

Service Oriented Architecture for Architects

(5 Days)

Overview

This five day training course for architects delves deep into various architectural aspects of SOA. It starts with Service Oriented Analysis and Design (SOAD). This will help the architects understand how requirements are captured, business processes are modeled and services are identified. The course moves on to explore information management, transaction handling, messaging architecture, developing services, testing services, and finally securing them.

Audience

Enterprise Architects, Solution Architects, Business Architects, Information Systems Architects, and Senior Developers.

Objectives

Students will get to actually apply various principles in hands on exercises. This will make the concepts come alive. Throughout the five day course, students will work through **18 real world labs in a hands-on SOA environment**.

After taking the course, an architect will gain enough knowledge to begin devising a comprehensive architecture for a new SOA based solution.

Prerequisites

Previous experience with software architecture is recommended. Some knowledge of Web Services and Object Oriented Analysis and Design is recommended, but not required.

Course Outline

Chapter 1. SOA Fundamentals

- Defining Service Oriented Architecture (SOA)
- Putting SOA in Context
- SOA As an Alignment Strategy
- The SOA Umbrella
- What's a Service?
- Service Actors
- SOA in Action
- Business Process Management
- BPM & Workflow
- SOA Governance
- SOA Governance Model
- SOA Job Role Impact
- SOA Re-Organization
- What Makes a Good Design?
- Is SOA a New Concept?
- Enterprise Computing Evolution
- What about Microservices?
- SOA Is Perfect...NOT!
- Service Characteristics
- When Do I Need a Service?
- About Services in SOA
- Contract-Driven Software
- SOA Standards
- Service Implementation

Chapter 2. SOA Case Study

- What is a Case Study?
- Case Study Background
- The Problem Statement
- Status Quo Issues
- Status Quo Issues (continued)
- Opportunities
- How Can SOA Help?
- Example Solution Snippet

Chapter 3. Introduction to Web Services

- A Conceptual Look at Services
- Defining Services
- Three Key Service Questions
- Service Communication Analogy
- Connecting the Dots
- SOA: Runtime Implementation
- What Is a Web Service?
- Enterprise Assets as Services
- Web Service Development Workflow
- Advantages of Web Services
- Web Service Business Models
- Example: Internal System Integration
- Example: Business Process Externalization
- Web Service Standards
- Binding via SOAP
- SOAP in Protocol Stack
- SOAP Structure
- SOAP Message Architecture
- Applying SOAP
- Interface via WSDL
- WSDL Structure
- Locating a Service
- UDDI Overview
- UDDI Structure
- Applying UDDI
- WS-I Overview
- WS-I Deliverables

Chapter 4. Layers of Services

- What Is Layering?
- Service Layers
- Layering Example
- The Application Service Layer
- The Business Service Layer
- The Orchestration Layer

- Layering Guidelines
- The User Interface Layer
- Context Awareness in SOA UI
- Web 2.0 Data Aggregation

Chapter 5. SOA Value Proposition

- The SOA Value Proposition
- Reducing Integration Expense
- Integration Costs Illustration
- Ripple Effect of Changes
- The Value of Service Layering
- Advantage of SOA Layering
- Increasing Asset Reuse
- SOA Economics/ROI
- Asset Reuse Illustration
- Service Reuse v. Object Reuse
- Increasing Business Agility
- Business Agility Illustration
- Traditional EAI Approach
- Problems with Traditional EAI Approach
- Change Flow Using Legacy Approach
- SOA Agility
- Build the Services
- Build the Process or Message Flow
- We Can Easily Change the Process
- Reducing Business Risk
- Example: Compliance Using SOA
- Business Advantages
- ROI Quantification Hurdles
- Real World SOA Example - Sears Canada
- Real World SOA Example - BlueStar Energy
- Real World SOA Example - Reliance Life Insurance
- Real World SOA Example - Harley-Davidson

Chapter 6. Architectural Topology for SOA

- Vendor Confusion
- Service Intermediaries
- Intermediary Options
- Intermediary Service
- Centralized Bus
- Logical Centralized Bus
- De-centralized Framework
- Policy Enforcement at Endpoints
- Comparing the Approaches

