Solution Architecture Training:
Enterprise Integration Patterns and Solutions for Architects

(3 Days)

Overview

This training course covers a wide range of integration solutions based on proven enterprise integration patterns that will aid the students in designing the architecture of complex interconnected business systems.

Audience

IT architects and designers who want to learn about Enterprise Integration Patterns and Solutions.

Objectives

This class combines theory with labs for hands-on, practical experience. After completing this class, the students will be able to apply the acquired knowledge in practice as well as make well-informed decisions in the area of enterprise integration within their organizations.

Prerequisites

Participants should have general understanding of Enterprise IT technologies.

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. Service-Oriented Architecture (SOA) Data Patterns

- SOA Data Service Patterns
- Pattern Template
- Data Federation Pattern: Synopsis
- Data Federation Pattern: Benefits
- Data Federation Pattern: Context
- Data Federation Pattern: Solution
- Data Federation Pattern: Solution Architecture

- Data Federation Pattern: Considerations
- Data Consolidation Pattern: Synopsis
- Data Consolidation Pattern: Benefits
- Data Consolidation Pattern: Context
- Data Consolidation Pattern: Solution
- Data Consolidation Pattern: Considerations
- Data Cleansing Pattern: Synopsis
- Data Cleansing Pattern: Benefits
- Data Cleansing Pattern: Context
- Data Cleansing Pattern: Solution
- Data Cleansing Pattern: Considerations

Chapter 3. Enterprise Service Bus (ESB)

- SOA and the ESB Pattern
- Loose Coupling
- Service Invocation
- Business Process
- Data Integration
- Enterprise Service Bus (ESB)
- Legacy System Integration
- Unsupported Protocol
- The Role of ESB in SOA
- ESB: Software Artifacts
- ESB: Software Artifacts
- Business Process
- Business Process: Example
- Minimum ESB Capabilities: Integration
- Minimum ESB Capabilities: Communication
- Minimum ESB Capabilities: Service Interaction
- Minimum ESB Capabilities: Management
- Security and ESB

Chapter 4. Introduction to IBM Integration Designer (IID) v8.0

- IBM Integration Designer (IID) v8.0
- SCA Basics
- Wiring Example
- Items Developed in IID
- The Project Structure
- Working With Shared Components
- Using the IDE
- The Test Server
- The Build Process
- Exporting Applications
- Module Versioning

Chapter 5. Service-Oriented Architecture (SOA) Patterns

- SOA Patterns
- Asynchronous Queuing Pattern: Problem
- Asynchronous Queuing Pattern: Solution
- Asynchronous Queuing Pattern: Implementation
- Asynchronous Queuing Pattern: Illustration
- Event-Driven Messaging Pattern: Problem & Solution
- Event-Driven Messaging Pattern: Implementation
- Event-Driven Messaging Pattern: Illustration
- Reliable Messaging Pattern: Problem & Solution
- Reliable Messaging Pattern: Implementation
- Reliable Messaging Pattern: Illustration
- Adapter Pattern: Problem & Solution
- Adapter Pattern: Implementation
- Adapter Pattern: Illustration
- Canonical Protocol Pattern: Problem & Solution
- Canonical Protocol Pattern: Implementation
- Canonical Protocol Pattern: Illustration
- Protocol Bridging Pattern: Problem
- Protocol Bridging Pattern: Implementation
- Protocol Bridging Pattern: Illustration
- Canonical Data Format Pattern: Problem & Solution
- Canonical Data Format Pattern: Implementation
- Canonical Data Format: Illustration
- Data Transformation Pattern: Problem & Solution
- Data Transformation Pattern: Implementation
- Data Transformation: Illustration
- Schema Centralization Pattern: Problem
- Schema Centralization Pattern: Solution
- Schema Centralization Pattern: Implementation
- Schema Centralization: Illustration
- Intermediate Routing Pattern: Problem
- Intermediate Routing Pattern: Solution
- Intermediate Routing Pattern: Implementation
- Intermediate Routing: Illustration
- Decoupled Contract Pattern: Problem & Solution
- Decoupled Contract Pattern: Implementation
- Decoupled Contract Pattern: Illustration
- Service Encapsulation Pattern: Problem & Solution
- Service Encapsulation Pattern: Implementation
- Service Encapsulation Pattern: Illustration
- Service Decomposition Pattern: Problem & Solution
- Service Decomposition Pattern: Implementation

