Project
3. Typical Software Projects – Why?
4. Business Logic Gets Replicated Over Time
5. Unique Interfaces Build Up Over Time
6. Unique Technologies Build Up Over Time
7. Unique Data Representations Build Up Over Time
8. What are Implications of Each of These Issues?
9. Consumer Uses These Services
10. Consumers Use Automotive Service Center
11. Service Model
12. Service Consumer
13. Service Bus
14. Commonality is Critical Element of SOA
15. Yes, YOUR Line of Business and YOUR Products ARE Different!!!!
16. Are the Toyota Camry and Lexus Totally Different?
17. The NEW Question to Ask….
18. Where are We Leveraging That Commonality?

Due to the nature of this material, this document refers to numerous hardware and software products by their trade names. References to other companies and their products are for informational purposes only, and all trademarks are the properties of their respective companies. It is not the intent of ProTech Professional Technical Services, Inc. to use any of these names generically

Mastering Web Services SOA for JEE Developers using RAD 7.5

Course Outline (cont'd)

19. The NEW Approach….
20. Service Provider
21. Business Process: OpenCheckingAcct
22. How Does SOA Address Replication of Logic?
23. How Does SOA Address Unique Interfaces?
24. How Does SOA Address Unique Technologies?
25. How Does SOA Address Unique Data Schemas?
26. How Does SOA Help Deal with Change?
27. Leverage SOA to Empower Customers
28. Leverage SOA to Empower Your Organization
29. Leverage SOA to Support for Strategic Growth and Change
30. Potential Benefits of SOA
31. The Benefits of a Well-Designed SOA
32. SOA Maturity Models Abound
33. Example: IBM's SIMM
34. Incremental Adoption of SOA

C. SOA: An Architectural Perspective
1. Enterprise Application Layers
2. Application Layers at a Glance
3. Services and Their Formal Contracts
4. Services Should be Stateless
5. What is a Legacy System?
6. The Challenge of Legacy Systems
7. Limitations Associated with Legacy Systems

III. SOA in Depth

A. Service-Oriented Architecture
1. Technical Principles
2. Logical Components of a SOA
3. Characteristics of a Good Service
4. Generic Nature of Services
5. Business Process-Driven Development
6. SOA Business Modeling
7. SOA Reference Architecture
8. Business Versus Application
9. Service Layers
10. Application Services
11. Functional Services
12. Business Process Services
13. Messaging
14. When is Messaging Used?
15. Two Messaging Models
16. More On Publish/Subscribe
17. Logical View of Publish/Subscribe
18. More On Point-to-Point (P2P)
19. Logical View of Point-To-Point
20. Message Servers
21. Messaging
22. SOAP
23. Common Framework: Addressing Cross-Cutting Concerns
24. Role and Uses of an Enterprise Service Bus
25. What Does the Enterprise Service Bus Do?
26. Common Framework: Addressing Cross-Cutting Concerns
27. Transaction Definitions
28. The ACID Transaction Properties
29. Transaction Lifecycle
30. The Challenge of Handling Transactions
31. The Solution to Handling Transactions
32. Security
33. Common Framework: Addressing Cross-Cutting Concerns
34. Governance and Compliance
35. Governance and Expertise
36. Governance and Service Lifecycle
37. Governance and Consumer/Provider Management
38. Challenge of Governance

IV. Path to Useful Web Services

A. Web Services Overview
1. What are Web Services?
2. Web Services Characteristics
3. Web Services Architecturally
4. Web Services Enable Decoupling
5. Web Services Challenges
6. Spec and Standard Evolution
7. Web Services Interoperability Organization
8. Basic Profile 1.1 Consists of:
9. Additional WS-I Profiles
10. .NET Platform
11. .NET Web Services
12. Java and Web Services

B. Web Services, Java, and JEE
1. XML and Java APIs at a Glance
2. XML Signature
3. XML Encryption
4. JAXP
5. JAXB
6. JAXP, JAXB and Web Services
7. Web Services APIs at a Glance
8. JAX-WS
9. SAAJ
10. JAX-WSA and XWSS
11. Web Services APIs
12. Web Services for JEE (JSR109)
13. JEE and Web Services
14. Web Services Metadata

Due to the nature of this material, this document refers to numerous hardware and software products by their trade names. References to other companies and their products are for informational purposes only, and all trademarks are the properties of their respective companies. It is not the intent of ProTech Professional Technical Services, Inc. to use any of these names generically

Mastering Web Services SOA for JEE Developers using RAD 7.5

Course Outline (cont'd)

15. Web Services Stacks at a Glance
16. Apache Axis 2.x
17. JBossWS
18. WSIT/Metro
19. WebSphere WS
20. WebSphere/RAD Web Service Stacks
21. Spring-WS

C. Web Services Quickstart
1. What is a "Typical" Web Services Stack?
2. Typical Tool Support
3. How Stack is Used on the Service-Side
4. How Stack is Used on the Client-Side
5. Debugging Web Services
6. TCP/IP Monitors Provide View of Wire
7. Lab: Implementing a Web Service
8. Lab: Debugging Web Services