Chapter 7. Introduction to Service Oriented Analysis & Design (SOAD)

- Applying OOAD Principles
- Encapsulation
- Encapsulation in SOAD
- Inheritance
- Inheritance in SOAD
- Polymorphism
- Polymorphism in SOAD
- Why OOAD Is Not Enough
- Granularity
- The Need for Loose Coupling
- The SOAD Methodology
- The SOAD Methodology Steps
- Stage 1: Requirements Gathering & Process or Message Flow Modeling
- Stage 1: Requirements Gathering & Process Modeling
- Stage 2: Service Identification
- Stage 3: Service Implementation
- Stage 4: Process Implementation
- SOAD Stages and SOA Lifecycle

Chapter 8. SOA Service Life Cycle

- SOA Adoption
- Adoption Stages
- Managing Services
- SOA Service Life Cycle Overview
- SOA's Circle of Life
- Discovery Phase
- Analysis & Design Phase
- Implementation Phase
- Deployment Phase
- Monitor Phase
- Retirement Phase

Chapter 9. Stage 1: Business Modeling and Use Cases

- Stages of SOAD
- Where are We in SOA Lifecycle?
- Stage 1: Business Process Modeling
- Basic Concepts
- SOA and Business Process Model
- Before You Get Started
- Process Modeling Steps

- Business Process Use Cases
- Modeling the Business Processes
- Use Case and Business Process
- The Return Handling Process Model
- Trading Partner Design Pattern
- The UML Alternative
- Best Practices

Chapter 10. Basic XML Schemas

- What is XML Schema ?
- Goals of Schema
- Converting DTDs to Schema
- Recall: Namespaces
- The equivalent schema
- Sample instance document
- Documents Needed
- XML Schema Namespaces
- Link Documents to Schemas
- Inline element declarations
- XSchema Data Types
- XSchema Type Definitions
- XSchema Simple Data Types
- Primitive Data Types
- Simple Types
- Facet – Restrictions on Element Content
- Using the Facet
- More Samples
- Define Simple Element Type
- Element Declaration
- Element Occurrence Indicators
- Complex Type
- Attribute Declaration
- Attribute Declarations
- Occurrence of Attributes
- Value Constraints on Attributes
- Sequence Element
- Element Choices
- Express any order
- Annotations

Chapter 11. Complex Data Types In Schema

- Simple Types
- Complex Types
- Complex Type Example
- Controlling Content
- <sequence>

- <choice>
- <all>
- Combining It All
- The XML
- Anonymous vs. Named
- Address Example
- Named Complex Types
- Named ComplexType Example
- Using Named Complex Type
- The XML
- <xs:any>

Chapter 12. Web Services Description Language (WSDL)

- WSDL Overview
- WSDL Syntax Overview
- <definitions>
- <import>
- <types>
- <message>
- <portType>
- <operation>
- <binding>
- <service>

Chapter 13. Service Identification and Specification

- Stages of SOAD
- Where are We in Service Lifecycle?
- The Service Identification Stage
- The Service Model
- Service Model Example
- Identify Service Operations from Business Process Model
- Identify Service Operations from Message Flow Model
- Group Operations as Services
- Reuse Services and Applications
- Define Logical Data Model
- Specify Service Interface
- Specify Business Process or Message Flow Interface
- Business Process Case Study
- Message Flow Case Study
- Service Contract Template
- Service Design Best Practices

Chapter 14. Simple Object Access Protocol (SOAP)

- SOAP Overview
- SOAP in Protocol Stack
- SOAP Document Components
- Example SOAP Request Document
- Example SOAP Response Document
- The <Envelope> Element
- The <Header> Element
- The <Body> Element
- SOAP Communication Style
- Communication Style Example
- Setting the Style in WSDL
- RPC/Encoded Style
- RPC/Literal Style
- Document/Literal Style
- Document/Literal Wrapped Style