Chapter 6. Enterprise Application Integration (EAI) Patterns

- Enterprise Integration Patterns
- EAI Patterns Summary
- Messaging Systems: Overview
- Pattern: Pipes and Filters
- Root Pattern: Message Channel
- Root Pattern: Message Router
- Root Pattern: Message Translator
- Root Pattern: Message Endpoint
- Root Pattern: System Management
- Monitoring Credit Bureau Example

Chapter 7. Master Data Management (MDM)

- What is Master Data Management?
- A typical data management scenario
- Why do you need MDM?
- Why do you need MDM in SOA?
- What role does MDM play in SOA?
- MDM and SOA shared principles
- MDM and SOA Governance
- MDM products
- Implementing MDM in an SOA

Chapter 8. EA Lessons Learned and Anti-Patterns

- Key EA Lessons Learned
- Three Critical Changes EA Must Make To Survive Hard Times
- Scott Ambler's EA Anti-Patterns
- EA Anti-Patterns

Chapter 9. API Management

- Drivers Towards Business Inter-connectivity
- View of the NetBeans IDE Web Services Facet
- Facebook Graph API Explorer
- APIs Proliferation
- API Management Defined
- API Management Disclaimers
- The Traditional Point-to-point Integration Example
- It Raises Some Questions …
- API Management Conceptual Diagram
- What Else is Needed?
- Gartner Research Stats
- API Management Offerings
- The Mashery API Management System Overview
- WSO2 API Management Main Components

Chapter 10. REST Services

- Many Flavors of Services
- Understanding REST
- Principles of RESTful Services
- REST Example – Create
- REST Example – Retrieve
- REST Example – Update
- REST Example – Delete
- REST Example – Client Generated ID
- SOAP Equivalent Examples
- REST Example – JSON
- REST vs SOAP Communication
- More REST vs SOAP
- REST vs SOAP Summary
- Famous RESTful Services

Chapter 11. Introduction to JAX-RS

- The JAX-RS Specification
- The Resource Class
- A Bunch of Annotations
- @Path
- Using Path Parameters
- HTTP Method Binding
- More Complex Paths
- Configuring JAX-RS for Deployment

Chapter 12. Designing a RESTful Service

- The Design Methodology
- Ingredients of a Service Operation Interface
- What Constitutes a REST Resource
- Resource Identifiers
- MIME Types
- HTTP Methods
- Request and Response Body Structure
- Example Operation Interface Document
- Formal (Machine-Readable) Specifications

Chapter 13. Defining the Cloud

- Wikipedia Entry
- Cloud Computing at a Glance
- Gartner Research on Cloud
- Electrical Power Grid Service Analogy
- The NIST Perspective
- Five Characteristics
- On-demand Self-Service (NIST Characteristic)
- Broad Network Access (NIST Characteristic)

- Resource Pooling (NIST Characteristic)
- Rapid Elasticity (NIST Characteristic)
- Measured Service (NIST Characteristic)
- The Three Cloud Service Models (NIST)
- The Cloud Computing Spectrum: IaaS, PaaS and SaaS
- The Four Cloud Deployment Models (NIST)
- The NIST Cloud Definition Framework
- A Hybrid Cloud Diagram
- Cloud Deployment Model Dynamics

Chapter 14. Cloud Services

- Defining Cloud Services
- User-Cloud Interaction
- Cloud Service Characteristics
- The Typical Cloud Services
- Application Services
- Messaging Application Service
- Email Application Service
- Cache Application Service
- Specialized Application Services
- AWS Analytics Systems
- Google App Engine (GAE) MapReduce Service
- Use Cases for MapReduce Jobs
- Integration Platform as a Service (IPaaS)
- Storage Services
- Object Storage
- Archive Storage
- Relational Storage
- NoSQL Storage
- Some AWS Storage Services
- Data Warehouses in the Cloud
- Cloud Utility Services
- Scalability and HA of Your Applications in the Cloud
- The Auto-scaling Service
- Monitoring Services
- Configuring Instance Health Check in AWS
- Amazon Web Services Integration Diagram
- Google App Engine (GAE) Services Integration Diagram
- Microsoft Azure Services
- Comparing Cloud Service Stacks