V. Foundation - XML and Java

A. XML, Namespaces & Schemas
1. What is XML?
2. XML Can Provide Application-Specific Information
3. Content: XML Document Syntax Rules
4. Structure: A Document Type Definition
5. XML Transformation to HTML
6. XML Separates Structure, Content and Format
7. TriveraTunes Purchase Order
8. Content as MarkUp
9. Tell Parser That Text is Data
10. Use Predefined Entities
11. Well-Formed and Valid XML Documents
12. Why Are These Definitions Important?
13. XML Namespaces
14. Name Collision - Example
15. Inter-Organization Name Collisions
16. W3C's Solution: Namespaces
17. Uniform Resource Indicator
18. Declaring a Namespace
19. Namespace Scope
20. Default Namespace
21. Attributes and Namespaces
22. Example of Namespaces
23. Namespaces Best Practices
24. Benefits From Valid XML
25. W3C XML Schemas
26. Impacts of Schemas
27. General Form of an XML Schema
28. Elements, Attributes and Types
29. Simple Schema and XML Document
30. Element Definitions
31. Corresponding XML Schema
32. Simple Types - Primitive Datatypes
33. Restricting Simple Types: Facets
34. Complex Types Bring More to Validation
35. Repetition Control
36. Restricting Simple Types
37. Complex Types Can be Derived
38. Derivation by Extension
39. Extension of Phone Number
40. Associating Schemas with XML Instances
41. Using XML Schema with Namespaces
42. Namespaces Provide Thread of Connection
43. Schema Defines a Target Namespace
44. XML Doc Uses Schema-Defined Namespace
45. schemaLocation Links Namespace to Location
46. Relating Schemas to XML

B. XML in Java - JAXP and JAXB
1. XML Parsers Are Complex and Powerful
2. Parsers and API's
3. Parser Generates DOM, Then Hands to App
4. Parsing With a DTD or Schema
5. Many Options to Consider
6. XML and Java
7. JAXP: Java API for XML Processing
8. Challenges to Mapping XML
9. Generating XML is Nondeterministic
10. JAXB: Binding XML to Java
11. JAXB 2.0 Incorporated Changes
12. JAXB 2.0 and Java Versions
13. Defining the Rules in JAXB
14. Turning Rules into Java Classes
15. Using the Generated Classes
16. Creating Content
17. Some JAXB Type Bindings
18. XML Schema for List of Items
19. Corresponding Class Interface
20. A Word About Validation…

VI. Binding – SOAP/REST

A. SOAP Overview
1. SOAP in a Nutshell
2. SOAP Specification Provides:
3. Anatomy of a SOAP Message
4. SOAP and HTTP
5. Simple Scenario
6. More Complex Scenario
7. Uses of SOAP
8. A Simple Example...
9. Remote Procedure Calls
10. Example of SOAP RPC Call
11. Example of Response

Due to the nature of this material, this document refers to numerous hardware and software products by their trade names. References to other companies and their products are for informational purposes only, and all trademarks are the properties of their respective companies. It is not the intent of ProTech Professional Technical Services, Inc. to use any of these names generically

Mastering Web Services SOA for JEE Developers using RAD 7.5

Course Outline (cont'd)

B. SOAP in Detail
1. Protocols Used With Web Services
2. Request and Response Example
3. The SOAP Envelope
4. SOAP Header
5. SOAP Body
6. SOAP Request/Response Example
7. SOAP Defines a Fault Element
8. SOAP Data Model
9. Example Using XSD Data Type
10. SOAP Styles and Modes
11. SOAP With Attachments
12. SOAP Messaging
13. Endpoint Behavior
14. SOAP Encoding Styles
15. SOAP 1.1 versus SOAP 1.2
16. What is SAAJ?
17. Understanding SAAJ
18. SOAPElement
19. SOAPElement Methods
20. SOAPMessage
21. SOAPPart
22. SOAPEnvelope
23. SOAPBody
24. SOAPBodyElement
25. SOAPHeaderElement
26. SOAPHeaderElement Methods
27. SOAPFault
28. Connections

C. REST
1. REpresentational State Transfer
2. REST Characteristics
3. REST Elements
4. REST in Web Service Terms
5. REST: Another Option for Binding
6. Characterizing REST
7. REST Example
8. REST Design Principles
9. REST/SOAP Comparison
10. SOAP versus REST
11. RESTing in Java

VII. Description - WSDL

A. WSDL
1. Describing Web Services
2. WSDL in Practice
3. WSDL Extensibility
4. WSDL/SOAP Namespaces
5. WSDL Elements
6. WSDL Anatomy
7. <definitions> element
8. <documentation> element
9. <types> element
10. <message> element
11. <portType> and <operation>
12. <binding> element
13. <port> and <service> elements
14. Looking Ahead – WSDL 2.0