Chapter 15. Service Design and Implementation

- Stages of SOAD
- Where are We in the SOA Lifecycle
- Introduction
- How Is a Service Developed?
- Top Down Development
- Web Services Programming Model
- Apply OOAD in New Service Development
- Bottom-Up Development
- Bottom-Up Technology Choices (Java)
- Example: JCA-Based Service
- Example: JAX-WS Service
- Bottom-Up Technology Choices (.NET)
- Example: ASMX Service
- Example: Adapter-Based Service
- Data Mapping
- Service Abstraction
- Interface Mapping
- Implementing the Services for UC001 Return Handling
- Best Practices

Chapter 16. Stage 4: Business Process Implementation

- Stages of SOAD
- Where are We in the SOA Lifecycle?
- Business Process Diagram
- Process Automation Challenges...
- BPEL

- Variables
- Partnership
- Example: A Buy-Sell Partnership.
- Modeling Partnership in BPEL
- Simple Activities
- Invoke Activity
- Structured Activities
- Process Development Phases
- Phase II Process Definition
- Phase III Process Compilation
- Phase IV Process Deployment
- Phase V Process Execution
- What Is a Good Process Design?
- Follow Integration Patterns
- Example: A Simple Process
- Additional Process Design Considerations

Chapter 17. Service Component Architecture(SCA)

- Need For a New Programming Model
- SCA Vendor Support
- Service Component Architecture
- SCA Basics
- Assembling Services
- SCA Components
- Service Components
- References and Wires
- Wiring Example
- Service Components
- Imports
- Export
- Imports and Exports
- Service Implementation Types

Chapter 18. Adapters

- What is an Adapter?
- Adapter Example
- The Adapter Pattern
- Resource Adapters
- Custom Adapters
- Adapter Based Services
- Advantages of Adapter Based Services
- Generating Adapter Based Services
- Communication Modes
- Outbound Communication
- Inbound Communication

Chapter 19. Information Management in SOA

- SOA and Enterprise Information Management
- Replication Overview
- Operational Challenges
- SOA and Data Basics
- Intro: Operational Data
- Data Publishing Event
- Modeling Events
- Data Mediation
- Data Format
- Generic Data Model
- Example Generic Data Model
- Mapping Data
- Loading Data
- Extract Transform Load (ETL)
- ETL and SOA
- Data Federation
- SOA Data Layering
- Data Federation vs ETL

Chapter 20. SOA Challenges and Risks

- SOA Challenges and Risks
- Emerging Standards
- Emerging Standards (contd)
- Selecting Tools and Infrastructure
- Service Selection and Creation
- Service Management
- Portfolio Management
- Paradigm Shifting
- Communication
- Policies and Compliance
- Project Management
- Training and Re-skilling
- Governance and Risk Mitigation

Chapter 21. Governance Fundamentals

- The Strategic Role of IT
- Governing IT
- IT Infrastructure Library (ITIL)
- ITIL: Managing IT Activities
- ICT Infrastructure Management (ICTIM)
- ICTIM Processes
- Control Objectives for Information and related Technology (COBIT)
- Need for SOA Governance
- SOA Governance

- SOA Governance Adoption
- Key Governance Relationships
- SOA Governance Elements
- SOA Governance Procedures
- Recommended Procedures
- More Recommended Procedure
- SOA Governance Policies
- Enterprise Policies
- Business Policies
- Service Policies
- SOA Governance Metrics
- More SOA Governance Metrics
- Some Best Practices
- Relevant Standards Work
- OASIS SOA-RM
- Reference Model in Context
- OASIS SOA-RA

Chapter 22. Overview of Service Registries

- Services Registry
- Why Do We Need a Service Registry?
- Main Activities when Using a Registry
- Publish
- Discovery
- Dynamic Discovery
- Management
- Enforce Governance Lifecycle
- SOA Registry Products