Chapter 15. AWS Simple Storage Service

- What is AWS Simple Storage Service (S3)
- AWS Storage
- Regions
- Getting started with S3
- Using BitTorrent
- Standard Durability
- More on Buckets
- Bucket Configuration Domains
- Bucket Permissions
- Authorization of REST Requests
- Adding Cross-Origin Resource Sharing Configuration
- Event Notifications
- The Requester Pays Option
- The Object Key
- Object Versioning
- Object Lifecycle Configuration
- Amazon S3 Data Consistency Model
- Observable Data Consistency Behaviors
- Eventually Consistent Reads vs Consistent Reads
- Amazon S3 Security
- Example of Object Encryption
- S3 Use Case: Backup and Archiving
- Another S3 Use Case: Static Web Hosting
- More on Static Web Hosting
- S3 Use Case: Disaster Recovery
- AWS S3 Pricing
- Storage Pricing
- Request Pricing
- Data Transfer Pricing
- Amazon S3 Transfer Acceleration
- How to Enable Transfer Acceleration
- Enabling Transfer Acceleration in S3 Console
- Amazon S3 SLA Definitions
- Amazon S3 SLA Service Commitment

Chapter 16. Designing Cloud Solutions

- "Good/Not-so-Good" Use Cases for the Cloud
- Design the Cloud Service Interface
- Practical Observations and Rules
- Analysis and Design (A&D) Best Practices
- A&D Best Practices - Prototyping
- A&D Best Practices – System Partitioning
- A&D Best Practices - Leveraging Cloud Platform Services
- Using Asynchronous Communication Patterns
- A&D Best Practices - Preempt Possible Data Corruption
- Caching
- A&D Best Practices - Staying Hands-On
- Be Aware of the CAP Theorem Constraints
- The CAP Triangle
- Cloud Layering
- Content Services
- Separate Static Content from Dynamic Content
- Logic Services
- Utility - Security Services
- Out-of-the-Box Security Service Example
- Layering Example
- Architecting for HA in AWS (Same Data Center)
- Architecting for HA in AWS (Different AZs)

Chapter 17. AWS Solution Architecture Patterns

- AWS Architecture Center
- List of Reference Architectures
- High Availability Solution Architecture Blueprint
- Log Analysis Solution Architecture Blueprint Summary
- Scalable Web App Solution Architecture Blueprint Summary
- Simplified Web App Solution Architecture Blueprint
- Architecting for AWS: Design for Failure
- Go with SOA and Asynchronous Communication Patterns
- Batch Processing with SQS
- Secure Your Applications
- Securing your Web Application Example
- Other Security Considerations
- Operational Checklists for AWS
- Excerpts from Operational Checklists

Chapter 18. Microservices

- What is a "Microservice"?
- One Helpful Analogy
- SOA - Microservices Relationship
- ESB - Microservices Relationship
- Traditional Monolithic Designs and Their Role
- Disadvantages of Monoliths
- Moving from a Legacy Monolith
- When Moving from a Legacy Monolith
- The Driving Forces Behind Microservices
- How Can Microservices Help You?
- The Microservices Architecture
- Utility Microservices at AWS
- Microservices Inter-connectivity
- The Data Exchange Interoperability Consideration
- Managing Microservices
- Implementing Microservices
- Embedding Databases in Java
- Microservice-Oriented Application Frameworks and Platforms

Lab Exercises

Lab 1. Basic Mediation Flow Development
Lab 2. Using Mediation Primitives
Lab 3. Develop a Simple RESTful Service
Lab 4. Extracting Information from a HTTP Request
Lab 5. Designing a RESTful Service
Lab 6. Using S3 for Website Hosting
Lab 7. Using Amazon Simple Queue Service
Lab 8. Provisioning Tomcat Web Server in EC2