VIII. Web Services in Java – JAX-WS

A. JAX-WS Overview
1. JAX-WS and JAX-RPC
2. JAX-RPC – Where It Stands
3. JAX-WS Overview
4. JAX-WS Architecture
5. JAX-WS Under the Hood
6. JAX-WS Features
7. JAX-WS Programming Model
8. JAX-WS Handlers
9. JAXB
10. WSIT
11. JAX-WS vs RMI

B. Working with JAX-WS
1. JAX-WS Service
2. Bottom-up Building of a Web Service
3. Top-Down Building of a Web Service
4. JAX-WS Development Process
5. Web Service Annotations
6. @WebService
7. @WebMethod
8. Additional Web Service Annotations
9. Generating the Portable Artifacts
10. Example of Artifacts Generated From WSDL
11. Deploying the Web Service
12. Lab: Cost Service
13. JAX-WS Client
14. Types of JAX-WS Clients
15. Creating the JAX-WS Artifacts
16. Example of Artifacts Generated From WSDL
17. JAX-WS Java Client

C. Handlers
1. Handlers: The Basics
2. JAX-WS and Handlers
3. Handler Life Cycle
4. Applying Handlers
5. SOAPMessageContext
6. Example of Handler Class
7. Configuring Handlers
8. Handler Configuration using webservices.xml
9. Handler Configuration using Annotations

Due to the nature of this material, this document refers to numerous hardware and software products by their trade names. References to other companies and their products are for informational purposes only, and all trademarks are the properties of their respective companies. It is not the intent of ProTech Professional Technical Services, Inc. to use any of these names generically

Mastering Web Services SOA for JEE Developers using RAD 7.5

Course Outline (cont'd)

IX. Advanced Web Services Topics

A. Web Services for JEE (WSEE)
1. WSEE
2. WSEE Server Programming Model
3. Server Programming Model
4. Servlets as Web Services
5. EJBs as Web Services
6. Routing SOAP Requests To An EJB
7. WSDD
8. WSDD Example
9. WSEE Client Programming Model
10. Client Programming Model
11. Types of WSEE Clients
12. WSEE Basic Client Operations
13. Static WSEE Client
14. Dynamic WSEE Client
15. DII WSEE Client
16. WSEE Client Packaging

B. Transactions in Web Services: WS-TX
1. Transactions
2. The ACID Transaction Properties
3. Transaction Lifecycle
4. Overview of a Transactional System
5. JEE Transaction Support
6. SOA's Challenge of Handling Transactions Solution: WS-Transaction (WS-TX)
7. WS-Transaction (WS-TX)
8. WS-Coordination
9. WS-AtomicTransaction
10. WS-BusinessActivity
11. Creating Transacted Web Service (Option 1)
12. Creating Transacted Web Service (Option 2)
13. Transaction Mapping
14. Client Coordinated Transaction
15. WS-AT and JEE
16. WS-BA and JEE

X. Discovery

A. Web Services Discovery
1. Issues With Broadly Scoped Discovery
2. What is UDDI?
3. UDDI Registries
4. What is WSIL?
5. What is WS-Discovery?
6. Examples of Tools That Support Discovery

XI. Defending XML Processing

A. Understanding What's Important
1. Common Vulnerabilities and Exposures
2. OWASP Top Ten for 2010
3. How Many Principles Can be Violated?
4. CWE/SANS Top 25 Most Dangerous SW Errors
5. Monster Mitigations
6. Defense In Depth - Layered Defense
7. Defense in Depth – An Example
8. Defense in Depth – Damage Control
9. Threat Analysis Revisited

B. Defending XML
1. Common Solutions to Big Three
2. XML Challenges
3. XML Signature
4. XML Signature Usage
5. Example of Digital Signature
6. XML Encryption
7. XML Encryption Usage
8. XML Encryption Protects Data
9. XML Attacks: Structure
10. CDATA Injection
11. XML Attacks: Injection
12. XPath Injection Flaws: Description
13. XPath Injection
14. Safe XML Processing
15. Dynamic Loading Using XSLT

C. Defending Web Services
1. Securing a Web service
2. Web Service Security Exposures
3. Transport-Level Security
4. When Transport-Level Alone is NOT Enough
5. Message-Level Security
6. Web Services Security Roadmap
7. WS-Security Enables Interoperability
8. Security Tokens
9. Example of Security Token
10. Message Authentication
11. XML Signature and Encryption
12. Picture is Still Evolving
13. What is XWSS?
14. XWSS Provides Many Functions
15. Known Common Web Service Attacks
16. Implementing WS-Security Securely
17. Web Service Appliance/Gateways
18. Networking Devices Targeting XML
19. Support Message Level Security
20. Device Usage Scenario: Authentication
21. Common Mistakes
22. SOAP WSDL Exposure
23. SOAP Attacks
24. Web Services DoS
25. OWASP Top 10 – Still Relevant?
26. Securing Web Services
27. Web Service Attacks

Due to the nature of this material, this document refers to numerous hardware and software products by their trade names. References to other companies and their products are for informational purposes only, and all trademarks are the properties of their respective companies. It is not the intent of ProTech Professional Technical Services, Inc. to use any of these names generically