Chapter 23. Messaging and Asynchronous Communication

- Asynchronous SOA
- Basic Messaging Patterns
- SOA Callbacks ...
- Callback Example
- Implementing Callbacks
- BPEL Correlation Sets
- Additional Uses of Callbacks
- Non-Blocking Calls in SOA
- Parallel Activity
- One-Way Non-Blocking Calls
- Assured Delivery
- Implementing the Publish Subscribe Pattern
- SOA Client Behavior
- BPEL Events Handling
- Event Handler Details 1/2

- Event Handler Details 2/2

Chapter 24. Error Handling and Transaction

- Error Handling in a Service
- Designing Faults
- Error Handling in a Process
- Fault Handler
- Fault Handler Example
- Raising Faults in a Process
- Transaction in SOA
- Transaction and Short Lived Business Process
- Transaction and Long Lived Business Process
- Example: Long Running Process
- Transaction Context Propagation
- Example: Transaction Context Propagation
- Compensation
- Compensation in a Microflow
- Compensation in a Long Running Process
- Example Compensation
- Compensation Handler
- Compensation Guidelines

Chapter 25. SOA Security Patterns

- Key Challenges in SOA Security
- Authentication Pattern
- Authorization Pattern
- Confidentiality Pattern
- Non-repudiation Pattern
- Inter-organization Authentication Pattern
- Single Sign On Pattern
- Federated Security Pattern

Chapter 26. SOA Patterns

- SOA / EAI Patterns
- Messaging Problem #1
- Asynchronous Queuing Pattern
- Asynchronous Queuing Pattern Illustration
- Messaging Problem #2
- Event-Driven Messaging Pattern
- Event Messaging Pattern Illustration
- Messaging Problem #3
- Reliable Messaging Pattern
- Reliable Messaging Pattern Illustration
- Protocol Integration Problem #1
- Adapter Pattern
- Adapter Pattern Illustration

- Protocol Integration Problem #2
- Canonical Protocol Pattern
- Canonical Protocol Pattern Illustration
- Protocol Integration Problem #3
- Protocol Bridging Pattern
- Protocol Bridging Pattern Illustration
- Data Management Problem #1
- Canonical Data Format Pattern
- Canonical Data Format Illustration
- Data Management Problem #2
- Data Transformation Pattern
- Data Transformation Illustration
- Data Management Problem #3
- Schema Centralization Pattern
- Schema Centralization Illustration
- Service Design Problem

Chapter 27. SOA Antipatterns

- What are Antipatterns?
- Technology-driven SOA Adoption
- So What's New?
- SOA Is the Cure All
- Web Service is SOA
- The Silo Approach
- Fine Grained Service
- Point-to-Point Communication
- Stateful Services

Chapter 28. SOA Infrastructure and Tools

- SOA Infrastructure and Tools
- Network Appliances
- Enterprise Service Bus
- Service Container
- Business Rules Engine
- Business Activity Monitoring
- Service & Policy Management
- Business Process Engine
- Service Registry
- Service Repository
- Development Tools
- Tool Combinations
- What is the minimum?

Chapter 29. Glossary

- Glossary

Chapter 30. Service Oriented Modeling and Architecture (SOMA)

- SOMA
- The Rational Unified Process
- SOMA & RUP

Chapter 31. WS BPEL 2.0 A Technical Overview

- WS BPEL 2.0
- Motivation
- Basics
- BPEL Usage
- BPEL Constructs
- Activities
- BPEL Documents
- Imports
- Partner Links
- Example: a Buy-Sell Partnership
- Modeling Partnership in BPEL
- Variables
- Variable Properties
- Correlation Sets
- BPEL Activities
- Standard Attributes
- BPEL Basic Activities - invoke
- BPEL Basic Activities - receive
- BPEL Basic Activities - assign
- BPEL Basic Activities - throw
- BPEL Basic Activities - rethrow
- BPEL Basic Activities - wait
- BPEL Basic Activities - empty
- BPEL Basic Activities - exit
- Structured Activities - sequence
- Structured Activities - if
- Structured Activities - while
- Structured Activities - repeatUntil
- Structured Activities - pick
- Structured Activities - flow
- Structured Activities - forEach
- BPEL Scopes
- BPEL Handlers